

## 1.

## INTRODUCTION

Valuation is the process of estimating the value of an asset. There are many ways to do valuation of an asset; but it is a challenging task and investment's success

significantly depends on the analyst's ability to determine the correct value.

## 2.

## VALUE DEFINITIONS AND VALUATION APPLICATIONS

## 2.1

## What is Value?

## 2.1.1) Intrinsic Value

The intrinsic value of an asset is the value of the asset, which is calculated based on "hypothetically" complete understanding of the asset's investment characteristics.

- **Abnormal/ Alpha Return:** It is an excess risk adjusted return
- **Ex post alpha:** It is the historical holding period return minus the historical return on similar assets.
- **Ex-Ante Alpha:** Forward looking Alpha is called ex-ante alpha.

Active investment manager estimates abnormal/alpha return to evaluate his/her returns. The difference between market price & his/her intrinsic value is called "mispricing". i.e.

$$V_E - P = (V - P) + (V_E - V)$$

$V_E - P$ : Mispricing  
 $V - P$ : True Mispricing  
 $V_E - V$ : Valuation Error

where,

$V_E$  = estimated value  
 $P$  = market price  
 $V$  = intrinsic value

This explains that difference b/w estimated value & prevailing market price is the sum of two components.

- True mispricing:** True (non- observable) intrinsic value "V" – observed market price "P"
- Valuation Error:** It is an error in the estimate of intrinsic value i.e. estimated intrinsic value " $V_E$ " - true (non-observable) intrinsic value "V"

- Good quality forecasts are essential for successful active security selection, which means that expectations should be correct and should be different from consensus expectations.
- However, even if accurate forecast is made and all risk adjustments are taken into account, uncertainty in the equity valuation persists. Moreover, it is not necessary that market price will converge to perceived intrinsic value within the investor's

investment horizon.

## 2.1.2) Going-Concern Value and Liquidation Value

**Going Concern Value:** It is a value based on the assumption that the company will continue its business activities into the foreseeable future.

**Liquidation Value:** It is a value based on the situation of financial distress i.e. when a company is dissolved and its assets are sold individually.

- **Orderly Liquidation Value:** Value of company's assets also depends on the time available to liquidate them i.e. value of an asset (e.g. inventory) which can be sold during a longer period of time will be **greater than** the value of "perishable" inventory that has to be liquidated immediately.

## 2.1.3) Fair Market Value and Investment Value

**Fair market Value:** It is the price at which an asset (or liability) would change hands between both a willing buyer and a seller when none of them is under compulsion to buy/sell and both have complete market information. This value is often used for assessing taxes and for financial reporting purposes.

**Investment Value:** It is a value based on the requirements, expectations and potential synergies of the acquisitions to a specific buyer (investor).

- **Accounting standards definition of Fair value:** Fair value is the amount for which an asset could be exchanged, a liability could be settled, or an equity instrument granted could be exchanged between knowledgeable, willing parties in an arm's length transaction.

## 2.1.4) Definition of Value: Summary

For the purpose of public equity valuation, analysts mostly use **Intrinsic value definition**.

## 2.2

## Applications of Equity Valuation

Equity Valuation is done for the following purposes:

- Selecting Stocks:** Stock is selected by examining the valuation of stock i.e. whether a stock is fairly priced,

overpriced or underpriced relative to its current estimated intrinsic value.

- 2. Inferring (Extracting) Market Expectations:** By estimating Market prices (valuation), analysts can determine market expectations about the future performance of companies.
- 3. Evaluating Corporate Events:** Valuation tools help analysts to access the impact of corporate events i.e. mergers, acquisitions, divestitures, spin-offs, and going private transactions.
- 4. Provide Fairness Opinions:** Valuation provides the fairness opinion to the interested parties i.e. in mergers etc.
- 5. Evaluating Business strategies and models:** Valuation helps in determining the effect of business strategies on share value.
- 6. Communicating with analysts and shareholders:** Valuation concepts facilitate communication among shareholders, management & analysts on the issues related to company value.
- 7. Appraising Private Businesses:** Valuation also helps in determining the value of private businesses e.g. in case of IPOs etc.

**8. Share based payment (compensation):** Equity valuation tools are also used to estimate share-based payments e.g. restricted stock grants etc.

#### Definitions:

**Merger:** A general term used for the combination of two companies.

**Acquisition:** Combination of two companies where one company is acquirer & the other the acquired.

**Divestiture:** In divestiture, company sells a major component of its business.

**Spin-off:** When the company separates one of its component businesses & transfers the ownership of the separated business to its shareholders.

**Leveraged Buyout:** An acquisition which involves large amount of debt (leverage) and often acquired company's assets are taken as collateral.

**IPOs:** Initial Public Offering is the initial issuance of common stock to the general public.

### 3. THE VALUATION PROCESS

It is a five steps process:

- 1. Understanding the business** i.e. with the help of industry & competitive analysis, financial statements and other disclosures.
- 2. Forecasting Company Performance** i.e. by forecasting sales, earnings, dividends etc.
- 3. Selecting the appropriate valuation model** i.e. based on the characteristics of the company and purpose of valuation.
- 4. Converting forecasts to a valuation** i.e. generating output of valuation models and doing judgmental analysis.
- 5. Applying the valuation conclusions** i.e. based on the output (in step 4), providing an opinion about the price, giving recommendation about an investment etc.

analyst while valuing an airline company determines the degree to which that company deals with these expenses and their effect on future cash flows.

**Three major factors needed to understand a business are:**

1. Attractiveness of the industries in which the company operates
2. Company's relative competitive position within its industry and its competitive strategy
3. How well has the company executed its strategies and what are its prospects for future execution

**1. Attractiveness of the industries in which the company operates:** Industry profitability is one of the important factors in determining a company's profitability. Basic economic factors i.e. supply and demand provide a fundamental framework to understand an industry. Analysts should also stay up to date regarding management, technological & financial developments and demographic trends.

**Industry Structure:** it includes

- a) industry's underlying economic & technical characteristics
- b) trends affecting that structure

#### 3.1 Understanding the Business

##### 3.1.1) Industry and Competitive Analysis

Industry knowledge helps analysts in understanding the basic characteristics of the markets in which the company operates, e.g. for an airline industry, labor and jet fuel costs are the two major expenses. Thus, an

Porter's Five forces that determine industry structure are as follows:

- 1) **Intra-industry rivalry:** Lower the rivalry among industry participants, greater is the industry profitability. Lower rivalry exists when (i) there are few competitors (ii) Companies with good brand identification exist.
- 2) **Threat of New Entrants:** Lower the threat of new entrants, greater the industry profitability. Lower threat of new entrants occurs due to relatively high entry barriers and results in less competition.
- 3) **Threat of Substitutes:** Lower the threat of substitutes, greater the industry profitability. Low threat of substitutes exists when (i) there are few potential substitutes (ii) high switching costs for consumers.
- 4) **Bargaining power of Suppliers:** Lower the bargaining power of suppliers, greater the industry profitability. Suppliers have low power when number of suppliers is large.
- 5) **Bargaining power of Buyers:** Lower the bargaining power of buyers, greater the industry profitability. Buyers have low bargaining power when number of buyers is large and the quantity consumed by each buyer is small relative to total supply.

*For detail: Volume 4, Reading 26.*

2. **Company's relative competitive position within its industry and its competitive strategy:** It is determined by the level & trend of the company's market share within its industry.

Porter's three generic corporate strategies for achieving above-average performance are:

- 1) **Cost Leadership:** being the lowest cost producer while offering products comparable to those of other firms.
- 2) **Differentiation:** selling unique products or services so that firm can demand higher (premium) prices from buyers.
- 3) **Focus:** focus on particular target segment or segments of the industry to seek competitive advantage. It is further divided into two strategies:

- (i) **Cost Focus:** Cost leadership i.e. targeting a segment based on cost basis.
- (ii) **Differentiation Focus:** differentiating product/service and targeting niche.

**Business model:** It refers to how a company makes money i.e.

- Which customers it targets
- What products/services it will sell
- How it delivers those products/services
- How it finances its activities

3. **How well has the company executed its strategies and what are its prospects for future execution:** In order to achieve competitive success, company needs to have both appropriate strategies and competent execution. Company's financial statements provide a basis for evaluating company's performance against its strategic objectives and help in forecasting company's future performance.

### 3.1.2) Analysis of Financial Reports:

- Financial ratio analysis is useful for established/mature companies.
- Company with a strong brand tends to have substantial advertising expenses (higher selling expenses as % of sales) but also relatively higher prices (higher gross margins).
- Nonfinancial measures are important to consider in newer companies valuation or companies creating new products.

**Practice:** Example 2,  
Volume 4, Reading 26.



### 3.1.3) Sources of Information

- Regulator mandated disclosures
- Regulatory filings (MD&A, Form 10-k, Form 20-F etc.)
- Company press releases (related to announcement of periodic earnings, company performance, etc.)
- Investor relations materials
- Third party sources i.e. industry organizations, regulatory agencies, & commercial providers of market intelligence.

### 3.1.4) Considerations in Using Accounting Information

#### Quality of Earnings Analysis:

It is a term used to evaluate the sustainability of the companies' performance and economic reality of the reported information.

- Non-recurring events i.e. positive litigation settlements, temporary tax reductions, gains/losses on sales of non-operating assets are considered to be of lower quality than earnings derived from core business operations.
- Cash component is more persistent than the accrual component of earnings; therefore, higher proportion of accruals is considered as a sign of lower earnings quality.
- If growth rate of assets is greater than growth rate of sales, it is a sign of aggressive accounting on part of company.

*See: Exhibit 1, Volume 4, Reading 26*



**Practice: Example 3 & 4,  
Volume 4, Reading 26.**

**Risk Factors that signal possible future negative surprises are:**

- Poor quality of accounting disclosures & lack of discussion of negative factors.
- Existence of related party transactions.
- Existence of excessive officer, employee, director loans.
- High management/director turnover.
- Excessive pressure on company personnel to meet revenue/earnings targets, meet debt covenants or earnings expectations.
- Material non-audit services performed by audit firm, disputes with auditors, changes in auditors.
- Management/director's compensation based on profitability or stock price.
- Fear of loss of market share or declining margins.
- History of persistent late filings, securities law violations etc.

### 3.2 Forecasting Company Performance

It is based on:

- 1) Economic environment in which the company operates
- 2) Company's own operating and financial characteristics

There are two approaches to forecast company's performance:

**i) Top-down Forecasting Approach:**



**ii) Bottom-up Forecasting Approach:**



- Analysts should consider both qualitative & quantitative factors in financial forecasting and valuation.

### 3.3 Selecting the Appropriate Valuation Model

Two broad types of valuation models (based on going concern assumption) are

- 1) Absolute Valuation Models
- 2) Relative Valuation Models

#### 3.3.1) Absolute Valuation Models

It is a model that specifies an asset's intrinsic value. It provides a point estimate of value, which is compared with market price. PV/Discounted CFs model is a type of absolute valuation model.

**PV/Discounted CFs model:**

It derives value of common stock as the PV or discounted value of expected future CFs. In private business appraisal, such models are known as **Income Models of Valuation**. It is further divided into following types:

**a) Dividend Discount Model:** Dividends represent cash flows available to shareholders; Present value models based on dividends are called Dividend discount models.

**b) Free cash flow to Firm Model (FCFF):** It defines CFs at the company level i.e. cash available after reinvestment in Fixed assets, Working capital and covering operating expenses. Present value models based on these CFs are called Free cash flow to firm models.

**c) Free Cash Flow to Equity Model (FCFE):** It defines CFs net of payments to providers of debt; In FCFE model, value is based on these CFs.

**d) Residual Income Models:** They are based on accrual accounting earnings in excess of the opportunity cost of generating those earnings i.e.  $NI - (\text{cost of equity} \times \text{Beginning value Equity})$

**e) Asset based Valuation:** It values a company on the basis of the market value of the assets or resources it controls.

Valuing Common stock based on PV models involves greater uncertainty than in case of bonds due to following reasons:

- i) Unlike bond, CFs stream owed to common stockholders is unknown.
- ii) Common stock has no maturity date, thus, forecasts extend infinitely into the future.
- iii) Significant uncertainty exists in estimating an appropriate discount rate.
- iv) Issues related to Corporate control & value of unused assets need to be taken into account.

### 3.3.2) Relative Valuation Models

It estimates an asset's value relative to that of another asset (benchmark). Benchmark price multiple is based on either a similar stock or average price multiple of group of stocks. The application of relative valuation is called the method of comparables.\*

It includes

**a) Price multiples:** P/E, P/S, P/CF, P/BV etc.

A stock selling at  $P/E < P/E$  of another comparable stock (comparison is made on the basis of earnings growth rate, risk etc.) → then stock is **relatively** undervalued (good buy).

*The terms undervalued & relatively undervalued have different meanings. When a comparison is made to stock's own intrinsic value, then we use the term "under/over valued". While comparing a stock with another stock, we use the term "Relatively under/over valued"*

**b) Enterprise multiples:** EV/CF, EV/S, EV/EBITDA, etc.

#### Relative Valuation Strategies:

- **Conservative investing Strategies:** Overweighting (underweighting) relatively undervalued (overvalued) assets with reference to benchmark weights.
- **Aggressive investing Strategies:** Short selling perceived overvalued assets & buying undervalued assets. This strategy is also known as **relative value investing/relative spread investing**. e.g. **Pairs Trading** "buying relatively undervalued stock & selling short the relatively overvalued stock".

#### \*Advantages of method of Comparables:

- It is a simple method.
- It is based on market prices.
- It is based on economic principle (similar assets should sell at similar prices).
- Analysts can easily communicate the results of an

absolute valuation in terms of a price or enterprise multiple.

### 3.3.3) Valuation of the Total Entity and Its Components

**Sum-of-the-parts Valuation:** A value that is estimated by adding the estimated values of each of the company's businesses as if each business were an independent going concern is known as sum-of-the-parts valuation. It is also known as **break-up value** or **private market value**.

**Conglomerate Discount:** It refers to the discount that is applied to the stock of company operating in multiple unrelated businesses compared to stock of companies with narrower focuses. This discount is applied due to the following reasons:

- a) Investing capital in unrelated businesses does not maximize shareholder value.
- b) Usually poorly performing companies tend to expand by investing in unrelated businesses.

**Practice:** Example 7,  
Volume 4, Reading 26.



### 3.3.4) Issues in Model Selection & Interpretation

Model that is selected for valuation purposes should be:

- i) **Consistent with the characteristics of the company being valued:** e.g. relative valuation is suitable for bank (as it is largely composed of marketable assets) but not appropriate for service based company.
- ii) **Appropriate given the availability and quality of data:** e.g. if a company has never paid dividends then dividend discount model is not appropriate to value this company.
- iii) **Consistent with the purpose of valuation and analyst's perspective:** e.g. investor seeking a controlling equity share (> 50%) will need to value the company using FCF model (free CFs) rather than dividends discount model.

## 3.4 Converting Forecasts to a Valuation

There are two important aspects of converting forecasts to valuation:

- i) **Sensitivity Analysis:** It determines how changes in a single input at a time would affect the outcome.
- ii) **Situational Analysis:** It determines how changes in a particular set of input variables at a time would affect the outcome.

**Situational Analysis deals with specific issues i.e.**

- **Control premium:** It is a premium paid to get controlling position in a company.
- **Lack of marketability discount:** It is a discount applied to the values of non-publicly traded stocks to compensate investors for the lack of public market/marketability.
- **Illiquidity discount:** It is a discount applied to illiquid stocks (shares with less market depth). It is also applied when the amount of stock that investor wishes to sell is large relative to that stock's trading volume.

**Sell-side Analysts:** Analysts who work at brokerage firms.

**Brokerage Firms:** They sell investments and services to institutions such as investment management firms.

**Brokerage:** It is a business of acting as agents for buyers or sellers, usually in return for commissions.

**Buy-side analysts:** Analysts who work for investment management firms, trusts, bank trust departments & similar institutions.

**3.5****Applying the Valuation Conclusions:  
The Analyst's Role & Responsibilities**

- Applying Valuation conclusions depends on the purpose of the valuation.
- Analysts valuation activities help their clients achieve investment objectives, contribute to the efficient functioning of capital markets and help shareholders in monitoring management's performance.
- In valuation activities, analysts are required to adhere to both standards of competence and standards of conduct.

**Practice:** Q7 & Q8 Reading 26 &  
FinQuiz Item-set ID# 10981.



## 2.

## RETURN CONCEPTS

The return on an investment is a basic component in evaluating an investment.

### Rate of Return measures:

#### 2.1 Holding Period Return (HPR)

HPR is the return from investing in an asset over a specified time period. It is the sum of two components:

- i) **Dividend yield or investment income** =  $(D_H/P_0)$
- ii) **Price appreciation return** =  $(P_H - P_0)/P_0$ . It is also known as **capital gains yield**.

- The holding period can be of any length.
- It is usually assumed that CF (Dividend) comes at the end of the period.

$$r = \{(D_H + P_H) / P_0\} - 1 \quad \text{OR} \quad r = \{(P_1 - P_0 + CF_1) / P_0\} - 1$$

where,

$D_H/CF_1$  = dividend per share at time t  
 $P_H/P_1$  = share price per share at time t  
 H = holding period  
 T = time

Here it is assumed that share is purchased at  $t = 0$  and sold at  $t = H$

### Annualizing Holding period return:

For example 1 day holding period return = 0.74%  
 Annualized Holding period Return =  $(1.0074)^{365} - 1$   
 = 13.7472 or 1,374.72%

#### 2.2 Realized and Expected (Holding Period) Return

##### 1) Realized Holding Period Return:

Return that is achieved in the **past** is Realized Return. Selling price and dividends for holding period in the past are known at  $t = 0$ . Thus, realized return is estimated using that selling price and dividend.

##### 2) Expected Holding period Return:

It is an anticipated return over **future** time period. This return is based on the **expected dividend yield and expected price appreciation** of the investor. Different investors have different expected returns for an asset.

#### 2.3 Required Return

It is the minimum level of expected return that an investor requires in order to invest in the asset over a specified time period, given the asset's riskiness. It represents the opportunity cost for investing and gives

an investor a threshold value for being fairly compensated for the risk of the asset. i.e.

If  $E(R) > RR$  → asset is undervalued  
 If  $E(R) < RR$  → asset is overvalued

- It can be viewed as the issuer's marginal cost for raising additional capital.
- Following two factors should be considered in determining fair compensation for risk:
  - i) asset risk perceptions of Investor
  - ii) risk aversion level of Investor

**Expected Alpha** = Expected return – Required Return

- When an asset is efficiently priced, expected alpha = 0.

**Realized Alpha (Ex-post alpha)** = (Actual holding period return) – (Contemporaneous Required Return)

- When investors have homogenous expectations (i.e. in CAPM model),  $RR = E(R)$
- When Current Price < Perceived value,  $E(R) > RR$ , as long as the investor expects price to converge to value over his/her time horizon.
- When Current Price > Perceived value,  $E(R) < RR$ , as long as the investor expects price to converge to value over his/her time horizon.

#### 2.4 Expected Return Estimates from Intrinsic Value Estimates

When an asset is mispriced (e.g. is **15% overvalued**), there are following 5 cases which may occur over the investment time horizon:

The mispricing may

- i) **Increase** (asset may become more overvalued)
- ii) **Stay the same** (asset may remain 15% overvalued)
- iii) **Be partially corrected** (e.g. the asset may become overvalued by 5%)
- iv) **Be corrected** (price changes to exactly reflect value)
- v) **Reverse** or be **overcorrected** (asset may become undervalued).

##### 3) Expected Holding period return:

It is approximately the sum of two returns: the required return and a return from convergence of price to intrinsic value.

- When an asset's intrinsic value  $\neq$  market price, the

investor expects to earn

**RR + return from the convergence of price to value**

- When an asset's intrinsic value = price, the investor expects to earn **RR** only.

$$E(R_t) = r_t + \{(V_0 - P_0) / P_0\}$$

where,

$r_t$  is the periodic required rate of return,

$\{(V_0 - P_0) / P_0\}$  = estimate of the return from convergence over the period

#### Example:

$$V_0 = \$80$$

$$P_0 = \$73.50$$

$$r_t = 7.4\%$$

$$\{(V_0 - P_0) / P_0\} = (80 - 73.50) / 73.50 = 8.84\%$$

If the price is expected to converge in 1 year, the investor would earn = 7.4% + 8.84% = 16.24%

But if price is expected to converge in 9 months,  $r_t = (1.074\%)^{(9/12)} - 1 = 5.50\%$

Thus,  $E(R) = 5.50\% + 8.84\% = 14.34\%$

$$\text{Target Price} = \text{Current Price} \times (1 + \text{RR}) - \text{Dividend}$$

**Practice:** Example 1, Volume 4, Reading 27.



## 2.5

### Discount Rate

It is a rate used to find PV of a cash flow.

In order to estimate intrinsic value, a required return based on marketplace variables (investment characteristics) is used rather than a required return, which is influenced by personal characteristics of an investor.

## 2.6

### Internal Rate of Return (IRR)

It is the discount rate that equates the discounted expected future cash flows to the asset's current price. IRR can be used as RR if the **markets are efficient** and PV model (i.e. growth rate assumption etc.) is correct.

We know,

$$\text{Intrinsic value} = \text{Year ahead dividend} / (\text{RR} - \text{Expected Dividend growth rate})$$

**OR**

$$\text{Intrinsic value} = D_1 / (k - g)$$

If the asset is fairly priced, i.e. market price = intrinsic value, we can solve for IRR as follows:

$$\text{RR (or IRR)} = (\text{Year ahead dividend} / \text{market price}) + \text{Expected dividend growth rate}$$

**OR**

$$k = (D_1 / P_0) + g$$

## 3.

### THE EQUITY RISK PREMIUM

The equity risk premium is the incremental return (premium) that investors require for holding equities rather than a risk free asset. Since the investor's returns depend only on the investment's future cash flows, equity risk premium is based on expectations for the future (like RR).

**Required return on equity** = Current expected risk-free return + Equity risk premium

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

Here, equity risk premium is adjusted for the share's particular level of systematic risk measured by Beta.

- Required return on Share  $i$  = Current expected risk-free return + Equity risk premium + (-) Other risk premium (discounts) appropriate for  $i$ .**

This equation is primarily used in the valuation of private businesses.

There are 2 Approaches to Equity Risk Premium Estimation:

- 1) Historical estimates
- 2) Forward looking estimates

## 3.1

### Historical Estimates

It is calculated as the mean value of the differences between broad-based equity market index returns and government debt returns over some selected sample period.

#### Assumption of the model:

Parameters that describe the return-generating process are assumed to remain constant over the past & into the future & thus, returns are assumed to be stationary. Historical equity risk premium estimation is based on the selection of:

- 1) **Equity index to represent equity market returns:** (broad based market value weighted indices are typically used).

**2) Time period for computing the estimate:** A common choice is to use the longest reliable returns series available, which helps to increase precision. However, extending the length of the data can introduce problems of nonstationarity, which is a less serious problem than the case in which the risk premium is shifted to a permanently different level.

**3) Type of mean calculated:** There are 2 ways for computing the mean.

- a) Geometric Mean (GM) = compounded annual excess return of equities over the risk free return
- b) Arithmetic mean (AM) = sum of the annual return differences / number of observations in the sample

**4) Proxy for the risk-free return:** 2 types of risk free rates can be used.

- a) Long term government bond return
- b) Short-term government debt instrument (T-bill) return.

### 3.1.1) Arithmetic or Geometric Mean

#### Important Concepts:

The GM is always  $<$  AM given any variability in returns.

$$GM = AM$$

when the returns for all periods are equal.

#### Advantages of using AM:

- i) AM best represents the mean return in a single period, thus, it appears to be a model-consistent choice for CAPM & multifactor models.
- ii) AM is assumed to be an unbiased estimator of the expected terminal value (with serially uncorrelated returns and a known underlying arithmetic mean).

#### Advantages of using GM:

- i) It is preferable to use GM for estimating multi-period returns.
- ii) Practically, AM overestimates the expected terminal value, thus, GM provides a better choice as it gives an unbiased expected terminal value of an investment.
- iii) Equity risk premium estimates based on GM have tended to be closer to the supply-side and demand-side estimates than AM.

### 3.1.2) Long-Term Government Bonds or Short-Term Government Bills

The yield curve is typically upward sloping (long term bond yields are typically  $>$  short term yields). Thus, risk-free rate based on a bond  $>$  risk-free rate based on a bill and equity risk premium will be smaller. However, with an

inverted yield curve, the short-term yields  $>$  long term yields and the RR based on T-bill can be much higher.

Usually, long-term government bond rate in premium estimates is favored. But Long-term government bonds are assumed to have more risks i.e. interest rate risk.

For multi-period valuation, use of a long-term government bond rate in premium estimates is preferable. While a risk premium based on T-bill rate is more suitable for discounting 1-year ahead cash flows.

For practical purposes, the analyst should try to match the duration of the risk free rate measure to the duration of the asset being valued.

For dealing with issues i.e. distortions related to liquidity and discounts/premiums relative to face value, the yield on "on the run" issues is preferred.

### 3.1.3) Adjusted Historical Estimates

#### Advantages of Historical Estimate:

- i) Historical estimate is a familiar & popular choice of estimation when reliable long-term records of equity returns are available.
- ii) This method provides an unbiased estimate of average return over the long term when no systematic errors are made in forming expectations.
- iii) It is an objective method since it is based on data.
- iv) These estimates are straightforward to compute.

#### Disadvantages & adjustments required:

Adjustments can be upward or downward.

Survivorship bias\* tends to inflate historical estimates of the equity risk premium. Thus, historical estimate is adjusted downward to remove this bias.

*\*It arises when poorly performing or defunct companies are removed from membership in an index, so that only relative winners remain. Also, backfilling of index returns using "survived" companies leads to positive survivorship bias into returns.*

A series of positive inflation and productivity surprises may result in a series of high returns that increase the historical mean estimate of the equity premium. In such cases, historical estimate should be adjusted downward.

**Practice:** Example 2,  
Volume 4, Reading 27.



## 3.2

### Forward Looking Estimates

Equity risk premium estimates based on forward looking or Ex-Ante data are known as Forward looking estimates.

**Advantages:**

- i) Ex-Ante estimates are less subject to data biases e.g. survivorship bias.
- ii) It does not rely on an assumption of stationarity.

**Disadvantages:**

- i) These estimates are subject to potential errors related to financial and economic models and biases in forecasting.
- ii) Needs to be updated periodically as new estimates are generated.

**Types of Forward looking Estimates:****3.2.1) Gordon Growth Model Estimates (GGM)**

**Intrinsic value** = Year ahead dividend / (RR – Expected Dividend growth rate)  
 $= D_1 / (k - g)$

The assumptions of this model are suitable for mature developed equity markets i.e. Eurozone, North America etc. since:

- Year ahead dividend is easily predictable for Broad based equity indices.
- The expected dividend growth rate may be estimated based on consensus analyst expectations of the earnings growth rate for an equity market index.

**Disadvantage:** The Gordon Growth model assumes a steady growth rate, which is not appropriate to use in an emerging market.

**GGM equity risk premium estimate** = Dividend yield on the index based on year-ahead aggregate forecasted dividend & aggregate market value + consensus long-term earnings growth rate – Current long-term government bond yield.

- Usually, Five-year horizon is used for long-term growth rate.
- GGM estimates generally change through time.

The above equation assumed a stable rate of earnings growth, but for rapidly growing economies, the assumption multiple earnings growth stages is more appropriate. For this purpose, we use the following equation to compute IRR.

**Equity index price** = PV Fast Growth stage ( $r$ ) + PV transition ( $r$ ) + PV Mature Growth stage ( $r$ )

- IRR is computed out of this equation.
- Using IRR as RR on equities and subtracting a

government bond yield gives an equity risk premium estimate.

**3.2.2) Macroeconomic Model Estimates (Supply side models):**

Equity risk premium can be estimated using a relationship between macroeconomic and financial variables.

- Such models are reliable for developed markets where public equities represent a relatively large share of economy.
- Disadvantage: The supply-side model does not work well in an emerging market.

**Equity risk Premium** =  $\frac{\{(1 + \text{EINFL}) (1 + \text{EGREPS}) (1 + \text{EGPE}) - 1\}}{+ \text{EINC}}$  - Expected risk-free return

where,

- **EINFL** = expected inflation.

*It is forecasted as  $\{(1 + \text{YTM of 20-year maturity T-bonds}) / (1 + \text{YTM of 20-year maturity TIPS})\} - 1$ .*

- **EGREPS** = expected growth rate in real earnings per share.

*This should approximately track the real GDP growth rate.*

- **Real GDP growth rate** = labor productivity growth + labor supply growth rate  
*Labor supply growth rate = population growth rate + increase in labor force participation rate*

- **EGPE** = expected growth rate in P/E ratio.

*When markets are efficient, this factor is zero i.e.  $1 + \text{EGPE} = 1 + 0 = 1$ .*

*When analyst views under/over valuation, +ve /-ve value is used.*

- **EINC** = expected income component.

*This includes both dividend yield and reinvestment return.*

**3.2.3) Survey Estimates:**

This method is based on asking a sample of people (experts) about their expectations.

- This model can be applied in an emerging market.
- These estimates are easy to obtain but there can be wide disparity between opinions.

## 4.

## THE REQUIRED RETURN ON EQUITY

The RR (required return) can be calculated using the following models.

## 4.1 Capital Asset Pricing Model (CAPM)

**Required Return on share i** = Current expected risk-free return + Bi (equity risk premium)

- Equity risk premium = Expected return on market portfolio – risk-free return
- A broad value-weighted equity market index is used to represent the market portfolio.
- Beta measures systematic/market risk.
- Beta = Covariance of returns with market returns / market portfolio variance.
- This equation should hold in equilibrium i.e. supply = demand.
- When market is integrated, we can obtain international CAPM or world CAPM in which risk premium is relative to a world market portfolio.

**Assumptions of the model:**

- Investors are risk averse.
- Investors make decisions based on mean return & variance of returns.
- Investors evaluate only the systematic risk of their portfolio.

**Disadvantage:** CAPM depends on just one factor, thus, CAPM may represent low explanatory power.

## 4.1.1) Beta Estimation for a Public Company:

The stock's unadjusted or raw historical beta is estimated by a least squares regression of the stock's returns on the index's returns. The actual values of beta estimates are influenced by several choices:

- The choice of the index used to represent the market portfolio. E.g. S&P 500, NYSE composite etc.
- The length of data period and the frequency of observations i.e. mostly 5 years of monthly data are used. For fast growing markets, 2 years of weekly observations are used.

In order to get more accurate future beta, raw beta is adjusted in the following way:

$$\text{Adjusted Beta} = (2/3) (\text{Unadjusted beta}) + (1/3) (1.0)$$

Thus, raw beta is adjusted towards mean value of 1.0. Some vendors adjust it toward the peer mean value rather than mean value of 1.0.

**Practice:** Example 3, 4 & 5,  
Volume 4, Reading 27.



## 4.1.2) Beta Estimation for Thinly Traded Stocks and Nonpublic Companies

Market price observations for nonpublic companies (with thinly traded stocks) are not easily available. Thus, the analyst can estimate their beta indirectly on the basis of the public peer's beta.

Steps to estimate a Beta for a Non-traded Company:

- 1) Select the benchmark (comparable) (either an individual company or median/average industry beta)
- 2) Estimate benchmark's beta
- 3) Unlever the beta of the public (benchmark) company so that it represents only the systematic risk.
- 4) Then, beta is re-levered to reflect the financial leverage of the nonpublic company (Subject Company).

$$B_u = [1 / \{1 + (D/E)\}] \times B_e$$

where,

$B_u$  = unlevered beta

$B_e$  = equity beta including effects of leverage

$D/E$  = Debt to equity ratio of **benchmark (public)** company

$$B_e' = [1 + (D'/E')] \times B_u$$

where,

$B_e'$  = Subject company's equity beta

$D'/E'$  = Debt to equity ratio of **subject** company

**Assumptions:**

- debt is of high grade i.e. debt's beta = 0
- level of debt adjusts to the target capital structure weight

**Practice:** Example 6,  
Volume 4, Reading 27.



## 4.2

## Multifactor Models

Multifactor models add a set of risk premia (e.g. Arbitrage pricing theory APT models) unlike CAPM, which adds a single risk premium.

$$r = R_f + (\text{Risk premium})_1 + (\text{Risk Premium})_2 + \dots + (\text{Risk premium})_k$$

where,

- $\text{Risk premium}_i = (\text{Factor sensitivity})_i \times (\text{Factor risk premium})_i$ .
- *Factor sensitivity or factor beta is the asset's sensitivity to a particular factor (holding all other factors constant).*
- *Factor risk premium for factor i is the expected return in excess of the risk-free rate with a unit sensitivity to factor i and zero sensitivity to all other factors.*

**Disadvantage:** Multifactor model does not ensure greater explanatory power and it is an expensive and complex method.

#### Types of multifactor models:

##### 4.2.1) The Fama-French Model (FFM):

It is the most widely known non-proprietary multifactor models. It is a 3-factor model and these factors are as follows:

- i) Market factor
- ii) Size factor
- iii) Value factor

$$r_i = R_f + \beta_{i,\text{market}} \times \text{RMRF} + \beta_{i,\text{size}} \times \text{SMB} + \beta_{i,\text{value}} \times \text{HML}$$

where,

- **RMRF** =  $R_M - R_f$
- **SMB** (small minus big) = average return on 3 small-cap portfolios – average return on 3 large-cap portfolios. This represents a small cap return premium. If the issuer's market cap is small, size beta is +ve.
- **HML** (high minus low) = average return on 2 high book-to-market portfolios – average return on 2 low book-to-market portfolios. HML represents a value return premium. If share has high book to market ratio, the value beta is +ve.
- For both the size and value betas, zero is the neutral value. Whereas market beta's neutral value is 1.
- Short-term risk free rate is used as expected risk free rate in FFM.

#### Important concepts:

- High book-to-market shares represent **value bias** and low book-to-market represent a **growth bias**.
- When Market factor beta (sensitivity) is +ve the stock is more risky relative to the market.
- When Size factor beta (sensitivity) is +ve small-cap stock
- When Value factor beta (sensitivity) is +ve value oriented stock
- SMB represents the mean return to shorting large-cap shares and investing the proceeds in small-cap shares. Similarly, HML represents shorting low

book to market shares and investing the proceeds in high book to market shares.

- The beta on market in the above equation is generally not exactly the same as the CAPM beta for a given stock. It can be > or < CAPM beta.
- Small market cap companies may be subject to risk factors such as less ready access to private & public credit markets and competitive disadvantages. High book-to-market may represent shares with depressed prices because of exposure to financial distress.
- FFM views the return premiums to small size and value as compensation for bearing types of systematic risk.
- Equity returns are subject to a very high degree of randomness over short horizons.

**Practice: Example 7,**  
**Volume 4, Reading 27.**



##### 4.2.2) Extensions to the Fama-French Model

##### Pastor-Stambaugh Model (PSM):

It is a 4 factor model i.e.

- i) Market factor
- ii) Size factor
- iii) Value factor
- iv) Liquidity Factor

This model adds a 4<sup>th</sup> factor to FFM i.e. LIQ which represents excess returns from investing in a portfolio of low liquidity stocks and shorting high liquidity stocks.

$$r_i = R_f + \beta_{i,\text{market}} \times \text{RMRF} + \beta_{i,\text{size}} \times \text{SMB} + \beta_{i,\text{value}} \times \text{HML} + \beta_{i,\text{liq}} \times \text{LIQ}$$

- |                           |   |                                           |
|---------------------------|---|-------------------------------------------|
| • Liquidity Beta = 0      | ➔ | Average liquidity (no impact on RR)       |
| • Positive Liquidity Beta | ➔ | Below-average liquidity (it increases RR) |
| • Negative Liquidity Beta | ➔ | Above-average liquidity (it decrease RR)  |

**Practice: Example 8,**  
**Volume 4, Reading 27.**



**Liquidity:** It is related to the ease and potential price impact of the sale of an equity interest into the market. It is a function of

- a) Size of the interest.
- b) Depth & breadth of the market
- c) Market's ability to absorb a block (large position) without an adverse impact on price.

**Marketability:** It relates to the right to sell an asset.

#### 4.2.3) Macroeconomic and Statistical Multifactor Models

**\*Fundamental Factor Model:** The FFM and PSM are examples of one type of a range of models for required return that are based on multiple Fundamental factors i.e. factors that are attributes of the stocks or companies themselves e.g. the price to earnings ratio, leverage etc.

**\*Macroeconomic Factor Model:** Here factors are economic variables that affect the expected future Cash flows of companies and/or discount rate that is appropriate to determine their PV.

**\*Statistical Factor Models:** Here, statistical methods are applied to historical returns to determine portfolios of securities.

**\*Refer to reading 53, Portfolio Concepts, Volume 6, Curriculum, for detail of these models.**

**Five factor BIRR Model:** It is a type of macroeconomic factor model. It includes the following 5 Factors:

**1) Confidence Risk:** the unexpected change in the return difference between risky corporate bonds and government bonds, both with maturities of 20 yrs.

- When confidence is high.....investors require less premium (vice versa)

**2) Time Horizon Risk:** Unexpected change in the return difference between 20-yr government bonds & 30-day T-bills. It represents investor's willingness to invest for the long term.

**3) Inflation Risk:** The unexpected change in the inflation rate.

- Nearly all stocks have –ve exposure to this factor i.e. returns decrease as inflation rises.

**4) Business cycle Risk:** The unexpected change in the level of real business activity.

- Positive surprise means expected growth rate of the economy measured in constant dollars has increased.

**5) Market Timing Risk:** It represents that portion of the total return of an equity market proxy (e.g. S&P 500) that remains unexplained by the first four risk factors. Almost all stocks have positive exposure to this factor.

$r_i = \text{T-bill rate} + (\text{sensitivity to confidence risk} \times \text{confidence risk premium}) - (\text{sensitivity to time horizon} \times \text{time horizon risk premium}) - (\text{sensitivity to inflation risk} \times \text{inflation risk premium}) + (\text{sensitivity to business cycle risk} \times \text{business cycle risk premium}) + (\text{sensitivity to market timing risk} \times \text{market timing risk premium})$

#### 4.3 Build-Up Method Estimates of the Required Return on Equity

$r_i = r_f + \text{Equity risk premium} \pm \text{One or premia (discounts)}.$

##### 4.3.1) Build-Up Approaches for Private Business Valuation

$r_i = r_f + \text{Equity risk premium} + \text{Size premium}_i + \text{Specific company premium}_i$

This method is widely used for thinly traded and closely held businesses.

- The level of the size premium is inversely related to the size of the company being valued.
- Company specific risk premium includes a premium for unsystematic risk of the subject company.
- It does not use Betas to adjust for the exposure to a factor.

**Disadvantages:**

- Build-up method relies on historical estimates, so it wouldn't work well when there is minimal historical data.
- The build-up model typically uses historical values as estimates. Historical data may no longer be relevant to the current situation.

##### 4.3.2) Bond yield Plus Risk Premium (BYPRP)

It is a type of Build Up method, which can be used for companies with publicly traded debt.

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

- Risk premium is often 3% to 4%
- The YTM on the company's Long term Debt includes:
  - A real interest rate and a premium for expected inflation, which are also factors embodied in a government bond yield.
  - A default risk premium: it captures factors such as profitability, the sensitivity of profitability to the business cycle, and leverage (operating & financial).

**Practice: Example 9, Volume 4, Reading 27.**



#### 4.4 The Required Return on Equity: International Issues

Issues in estimating the required return of equity in a global context includes:

**Exchange rates:** An investor is concerned with returns and volatility stated in terms of his/her own currency. The proper method of compensating for changes in exchange rates is to calculate the required return in the home currency, then adjust the return using forecasts for changes in the exchange rate.

**Data and model issues in emerging markets:** Due to difficulty of required return and risk premium estimation in emerging markets, following 2 approaches are used to estimate equity risk premium.

**i) Country Spread Model:** It uses developed market as a benchmark and adds a premium for emerging market risk. The country spread model is designed to adjust data from emerging markets for comparison with data from developed markets. It is not used to calculate an expected return.

**Equity risk premium estimate** = Equity risk premium for a developed market + Country premium

where,

Country premium represents a premium associated with the expected greater risk of the emerging market compared to the benchmark developed market. It is calculated as

**Country Premium** = yield on emerging market bonds (denominated in the currency of the developed market) – yield on developed market government bonds

**Example:**

Country premium (yield differential b/w U.S. dollar denominated government of Russian bonds & U.S. treasury bonds) = 13%

U.S. equity risk premium = 4.5%

Russian equity risk premium = 4.5% + 13% = 17.5%

**ii) The country risk rating model:** This model provides a regression-based estimate of the equity risk premium based on the empirical relationship between developed equity market returns and International Investor's semi-annual risk ratings for those markets. The estimated regression is then used with the risk ratings for less developed markets to predict the required return for those markets.

### 5. THE WEIGHTED AVERAGE COST OF CAPITAL

**Cost of Capital:** The overall required rate of return of a company's suppliers of capital (debt & equity). It is estimated using the company's after-tax weighted average cost of capital (WACC).

**WACC** =  $\{MVD / (MVD + MVCE)\} \times r_d (1 - \text{Tax rate}) + \{MVCE / (MVD + MVCE)\} \times r$

where,

MVD = current market value of debt

MVCE = current market value of (common) equity

MVD + MVCE = total market value of the firm

$r_d (1 - \text{Tax rate})$  = after tax cost of debt.  $r_d$  is estimated using expected YTM of the company's debt based on current market values.

$r$  = cost of equity. It is estimated using any of the methods presented in this reading for estimating required return on equity.

Tax rate = Marginal tax rate is used instead of effective tax rate, since; marginal tax rate better reflects a company's future cost in raising funds.

- Total Firm value using PV model is estimated using the cost of capital. In order to get the value of equity, market value of debt is subtracted from firm value. i.e.

**Firm Value = value of debt + value of equity**

**Value of Equity = Firm Value – value of Debt**

- Company's capital structure may change over time, for this reason, it is preferred to use Target weights instead of current market value weights when calculating WACC.
- No tax adjustment is done for cost of equity, since, payments to shareholders i.e. dividends are not tax deductible.
- The RR on equity ↑ as leverage ↑
- The RR on equity ↓ as liquidity ↑

**Practice:** Example 10, Volume 4, Reading 27.



**6. DISCOUNT RATE SELECTION IN RELATION TO CASH FLOWS**

1. **Cash flow to equity** (cash flow after more senior claims e.g. promised payments on debt and taxes) is discounted using **cost of equity ( $r$ )**.
2. **Cash flow to the firm** is discounted using cost of capital (**WACC**).
3. Nominal discount rates must be used to discount nominal CFs.
4. Real discount rates must be used to discount real CFs.

*Practice Question 1 from CFAI Curriculum, Volume IV, Reading 27 as it very well explains the return measures concept.*

Practice:  
FinQuiz Item-set ID# 15600.

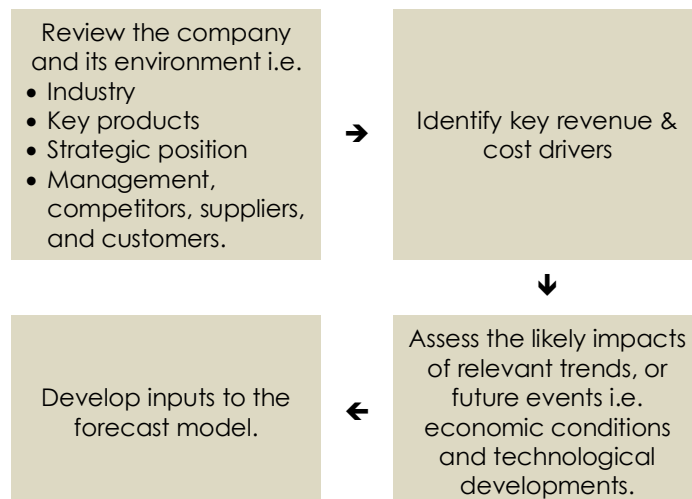


## 1.

## INTRODUCTION

Fundamental equity valuation requires an analyst to make financial forecasts because value is a function of future expected cash flows and these cash flows must be forecasted. Building an effective forecast model requires a thorough understanding of a company's business, management, strategy, external environment, and historical results.

## Steps of developing a financial forecast model



## 2.

## FINANCIAL MODELING: AN OVERVIEW

The majority of value of a company depends on its ability to generate future cash flows which in turn depends on the amount of net income generated by the business\*. Therefore, in financial modeling, first of all income statement is modeled. The income statement also helps in modeling a company's balance sheet and cash flow statement.

\*However, for banks and insurance companies, companies' overall value depends on value of existing assets and liabilities on the balance sheet.

## 2.1 Income Statement Modeling: Revenue

The first step in income statement modeling is to determine the important components of a company's revenue. Company's revenue can be analyzed in three ways:

**1) Geographical analysis:** It involves classifying company's revenue into various geographical "buckets" (groupings). These buckets can be narrowly defined (i.e. by individual countries) or broadly (i.e. by region of the world). A global analysis is useful for analyzing overall growth of global companies operating in multiple countries with different underlying growth rates or competitive environments.

*Percentage of sales that come from a specific geographic region = Sales of a particular region / Total sales of a company*

**2) Business segment analysis:** It involves classifying a company's revenue into various business segments. Information about various business segments can be obtained from segment disclosures in companies' financial statements. In a business segment analysis, an analyst must analyze the materiality and relevance of a company's chosen segmentation of its business.

**3) Product line analysis:** It involves classifying a company's revenue into different product lines that, in combination, account for most of the company's sales.

**Practice:** Example 1, Volume 4, Reading 28.



The second step in income statement modeling is to project future revenue. The future revenue can be projected using three approaches i.e.

**1) Top-down approach (2.1.1):** In a top-down approach, industry sales are forecasted on the basis of their historical relation with some macroeconomic indicator(s) i.e. real GDP. Company's market share is forecasted on the basis of historical market share and company's future competitive position.

There are two common top-down approaches to modeling revenue:

**i. Growth relative to GDP growth:** In a growth relative to GDP growth approach, the growth rate of nominal gross domestic product (GDP) is forecasted and then industry and company growth are estimated relative to projected GDP growth rate.

- Volumes can be projected by forecasting real GDP growth.
- Prices can be projected by forecasting inflation.

The company's projected revenue growth can be expressed as % point premiums or discounts to the nominal GDP growth rate depending on a company's position in the industrial life cycle or business cycle sensitivity e.g. growth rate of 150 bps above the nominal GDP growth rate.

The company's projected revenue growth can also be expressed in relative terms e.g. company's revenue growth rate 10% faster than that of GDP growth rate of 5%. In absolute terms, the forecast % change in revenue will be 5%  $(1 + 0.10) = 5.5\%$  or 50 bps higher.

**ii. Market growth and market share:** In a market growth and market share approach, an analyst forecasts the growth in particular markets and then based on these forecasts, project the subject company's market share.

*Company's projected revenue growth = Projected market share × Projected sales of a given product market*

- Regression analysis (with product market revenue as dependent variable and GDP as independent variable) can also be used if the product market revenue has a predictable relationship with GDP.

**2) Bottom-up approach (2.1.1-2.1.3):** In a bottom-up approach, sales of a unit within the company (i.e. individual product lines, locations, or business segments) are forecasted first; and then, an analyst estimates future total revenue for the company by aggregating the projections for the individual products or segments. Total revenue for a product market, industry or the overall economy is forecasted by aggregating the projections for individual companies.

There are three common bottom-up approaches to modeling revenue:

**a) Time series:** It involves fitting a trend line to historical data and then projecting sales over the desired time-frame using regression analysis. With regard to future revenue growth rate, the historical growth rates are either assumed to continue or future sales are assumed to decline linearly from current rates

to some long-run. Time-series methods can also be used in a top-down analysis to project GDP growth.

**b) Return on capital:** This method involves projecting revenue based on balance sheet accounts. It is typically used by financial companies to project their interest revenue.

Interest revenue = Loan × Average interest rate

**c) Capacity-based measure:** It involves projecting revenue based on same-store growth and sales related to new stores. It is typically used by retail companies.

**3) Hybrid approach:** It is a combination of both top-down and bottom-up approach. It is the most commonly used approach and it helps identifying implicit assumptions or errors that may arise from using a single approach.

In a hybrid approach:

- An analyst projects market growth and market share using a top-down analysis.
- Then, using these estimates, analyst projects revenue for individual product lines or business segments using a bottom-up analysis.

Sum of forecast segment revenue = Segment market size × Market share for all segments

**Volume and price approach:** In a volume and price approach, volumes (i.e. the number of products sold or the number of customers served) and average selling price are separately forecasted.

Revenues forecasts are the most important forecasts as many items on the income statement and balance sheet are often assumed to increase proportionally with sales e.g. inventories, receivables, variable costs etc.

Then, as sales increase, items that are tied to sales also increase, and the values of those items for a particular year are estimated as percentages of the forecasted sales for that year.

**Practice:** Example 2, Volume 4, Reading 28.



## 2.2 Income Statement Modeling: Operating Costs

Analyzing the company's cost structure helps an analyst to estimate the efficiency potential and margin potential of a subject company.

The projections about company's operating costs and the assumptions used in costs/expense projections should be consistent with the company's revenue projection. For example, if a relatively high-margin

product is expected to grow faster than a relatively low-margin product, then the overall margin should be forecasted to improve. Similarly, in the supermarket sector the projected floor square footage underlying the revenue projections should be the same as the floor space projections underlying the unit selling expense forecasts.

### Three approaches to forecasting company's operating costs:

- 1) **Top-down approach:** In a to-down method, an analyst first projects the overall level of inflation or industry-specific costs and then makes assumptions about the individual company's operating costs using those estimates.
- 2) **Bottom-up approach:** In a bottom-up method, an analyst forecasts about the segment-level margins, historical cost growth rates, historical margin levels, or the costs of delivering specific products.
- 3) **Hybrid approach:** It is a combination of both top-down and bottom-up elements.

### Types of costs:

- **Fixed costs** are costs that are not directly related to future investment in property, plant, and equipment (PP&E) and to total capacity growth. In general, fixed costs are assumed to grow at their own rate, based on an analysis of future PP&E growth.
- **Variable costs** are costs that are directly related to revenue growth.
 
$$\text{Forecasted variable costs} = \% \text{ of revenue}$$

Or

$$\text{Forecasted variable costs} = \text{Unit volume} \times \text{Unit variable costs}$$

Mostly, it is difficult for an analyst to forecast future revisions to cost estimates associated with future benefit obligations and pensions. Other factors that lead to uncertainty of cost estimates include competitive factors and technological developments.

### Important to Note:

- When gross margins increase with sales levels, it indicates that the subject company has economies of scale (i.e. average costs per unit of a good or service produced decrease with an increase in volume). Factors that can lead to economies of scale include:
  - Higher level of production
  - Greater bargaining power with suppliers
  - Lower cost of capital
  - Lower per unit advertising expenses
- When a subject company's cost of goods sold as a percentage of revenue is relatively low than that of its competitor, it indicates that the subject company has economies of scale in cost of goods sold.
- When a subject company's average SG&A per

square foot (SG&A / Average selling area square footage in millions sq. ft) increases relative to competitor, it indicates that service levels at the subject company are higher.

- When performance of a subject company is consistently better than that of its competitor, it indicates it has more satisfied customer base.

**Practice: Example 3,  
Volume 4, Reading 28.**



### 2.2.1) Cost of Goods Sold

The cost of goods sold (COGS) typically represents the largest cost for manufacturing and merchandising companies; therefore, a small error in COGS can have a significant effect on the forecasted operating profit. For a manufacturing company,

$$\text{COGS} = \text{Raw materials} + \text{Direct labor} + \text{Overhead used in producing the goods}$$

- COGS is inversely related to gross margin i.e. as COGS increases, gross margin falls. COGS is more directly reflected by gross margins than that of profit margins.
- Analyzing the subject company's COGS as a % of sales helps analysts to evaluate whether a company is gaining or losing market share. Falling COGS as a % of sales implies higher gross margins, indicating that the company is gaining market share.

An analyst should evaluate the impact of unhedged changes in input costs on company's operating profit, e.g. impact of unhedged changes in jet fuel costs on an airline company's operating profits, impact of changes in input prices on the commodity-driven companies' gross margins etc.

When jet fuel costs increase significantly → increase in variable costs is greater than increase in revenue growth → consequently, an airline company's operating profits decrease.

For developing short-term forecasts for these costs, it is necessary to breakdown both the costs and sales into volume and price components.

A company can mitigate the impact of sudden shocks in input costs on its profitability by using different hedging strategies. A general hedging strategy employed by the companies is usually disclosed in the footnotes of the annual report. A company can mitigate the impact of increasing sales prices on sales volume by gradually increasing sales price.

### Gross margins may vary among companies within a sector due to two reasons:

- Differences in the business operations and business

models. For example, in a franchised retailing business model, the wholesaler has lower gross margins as it offers products to franchisees with a small mark up; however, most of the operating costs are incurred by the franchisee.

- *Competitive advantage or superior competitive position*

### Important things to Note:

- When a subject company has high sales growth rate in the region with the largest amount of sales, it indicates high future revenue growth rate.
- When the operating margin of a subject company in the largest and fastest growing region is less than the overall average, it indicates declining operating margin.
- When a subject company has high sales growth rate in a lower margin region, it indicates low future operating margin growth rate.

### 2.2.2) Selling, General, and Administrative Expenses

Selling, general, and administrative expenses (SG&A) are another major type of operating costs. Unlike COGS, SG&A expenses are not directly related to revenue of a company.

SG&A expenses include:

**Wages and salaries:** These expenses are variable and linked to sales e.g. wages and salaries increase with additional sales people and/or an overall increase in wages and benefits for the sales force.

**Overhead costs for employees:** These expenses primarily depend on the number of employees at the head office and supporting IT and administrative operations rather than short-term changes in the level of sales.

**Research and development expense:** These expenses are also fixed in nature and are not linked to sales.

**Practice:** Example 4 & 5,  
Volume 4, Reading 28.



## 2.3 Income Statement Modeling: Non-operating Costs (Section 2.3.1-2.3.2 and 2.4)

Most important line items stated on the income statement below operating profit include:

**Interest income:** It depends on the amount of cash and investments on the balance sheet and the rates of return earned on investments. It is a major component of revenue for financial companies i.e. banks and insurance companies.

**Interest expense:** It is a financial expense and it depends on the level of debt on the balance sheet and the

interest rate on the debt. To estimate future interest expense, an analyst should evaluate the debt level of the subject company, the maturity structure of the company's debt and the corresponding interest rates, the subject company's cash position as well as the impact of changes in interest rates on the market value of company's debt and interest expense in the future.

- When interest rate on debt is variable, the interest would be determined from existing market rates.
- When interest rate on debt is **fixed**, finance costs are estimated as:

**Finance costs** = (Fixed interest rate on debt × Gross debt at the beginning of the period) – (Interest income rate × cash position at the beginning of the period)

**Gross debt** = Long-term financial debt + Short-term financial debt + Accrued interest

**Net debt** = Gross debt – Cash and cash equivalents

**Effective interest rate** = Interest expense / Average gross debt

- Using an effective interest rate to project future finance costs is a preferred approach as it takes into account the company's equity structure.

**Interest rate on average cash position** = Interest income / Average cash position

**Interest rate on the average net debt** = Net interest expense / Average net debt

**Taxes:** Like interest expense, taxes are the major component of non-operating costs. Taxes primarily depend on jurisdictional regulations. They may also vary depending on the nature of a business as some companies may enjoy special tax treatment, e.g. R&D tax credits or accelerated depreciation of fixed assets.

Generally, there are three types of tax rates:

- Statutory tax rate:** It is a tax rate that is applied to a company's domestic tax base.
- Effective tax rate:** It is a tax rate calculated as the reported tax amount on the income statement divided by the pre-tax income. *The effective tax rate is used for forecasting earnings on the income statement.*

- The effective tax rate may be different from the statutory tax rate due to many reasons including tax credits, withholding tax on dividends, adjustments to previous years, and expenses not deductible for tax purposes.
- When a company operates in more than one region, then its effective tax rate will be the weighted average of the tax rates of the different countries.

- **Important to Note:** If a subject company's effective tax rate is consistently lower than statutory rates or the effective tax rates reported by competitors, then an analyst should consider the impact of any future changes in taxes in forecasting future tax expenses. An analyst should also adjust for any one-time events and for any volatile components in estimating future tax rates e.g. if the income from equity method investees represent a significant portion of pre-tax income of company but is also highly volatile, then the future effective tax should be estimated by excluding that income.

iii. **Cash tax rate:** It is the tax rate calculated as actually paid (cash tax) divided by pre-tax income. *The cash tax rate is used for forecasting cash flows.* The cash taxes are typically different from the reported taxes due to timing differences between accounting and tax calculations. Differences between cash taxes and reported taxes result in a deferred tax asset or a deferred tax liability.

**Deferred tax asset/liability = Profit and loss tax amount – Cash flow tax amount**

**Minority interest or income:** It refers to the portion of income or expense that does not belong to the parent company; rather, it belongs to an affiliate. If a consolidated affiliate generates profits (losses), minority interest is deducted from (added to) parent company's net income.

**Share count:** It refers to shares issued and outstanding. Share count changes as a result of dilution associated with stock options, convertible bonds etc.; issuance of new shares; and share repurchases. Future share count changes can be estimated by analyzing the market price of a stock. In order to project share issuance and repurchases, an analyst should analyze a company's capital structure.

**Unusual charges:** Typically, analysts do not consider unusual charges in their projections because these charges are difficult (if not impossible) to forecast.

**Practice:** Example 6 & 7,  
Volume 4, Reading 28.



## 2.5 Balance Sheet and Cash Flow Statement Modeling

Projections of balance sheet line items are very closely linked to income statement projections. For example,

- The assets shown on the balance sheet must increase if sales are expected to increase i.e. as sales increase, companies generally need more inventory. The accounts receivable also increase proportionately with sales, unless a company changes its credit policy or has a change in its types

of customers.

- As assets increases, liabilities (i.e. accounts payable, accruals, and debt) and equity (i.e. retained earnings, common stock and preferred stocks) must also increase because the additional assets must be financed.
- In the long-run, there is a close relationship between sales and fixed assets for all companies i.e. increasing sales demands increasing capacity.

### Projecting working capital accounts:

- Future **Accounts receivable** can be projected using Days sales outstanding ratio (DSO) i.e.

Projected Accounts receivable = Forecasted annual sales (assuming all credit sales) × (Assumed Days sales outstanding/ 365)

- Future **inventory** can be projected using an inventory turnover ratio i.e.

Projected inventory = Assumed COGS / Assumed Inventory turnover ratio

**Projecting working capital using Top-down analysis:** It involves projecting working capital and efficiency ratios based on analysis of overall economy e.g. if an analyst projects that economy-wide retail sales will decrease unexpectedly in future, then he/she will assume a slower inventory turnover across the retail sector.

**Projecting working capital using Bottom-down analysis:** It involves projecting working capital and efficiency ratios based on company's historical efficiency ratios. Generally, if efficiency ratios are held constant, working capital accounts tend to change proportionally with the related income statement accounts.

**Projecting long-term assets:** Changes in long-term assets i.e. property, plant, and equipment (PP&E) primarily depend on capital expenditures and depreciation.

- Projections about future depreciation depend on historical depreciation and disclosure about depreciation schedules.
- Projections about future capital expenditures depend on judgment of the future need for new PP&E. Capital expenditures can be of two types:
  - i. *Maintenance capital expenditures:* Capital expenditures that are needed to sustain the current business are referred to as maintenance capital expenditures. To account for inflation, maintenance capital expenditure forecasts should be greater than that of depreciation.
  - ii. *Growth capital expenditures:* Capital expenditures that are needed to expand the business are called growth capital expenditures.

**Projecting Company's future capital structure:** A company's future capital structure can be forecasted using leverage ratios (i.e. debt-to-capital, debt-to-equity, and debt-to-EBITDA). In estimating future capital structure, an analyst should consider historical company practice, management's financial strategy, and the capital requirements implied by other model assumptions.

**Rate of return on invested capital (ROIC):** After modeling income statements and balance sheets, analysts can estimate the rate of return on invested capital (ROIC), which measures the profitability of the capital invested by the company's shareholders and debt holders. It is calculated as follows.

#### ROIC

**= Net operating profit after taxes (NOPLAT) / Invested Capital**

**= Earnings before interest expense / (Operating assets – Operating liabilities)**

- To increase ROIC company must either increase earnings, or reduce invested capital, or both.
- ROIC is a better measure of profitability than return on equity because it is *not affected by a company's degree of financial leverage*.
- When a company has consistently high ROIC, it indicates that the company has a competitive advantage.

**Return on capital employed (ROCE):** ROCE is a pre-tax measure i.e. it is ROIC before tax. It is calculated as follows.

$$\text{ROIC} = \text{Operating profit} / \text{Capital employed (i.e. debt and equity capital)}$$

- Since ROCE is a pre-tax measure, it can be used to compare profitability of companies with different tax structures.

#### Important things to Note in Modeling Balance sheet line items:

- When a subject company generates profits and retains all of its earnings, it will result in increase in equity on the balance sheet; and in order to maintain a constant debt-to-capital ratio, the company will need to increase its debt.
- When depreciation is expected to increase more than that of capital expenditures, net PP&E is

expected to decline. Declining net PP&E implies that growth in total invested capital will be less than that of earnings; consequently, ROIC will increase.

**Practice: Example 8,  
Volume 4, Reading 28.**



## 2.6 Scenario Analysis and Sensitivity Analysis

It is relatively easy to estimate the value of a large, mature, slow growing, non-cyclical businesses with well-capitalized balance sheets. By contrast, greater uncertainty is involved in estimation of valuation of new ventures, companies exposed to technological or regulatory change, companies with significant operating or financial leverage.

Instead of estimating a single intrinsic value for a company, analysts should estimate a range of intrinsic values using sensitivity or scenario analysis. Typically, the range is approximately symmetrical with the base case estimate of intrinsic value representing the middle point of the distribution with similar probabilities of upside and downside outcomes. The width of the tails will depend on the level of uncertainty regarding forecasts. E.g. a large, mature, slow-growing company would have a steep distribution with relatively thin tails that reflects a relatively low probability of extreme values.

- **Sensitivity analysis** involves changing one assumption at a time to evaluate the effect on the subject company's estimated intrinsic value.
- **Scenario analysis** involves changing multiple assumptions (e.g. for revenue growth, operating margin, and capital investment) simultaneously to evaluate the effect on the subject company's estimated intrinsic value.

The value of the equity could be zero when there is a high probability that company's cash flows will be insufficient to meet its interest and principal payments.

Similarly, the value of the equity could be very little or zero and will highly depend on the success of the product if the subject company has a single untested product. Value of such companies should be estimated using a probability-weighted average of the various scenarios.

## 3. THE IMPACT OF COMPETITIVE FACTORS ON PRICES AND COSTS

An industry's long-run profit potential depends on the structure of the industry as determined by the five competitive forces. The intensity of competitive environment and its impact on company's costs and

price projections can be analyzed by using **Michael Porter's "five forces" framework**. These forces include:

**1) Threat of substitute products:** When close substitutes exist, buyers will switch to substitutes in response to price increase for the product.

- The more close substitutes a product has and the lower the switching costs → the more **elastic** its demand and as a result, the company has lower pricing power.
- Opposite occurs when there are few substitutes and switching costs are high.

**2) Intensity of rivalry among incumbent companies:** The intensity of rivalry among incumbent/current companies in the industry depends on industry's competitive structure i.e.

- The more competitive the industry is → the more intense the rivalry among existing firms will be → and as a result the lower the companies' ability will be to raise prices, to provide less product for the price, and to earn more profits. As a result, the less price competition among the firms will be.
- Opposite occurs when there is less intense rivalry.
- When an industry has cost advantages and increasing volumes, price competition is limited.

**3) Bargaining power of suppliers:** Suppliers have the most bargaining power when they are small in number and when they are the suppliers of unique/scarcely inputs. As a result, it is costly to switch to another supplier.

- The greater the bargaining power of suppliers → the more ability they have to raise prices or restrict the supply of key inputs to a company → the more downward pressure on profitability a company faces.

**4) Bargaining power of customers:** Buyers have the most bargaining power when they are few in number and when they purchase a major portion of company's output.

- The greater the bargaining power of buyers → the more influence they have on the intensity of competition, and as a result, the lower the company's ability to maintain or increase prices.
- Generally, the bargaining power of buyers is lower in markets with a fragmented customer base, a non-standardized product, and high switching costs for the customer.

**5) Threat of new entrants:** The threat of new entrants to the industry depends on barriers to entry and the expected reactions of existing firms to a new competitor i.e.

- The lower the barriers to entry → the easier it is to enter the industry → the more competitive the industry will be (i.e. reduced market concentration) → the greater the internal (industry) rivalry; the less pricing power companies have, and as a result, the smaller the cost-price margins.
- Opposite occurs when there are relatively high barriers to entry i.e. the higher the barriers, higher the profitability.

**In summary:**

**Below-average revenue growth is forecasted for a company when:**

- Fixed costs are high;
- Consumption is declining;
- Customer base is highly consolidated, giving customers greater bargaining power;
- Price competition is intense;
- Threat of new entrants is high;

**Companies have limited pricing power when an industry:**

- Is highly fragmented and without price leadership;
- Has limited growth;
- Has high exit barriers;
- Has high fixed costs;

It is important to note that when market is very fragmented and without price leadership, companies cannot offset their declining volumes by increasing prices.

Government is not considered as the sixth force because government involvement is neither inherently good nor bad for industry profitability. In fact, the impact of government on competitive environment can be best analyzed by evaluating the impact of specific government policies on the five competitive forces.

**Practice: Example 9,  
Volume 4, Reading 28.**



## 4.

## INFLATION AND DEFLATION

### 4.1 Sales Projections with Inflation and Deflation

#### 4.1.1) Industry Sales and Inflation or Deflation

The impact of inflation or deflation on revenue and expenses vary among companies and may also vary depending on the categories of revenue and expenses within a single company.

- The higher the company's ability to pass on higher input costs to customers by increasing prices → the higher and more stable profits and cash flow it has relative to competitors. A company has higher ability to increase prices to compensate for costs inflation when:
  - It is a dominant player in the industry;
  - Customer base is fragmented;
- In general, companies with strong branding or proprietary technology are able to pass on higher input costs to customers by increasing prices.
- The magnitude of increase in prices to compensate for costs inflation also vary among countries; e.g. as the increase in prices of grain will have greater impact on the expenses of a specialist retail bakery chain than that of a diversified standard supermarket chain, the bakery will increase its prices by a higher percentage than the grocer in response to increased grain prices.
- When due to intense competition it is difficult for the company to increase its prices in response to increasing input costs, a company can sustain its profit margins in the short-run by reducing advertising and promotional spending. However, this strategy may weaken company's brand name in the long-run.

In an **inflationary** environment with price elastic demand for a product (i.e. due to availability of greater cheaper substitutes), increasing prices too soon results in decrease in volumes in the short-run; whereas increasing prices too late will lead to decrease in profit margin.

In a **deflationary** environment when input costs are low, decreasing prices too soon results in fall in profit margins in the short-run whereas decreasing prices too late results in decrease in sales volumes.

Due to this price-volume trade-off, it is often difficult to make accurate revenue projections.

#### 4.1.2) Company Sales and Inflation or Deflation

Impact of inflation and deflation on pricing strategy vary depending on industry structure, competitive forces, different rates of cost inflation in the countries where the company operates and the price elasticity of demand.

- When demand is relatively price elastic → increasing prices to compensate for inflation in input costs

results in decrease in revenue.

- When demand is relatively price inelastic → increasing prices to compensate for inflation in input costs results in increase in revenue.

When there is high inflation in a company's export market compared to company's domestic inflation rate, export country's currency will depreciate and as a result, any pricing gains will be offset by the currency losses associated with depreciation of the export country's currency.

**Practice: Example 10,**  
**Volume 4, Reading 28.**



#### 4.2.1) Industry Costs and Inflation or Deflation

The impact of inflation or deflation on an industry's cost structure depends on three factors i.e.

**Specific purchasing practices of companies:** When a company uses long-term contracts or hedging strategies to mitigate the impact of increase in input costs on its profitability, then any expected input price fluctuations would have less significant impact on its costs.

**Competitive environment:** When in an industry, alternative inputs are available or when industry participants are vertically integrated, then input price fluctuations would have less significant impact on the costs.

#### 4.2.2) Company Costs and Inflation or Deflation

To forecast costs, an analyst should:

- Monitor the underlying drivers of input prices e.g. the price of agricultural products is highly linked to weather conditions.
- Evaluate company's ability to substitute cheaper alternatives for expensive inputs.
- Evaluate company's ability to increase its efficiency to offset the impact of increase in input prices.

**Practice: Example 11,**  
**Volume 4, Reading 28.**



## 5.

## TECHNOLOGICAL DEVELOPMENTS

Technological developments can affect demand for a product and/or the quantity supplied of a product.

**Impact on demand:** When a technological development results in the development of attractive substitute products that may cannibalize demand for an

existing product, the demand curve for the existing product will shift to the left.

### Impact of lower sales volume due to cannibalization of demand on company's revenue:

Revenue loss for company due to cannibalization of demand = Projected number of units of product cannibalized by the new substitute product × Estimated ASP

Where,

$$\text{Average selling price (ASP)} = \frac{\text{Company's estimated average revenue}}{\text{Company's estimated shipments of the product}}$$

Number of units of a product cannibalized by the new substitute product = Expected number of product shipments × Percentage representation of each

category (e.g. consumer & non-consumer) × Cannibalization factor for the category

Post cannibalization shipments = Pre-cannibalization shipments – Expected cannibalization

Post cannibalization revenue = Pre-cannibalization revenue – Estimated impact on revenue from cannibalization

**Impact on supply:** When a technological development results in lower manufacturing costs, the supply curve will shift to the right.

**Practice:** Example 11 & 12, Volume 4, Reading 28.



## 6.

## LONG-TERM FORECASTING

The selection of the forecast time horizon depends on following five factors.

### a) Investment strategy of the investor:

**b) Investor's average portfolio turnover:** Ideally, the forecast time horizon should be in line with average annual turnover of the portfolio. For example, a stated investment time horizon of 3-5 years would imply average annual portfolio turnover between 20-33%.

**c) Cyclicity of the industry:** The forecast time horizon should be long enough to allow the companies to reach an expected mid-cycle level of sales and profitability. Generally, *long-term forecasts better represent the normalized earnings\* potential of a company* than a short-term forecast.

\***Normalized earnings** are the expected level of mid-cycle earnings for a company excluding any unusual or temporary factors.

**d) Company specific factors:** The forecast time horizon should be long enough to allow the companies to realize and to reflect the expected benefits from recent acquisition or restructuring activity in their financial statements.

### e) Analyst's employer's preference

After developing financial projections for the selected forecast time-horizon, an analyst can estimate the terminal value of the subject company using various methods i.e.

**1) Historical multiples-based approach:** This method assumes that the future growth and profitability of the company will be similar to historical growth and profitability of a company.

- If the future growth or profitability of the company is expected to resemble the past, then historical multiple can be used as the target multiple.
- If the future growth or profitability of the company is expected to be different from past, then the historical multiple used as a target multiple should be adjusted for this difference in growth and/or profitability i.e.
  - If a company's future profitability is expected to be greater (lower) than its historical profitability, then the company's shares are likely to trade at a premium (discount) to their historical average multiple to reflect the expected improvement (degradation) in profitability.
  - If intensity of competition in the market is expected to increase in the future, then the company's shares are likely to trade at a discount to their historical average multiple to reflect the likely degradation in profitability.
  - If the future growth or profitability of a company is expected to change significantly due to a major acquisition or divestiture, then it is not appropriate to use historical valuation multiple as the target multiple.

**2) Discounted Cash flow (DCF) approach:** In the DCF approach, the terminal year cash flow projection used to estimate a perpetuity value for **cyclical companies** (i.e. airline company) should represent normalized cash flow because using a trough (boom) year cash flow in developing terminal value will result in understated (overstated) intrinsic value. *Normalized free cash flows* are the expected level of mid-cycle cash flow from operations adjusted for unusual items less recurring capital expenditures.

- The long-term growth rate used as an input in the perpetuity calculation to estimate a perpetuity value should be reasonable.

Factors that may affect terminal value of a company (particularly if the company has high financial leverage) include:

- Economic disruption i.e. global financial crisis.
- Government regulations and technology developments. The impact of regulation and technology on profitability vary among industries. E.g. utility companies are subject to high regulations but are not exposed to technological developments; whereas, medical device

manufacturers are subject to both regulation and technological advances.

An analyst should also consider the expected changes in the future long-term growth rate by analyzing inflection points. For example, when a company has financial leverage, changes in interest rates will create an inflection point in the company's outlook.

**Practice:** Example 14 & 15, Volume 4, Reading 28.



## 7.

## BUILDING A MODEL

### 7.1 Industry Overview

Industry overview involves determining industry structure by analyzing five competitive forces as discussed above. For example,

**Threat of substitutes** will be **LOW** when consumers show brand loyalty toward the subject company's product.

**Rivalry** will be **LOW** when market is highly concentrated and has limited producers.

**Bargaining power of suppliers** will be LOW/MEDIUM when a large number of small independent suppliers exist in the market.

**Bargaining power of buyers** will be LOW when company's product is consumed in small and fragmented on-premises outlets.

**Threat of new entrants** will be LOW when there are high barriers to entry.

### 7.2 Company Overview

Company overview involves analyzing different business segments of the subject company and the percentage of total revenue and total operating profits represented by each segment.

If a company has various business segments, sales projections are made for each of those segments and then the segments forecasts are combined to estimate company's total sales forecasts.



Level economic activity in each of the company's marketing areas is forecasted.



Company's expected market share in each distribution territory is evaluated.



Company's pricing strategies are analyzed i.e. whether the company has plans to increase price to enhance margins or to lower prices to increase market share.

### 7.3 Construction of Pro Forma Income Statement (Section 7.3.1 – 7.3.6)

**A. Revenue Forecast:** In constructing a pro forma income statement, company's revenue can be projected by employing a hybrid approach i.e. economic growth in the relevant regions are forecasted (top-down analysis); based on these estimates, the growth trends in individual segments are projected (bottom-up analysis).

Factors that may lead to changes in revenue include:

#### Changes in volume

**Changes in price:** Price changes refer to price changes for a single product as well as changes in price/mix (i.e. changes in average price resulting from selling a different mix of higher and lower priced products).

- Strong price/mix effect improves company's gross margin.
- Changes in revenue attributable to volume or price/mix are considered as **organic growth**.

**Overall organic revenue growth = [(1 + volume growth) (1 + % of price/mix contribution to revenue growth)] - 1**

- **Changes in foreign exchange rates:** Appreciation (depreciation) of foreign currency of the region where the business segment operates positively

(negatively) affect company's revenue.

*For details, see exhibit 44.*

- B. Cost of Goods Sold:** When a company has high price/mix resulting from limited supply and growing demand → cost of goods sold tends to decline and consequently, company's gross margin improves in future periods.
- C. Selling, General, and Administrative Expenses:** SG&A expenses tend to increase if company's distribution and advertising and promotion (A&P) costs increase and/or if the company expands its distribution network.

Sales  
 Less: COGS  
     = **Gross profit**  
 Less: Administrative expenses  
 Less: Distribution expenses  
 Add: Other income from operation  
     = **EBIT**  
 Add (Less): Other operating income (expenses)  
 Less: Finance costs & other financial expenses  
     = **Profit before tax**  
 Less: Income Tax  
 Add: Income from associates  
     = **Profit from continuing operations**  
 Add (Less): Profit (loss) from discontinued operations  
     = **Net profit for the year**  
 Less: Non-controlling interests  
     = **Owners of the company**

*For details, see exhibit 45.*

**D. Operating Profit by Division:**

EBIT (a proxy for operating profit) = Revenue - cost of goods sold - SG&A costs + other income from operations

- EBIT for consolidated operations should be equal to Cumulative EBIT of the individual segments.

EBITDA = EBIT + Depreciation & amortization expense

*For details, see exhibit 46.*

**E. Non-Operating Expenses:**

*For details, see exhibit 47.*

- F. Corporate Income Tax Forecast:** An analyst may use the average rate for historical periods as the projected income tax rate.

trends. For example, if strong growth in sales volume is anticipated, higher capital expenditures will be projected compared to historical level; similarly, if fixed assets are expected to grow in future periods, depreciation will also increase.

*For details, see exhibit 48.*

**7.4.2) Working Capital Forecasts**

Higher working capital will be forecasted if sales are anticipated to grow in the future periods. Increasing working capital implies negative operating cash flows (cash outflows).

*For details, see exhibit 49.*

**7.4.3) Forecasted Cash Flow Statement**

Cash flows from operating activities:  
 Net income (profit after taxes)  
 Adjustment to determine cash flow:  
 Add back depreciation  
 Decrease in accounts receivable  
 Decrease in inventory  
 Increase in accounts payable  
 Total adjustments  
 Net cash flows from operating activities  
 Cash flows from investing activities:  
 Increase in plant and equipment  
 Net cash flows from investing activities

Cash flows from financing activities:  
 Increase in notes payable  
 Increase in LTD  
 Dividends paid  
 Net cash flow from financing activities  
 Forecasted increase in cash

*See exhibit 50.*

**7.4.4) Forecasted Balance Sheet**

Property, plant & equipment  
 Add: Investment in associates  
 Add: Other financial assets  
 Add: Deferred tax assets  
     = **Total non-current assets**  
 Inventories  
 Add: Trade and other receivables  
 Add: Cash & cash equivalents  
 Add: Other current assets  
     = **Total current assets**

**Total assets = Total non-current + Total current assets**

Share capital  
 Add: Share premium  
 Less: Treasury shares  
 Add: Consolidated reserves  
     = Net profit to owners of the company  
 Less: Translation reserve  
 +/-: Profit or loss recorded in equity  
     = Equity attributable to shareholders  
 Less: Non-controlling interest

**7.4 Construction of Pro Forma Cash Flow Statement and Balance Sheet**

**7.4.1) Capital Investments and Depreciation Forecasts**

The necessary production capacity and corresponding capital investments and cash outlays for the coming years can be projected based on the expected volume

**= Equity**

Long-term financial debt

Add: Provision for employee benefits

Add: Long-term provisions for liabilities and charges

Add: Deferred tax liabilities

**= Total non-current liabilities**

Short-term financial debt and accrued interest

Add: Trade and other payables

Add: Income tax payable

Add: Short-term provisions for liabilities and charges

Add: derivative financial instruments

Add: Liabilities held for sale

**= Current liabilities***See exhibit 51.***7.5****Valuation Inputs**

Company's value can be estimated using different metrics i.e. free cash flow, earnings per share, EBITDA, or EBIT. The company-specific inputs needed to build a discounted cash flow model are as follows.

Normalized operating profit

**Less:** Taxes

= Normalized operating profit after tax

**Add:** Depreciation and amortization

Change in Working capital

Capital expenditures

= Free cash flow to the firm

**Practice:** End of Chapter Practice Problems for Reading 28.



## 1.

## INTRODUCTION

Common stock represents an ownership interest in a business.

There are *four* broad steps to apply Discounted Cash Flow (DCF) analysis to equity valuation:

- 1) Selecting an appropriate definition of CFs.
- 2) Forecasting CFs.
- 3) Choosing an appropriate discount rate methodology.
- 4) Estimating the discount rate.

## 2.

## PRESENT VALUE MODELS

## 2.1

## Valuation Based on the Present Value of Future Cash Flows

The value of an asset depends on the benefits or returns, which are expected to be received from it. These returns are known as expected future cash flows.

There are two elements of DCF valuation:

- 1) Estimating the CFs.
- 2) Discounting the CFs by taking into account the time value of money.

Cash flows are known with certainty in case of government bonds, as they are default-free. Thus, risk free rate can be used to discount these CFs.

Unlike risk-free government bonds, future cash flows for equity investments are not known with certainty and are not risk free. There are two approaches to deal with such risky CFs.

- 1) **Expected** cash flows are discounted.
- 2) **Discount rate** is **adjusted** to reflect the risk inherent in CFs.

**Asset's value is PV of its expected future CFs i.e.**

$$V_0 = \sum_{t=1}^n \frac{CF_t}{(1+r)^t}$$

where,

$V_0$  = value of an asset at  $t = 0$

$n$  = number of CFs over the life of the asset

$CF_t$  = expected CF at time  $t$

$r$  = required rate of return (discount rate)

## 2.2

## Streams of Expected Cash Flows

Three most commonly used definitions of Cash flows are:

- a) Dividends
- b) Free cash flows
- c) Residual income

**Dividend discount model:**

- It uses dividends to represent CFs.
- Dividends are less volatile than earnings; therefore, DDM values are less sensitive to short-run fluctuations.
- DDM values reflect long term intrinsic value.
- Fast growing companies take advantage of profitable growth opportunities by reinvesting all earnings instead of paying dividends.
- A mature/established profitable company has fewer attractive investment opportunities; therefore, it pays dividends and is hesitant to reduce level of dividends.

**DDM is most appropriate to use when:**

- The company is dividend paying.
- Dividends represent clear and consistent relationship with the company's earnings/profitability i.e. if earnings rise, dividends also rise.
- The investor plans to purchase just a small ownership share (minority shareholder) that does not have the ability to either influence or control the timings & amount of dividends (i.e. Dividend Policy).

**International differences in Dividend Policy:**

- European and Asian small-cap companies usually pay dividends unlike U.S. companies.
- Developed markets do not prefer to pay cash dividends. They prefer to distribute cash in the form of share repurchases.

**Practice: Example 1,  
Volume 4, Reading 29.**



**Practice: Example 2,  
Volume 4, Reading 29.**



### Free Cash Flows Model:

For a "going concern" firm, all of the cash generated from operations is not "freely available" for distribution among capital providers (debt & equity); rather some of the cash is needed to meet firm's working capital and fixed capital requirements.

#### i. Free Cash Flow to the Firm (FCFF):

It is the cash generated from operations which is available to distribute among firm's suppliers of capital (debt & equity) after paying for operating expenses (e.g. taxes) and operating investments (both WC and Fixed capital investments).

#### ii. Free Cash Flow to Equity (FCFE):

It is the cash available after paying for operating expenses (e.g. taxes), operating investments (both WC and Fixed capital investments) and debt payments.

### Important:

- FCFF is a **pre-debt** free cash flow concept.
- FCFE is **post-debt** free cash flow concept.
- **FCFF is preferable to use when:**
  - a) Company has volatile capital structure.
  - b) Company is highly leveraged i.e. large % of debt in capital structure.
  - c) Company has negative FCFE.

### Free cash flow models are most appropriate to use when:

- The company is non-dividend paying.
- Dividends are not related to earnings/profitability of the company.
- Free cash flows appear to be a reasonable representative of company's earnings and profitability.
- The investor has a controlling share in the company i.e. has influence & control on company's policies.

### Problem in applying Free Cash Flow Approach:

- Rapidly growing companies have higher capital expenditures and thus, have negative expected free cash flows far into the future. Discounting the negative cash flows will lead to a negative value, which is not meaningful.

### Residual Income (RI):

It is the earnings for the period after taking into account the investors' dollar required return.

$$\text{Residual Income} = \text{NI} - (\text{cost of equity} \times \text{Beginning BV of common equity})$$

where,

*Cost of equity is the required return or opportunity cost of common shareholders.*

- RI represents economic gain to shareholders (common) or returns earned in excess of opportunity costs.
- RI matches profits to the time period in which they are earned i.e. (accrual basis).

According to RI model,

$$\text{Value of stock} = \text{BVPS at } t = 0 + \text{PV of expected future residual earnings}$$

where,

$$\text{BVPS} = \text{common shareholders' equity} / \text{number of common shares outstanding}$$

### Important:

RI model is valid only when **Clean Surplus Accounting** exists i.e.

$$\text{BV}_t = \text{BV}_{t-1} + \text{NI}_t - \text{Dividends}_t$$

### RI model is most appropriate to use when:

- The company is not paying dividends.
- The company's expected free cash flows are negative far into the future.

### Problems in applying RI model:

- RI model requires detailed knowledge of accrual accounting.
- RI model cannot be used in case of higher degree of distortion and poor quality of accounting disclosure

### 3. THE DIVIDEND DISCOUNT MODEL

#### 3.1 DDM With Single Holding Period

When an investor wishes to buy a stock and hold it for one year then

**Value of Stock** = PV of expected Dividend + PV of expected Selling Price at the end of year one

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

where,

$V_0$  = value of stock at  $t=0$

$D_1$  = expected dividend for year 1

$P_1$  = expected selling price at  $t=1$

$r$  = required rate of return

**Practice:** Example 3,  
Volume 4, Reading 29.



The general expression for  $n$ -holding periods is

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

When the holding period is extended into the indefinite future then

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

**Practice:** Example 4,  
Volume 4, Reading 29.



**Growth Patterns used in DDM:**

- 1) Gordon growth model i.e. constant growth forever.
- 2) Two distinct stages of growth i.e. Two stage model & H-model.
- 3) Three distinct stages of growth i.e. Three stage model

#### 3.2 Multiple Holding Periods

Value of stock for 2 years holding period is

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

### 4. THE GORDON GROWTH MODEL (GGM)

GGM assumes that dividends grow indefinitely at a constant rate.

GGM equation is as follows:

$$V_0 = \frac{D_0 \times (1+g)}{r-g}$$

or

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

where,

$g$  = expected constant growth rate in dividends

$D_1$  = expected dividend payable at  $t=1$

$r$  = required rate of return on equity

**Assumptions & Characteristics of GGM:**

- $g$  remains constant indefinitely in the future.
- $r > g$
- Constant proportional relationship exists b/w earnings & dividends i.e. both earnings & dividends grow at  $g$  and payout ratio is constant.

- When prices are efficient (price = value), price is expected to grow at  $g$ .
- Dividend yield & capital gains yield stay constant through time.
- GGM is a **single stage** DDM.
- Growth rate is measured by growth in GDP.
- Nominal Growth rate = Real growth rate in GDP + Expected long-term rate of Inflation.
- For companies with earnings growth rate > economy's nominal growth rate, it is recommended to use multistage DDM instead of GGM.
- GGM can also be used to value broad equity market indices.
- GGM can also be used to value Preferred stock (fixed rate perpetual preferred stock) i.e.

$$V_0 = \frac{D}{r}$$

where,

$r$  = capitalization rate

$g = 0$

- GGM can also be used to estimate equity risk

premium i.e.

**GGM equity risk premium** = one-year forecasted dividend yield on market index + consensus long-term earnings growth rate – long-term government bond yield

**GGM is most appropriate to use when:**

- Company is dividend paying.
- Dividends are related to company's earnings/profitability.
- Companies whose earnings are growing at a rate similar to economy's nominal growth rate or less than economy's nominal growth. (Earnings growth rate greater than the nominal GDP growth rate cannot exist for an indefinite period).
- When company exists in developed markets.

**Limitations of GGM:**

- The output of GGM is very sensitive to small changes in the inputs i.e. assumed growth rate (g) and required rate (r).
- GGM cannot be easily applied to non-dividend paying stocks.
- Growth patterns are difficult to predict for some firms.

**Practice:** Example 5, 6 & 8, Volume 4, Reading 29.



**Negative Growth rate in dividends:**

**Practice:** Example 9, Volume 4, Reading 29.



#### 4.3 Share Repurchases

Companies have two options regarding distribution of free cash flow to shareholders.

- In the form of share repurchases (buy backs).
- In the form of dividends.

**Share Repurchases v/s Cash Dividends**

- Number of shares outstanding decreases when shares are repurchased. Thus, relative ownership of selling shareholders is reduced as compared to non-selling shareholders.
- Firms paying dividends are committed to their dividend paying policy and are hesitant to reduce cash dividends or stop paying cash dividends. While, firms have no obligation to maintain their share repurchase practices.

- Share repurchases are generally difficult to predict than cash dividends (both in timing & monetary terms).
- Share repurchases have neutral effect on the wealth of existing shareholders when the shares are repurchased at market prices.

#### 4.4 The Implied Dividend Growth Rate

One of the reasons of estimated value of a stock being different from its actual market value is the difference in growth rate assumptions.

Thus, we can obtain the **implied growth rate** with the help of following inputs:

- Actual market price
- Expected dividend
- Required rate of return

**Practice:** Example 10, Volume 4, Reading 29.



#### 4.5 The Present Value of Growth Opportunities

The actual value of a share is the sum of two components:

1. Value of a company without reinvestment of earnings i.e. no-growth value per share.
2. Present value of growth opportunities (PVGO).

$$V_0 = \frac{E_1}{r} + PVGO$$

where,

PVGO = Sum of PV of expected profitable opportunities of reinvesting the earnings.

$E_1/r$  = no-growth value per share

- When rate of return from reinvestment < required rate of return, then in spite of increasing EPS, reinvestment should not be done. Earnings should rather be distributed to shareholders in the form of cash dividends.
- Reinvestment increases shareholders' value only when it generates returns > opportunity cost (r) i.e. Projects with positive NPV only.
- When  $P_0 = V_0$  then,

$$PVGO = P_0 - \frac{E_1}{r}$$

**Reasons for having Negative Value of PVGO:**

- Instead of creating value, company's investment policy is destroying shareholders' value.
- Estimated no-growth value per share ( $E_1/r$ ) is too

high.

- Required return on equity is **too low**.

#### Determinants of PVGO:

- Presence of good business opportunities.
- Availability of real options to a company e.g. option available when to start a project, adjust the scale of project or option to abandon future projects.

Equation of Value of stock can be restated as

$$\frac{V_0}{E_1} \text{ or } \frac{P_0}{E_1} \text{ or } \frac{P}{E} = \left[ \frac{1}{r} \right] + \left[ \frac{PVGO}{E_1} \right]$$

where,

$1/r$  = value of P/E for no-growth company.

$PVGO/E_1$  = component of P/E value that represents growth opportunities.

#### 4.6 Gordon Growth Model and the Price-to-Earnings Ratio

Leading and trailing justified P/E multiples can be derived from the Gordon growth model.

Justified P/E expression has two uses:

- Analyst can figure out whether the stock is under/over or fairly valued by comparing the actual P/E ratio with the justified P/E ratio.
- Analyst can evaluate whether the growth rate used to estimate P/E is reasonable or not.

$$\text{Leading P/E ratio} = \frac{P_0}{E_1} = \frac{D_1/E_1}{(r - g)} = \frac{(1 - b)}{(r - g)}$$

$$\text{Trailing P/E ratio} = \frac{P_0}{E_0} = \frac{D_0(1 + g)/E_0}{(r - g)} = \frac{(1 - b)(1 + g)}{(r - g)}$$

where,

$P_0/E_1$  = today's market price per share / forecasted next 12 months EPS (or next fiscal's year's earnings per share)

$P_0/E_0$  = today's market price per share / trailing 12 months EPS

$b$  = retention rate

$1 - b$  = dividend payout ratio

$r$  = required rate of return

$g$  = growth rate

- The higher the anticipated dividend growth rate, the higher the stock price (all else equal).

**Practice:** Example 11, Volume 4, Reading 29.



#### 4.7 Estimating a Required Return Using the Gordon Growth Model

The GGM can be used to derive required rate of return ( $r$ ) i.e.

$$r = \left[ \frac{D_0(1 + g)}{P_0} \right] + g = \left[ \frac{D_1}{P_0} \right] + g$$

where,

$D_1/P_0$  = dividend yield

$g$  = capital gains (or appreciation) yield

**Practice:** Example 12, Volume 4, Reading 29.



### 5. MULTISTAGE DIVIDEND DISCOUNT MODELS

Assumption of stable dividend growth rate for an indefinite period into the future (i.e. in GGM) is not appropriate to use in many firms. Practically, growth is assumed to have following three stages.

#### 1) Growth Phase

- Firm enjoys rapidly expanding markets.
- **Profit margin:** High
- **Growth rate in earnings:** Supernormal.
- **Capital requirements:** High
- **FCFE:** Negative
- **ROE > r**
- **Dividend payout ratio:** Low or zero.
- **Preferred Model for valuation:** The three-stage

#### DDM

Justified P/E is not a preferred valuation method for high-growth companies because it assumes a constant growth rate in perpetuity.

The three-stage DDM is most appropriate to analyze firms with high growth rate because of its flexibility.

H-model may not be appropriate, because a linear decline from the high growth rate to the constant growth rate cannot be assumed and the dividend payout ratio is fixed.

## 2) Transition Phase

- Increasing competition & market saturation put downward pressure on prices.
- Growth rate in earnings:** May be above average but is decreasing toward the growth rate of the overall economy.
- Profit margin:** May be above average but is decreasing toward the growth rate of the overall economy.
- Capital requirements:** Low or decreasing.
- FCFE:** Positive or increasing.
- ROE starts falling towards  $r$ , i.e.  $ROE \rightarrow r$
- Dividend payout ratio:** Move from zero to a positive number or increases
- Preferred Model for valuation:** The two-stage DDM.

The two-stage DDM is well suited to firms that have high growth and are expected to maintain it for a specific period i.e. transition phase. The model is not useful in analyzing a firm that is in an industry with low barriers to entry.

## 3) Mature Phase

- Earnings growth rate:** Stabilize at long-term level.
- Profit margins:** Stabilize at long-term level.
- Capital requirements:** Stabilize at long-term level.
- FCFE:** Stabilize at long-term level.
- ROE =  $r$**
- Dividend payout ratio:** Stabilize at long-term level.
- Preferred Model for valuation:** Gordon Growth Model (GGM).

### Types of Multistage DDMs:

- 1) The two-stage DDM
- 2) The H-Model (type of two-stage)
- 3) The three-stage DDM.

### 5.1 Two-Stage Dividend Discount Model

There are two versions of two-stage DDM. Both versions assume constant growth at a mature growth rate in stage-two.

**a) First version of Two-stage Model (General Two-stage Model):** Stage 1 represents abnormal growth e.g. 20% and stage 2 (transition to maturity) growth rate falls abruptly to sustainable lower level e.g. 5%.

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

where,

$V_n$  = estimate of  $P_n$

$$V_n = \frac{D_0 \times (1+g_s)^n (1+g_L)}{(r-g_L)}$$

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

### Assumptions of the model:

First "n" dividends grow at supernormal growth rate i.e.  $g_s$ . Supernormal growth can be achieved through possession of a patent, first-mover advantage etc.

After time "n", growth rate changes to normal long-term rate due to the increased level of competition and growth in the overall economy i.e.  $g_L$ .

### Limitations of the Model:

Abrupt movement from initial supernormal growth period to the final sustainable lower growth period is an unrealistic assumption.

**b) Second version of Two-stage Model:** It is also known as H-Model. Here, growth rate after supernormal growth period does not fall abruptly; rather it is assumed to decline linearly to a sustainable lower level.

**Practice:** Example 13 & 14,  
Volume 4, Reading 29.



### 5.2 Valuing a Non-dividend Paying Stock

**Practice:** Example 15,  
Volume 4, Reading 29.



It is difficult to correctly estimate the timing and amount of dividends initiated by a non-dividend paying firm, therefore, it is preferred to use free cash flow or residual income models to value such stocks.

### 5.3 The H-Model

It is a type of two-stage model in which initially growth is at a high rate and then it linearly declines to normal rate.

$$V_0 = \frac{D_0 \times (1+g_L)}{(r-g_L)} + \frac{D_0 \times H \times (g_s - g_L)}{(r-g_L)}$$

or

$$V_0 = \frac{[D_0 \times (1+g_L)] + [D_0 \times H \times (g_s - g_L)]}{(r-g_L)}$$

where,

$V_0$  = value per share at  $t=0$

$D_0$  = current dividend

$g_L$  = normal long-term dividend growth rate after year  $2H$

$g_s$  = initial short-term dividend growth rate

$H$  = half-life in years of the high-growth period i.e. high growth period =  $2H$  years

$r$  = required rate of return on equity

- $[D_0 \times (1+g_L)] / (r - g_L)$  represents value of firm when it grows at  $g_L$  forever.
- $[D_0 \times H \times (g_S - g_L)] / (r - g_L)$  represents extra value of firm when it grows initially at higher growth rate i.e.  $g_S > g_L$ .
- Larger the  $H$  (longer supernormal growth period), higher the share value, all else equal.
- Since H-Model is just an approximation model, it is better to use more exact model when  **$H$  is high** and/or difference between  $g_S$  and  $g_L$  is large.

**Practice:** Example 16,  
Volume 4, Reading 29.



## 5.4 Three-stage Dividend Discount Model

There are two versions of three-stage DDM.

**a) First version:** The firm is assumed to have three distinct stages of growth and second stage (middle stage) growth rate is constant i.e. stable growth rate in each of the three stages.

**b) Second version:** Second stage growth rate is not constant, rather it is assumed to decline linearly to the mature growth rate. Thus, second & third stages are treated as H-Model.

- In three-stage model, the middle stage is known as transition stage.

**Practice:** Example 17 & 18,  
Volume 4, Reading 29.



## 5.5 Spreadsheet (General) Modeling

- Spreadsheets can be used to model complex and complicated growth patterns in DDMs. Spreadsheets reduce the likelihood of computational inaccuracies and allow analysts to more easily modify models to reflect many scenarios.

**Practice:** Example 25,  
Volume 4, Reading 29.



### Estimating Growth rate:

There are two approaches to estimate "g".

- 1) Estimating the sustainable growth rate\* with the help of following formula.

$$g = b \times \text{ROE}$$

where,

$g$  = dividend growth rate

$b$  = earnings retention rate

ROE = return on equity

**\*Sustainable growth rate:** Growth rate that can be sustained for a given level of ROE when capital structure is constant and no additional common stock is issued. (when debt is growing at rate  $g$ , capital structure is constant)

$$g = \frac{NI - \text{Dividends}}{NI} \times \frac{NI}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Shareholders' Equity}}$$

$g = \text{PRAT}$  i.e.

$g = \text{profit margin (P)} \times \text{retention rate (R)} \times \text{asset turnover (A)} \times \text{financial leverage (T)}$

### NOTE:

ROE is calculated using beginning of period shareholders' equity.

- Higher the ROE, higher the dividend growth rate, all else constant.
- **Dividend Displacement of earnings:** Higher the earnings retention ratio, higher the growth rate in dividends, all else constant.

ROE is estimated as follows:

- a) DuPont decomposition of ROE.
- b) Assuming  $\text{ROE} = r$
- c) Assuming  $\text{ROE} = \text{Median industry ROE}$ .

$$\text{ROE} = \frac{NI}{\text{Shareholders' equity}}$$

$$\text{ROE} = \frac{NI}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Shareholder's equity}}$$

$$\text{ROE} = \frac{NI}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Shareholders' equity}}$$

$$\text{ROE} = \text{Net profit margin} \times \text{Asset Turnover} \times \text{Leverage}$$

- 2) Growth rate of a firm can be estimated by using macroeconomic & industry growth rate projections.

**Practice:** Example 20,  
Volume 4, Reading 29.



## 5.6 Estimating Required Return Using Any DDM

- For **H-Model**, the expected rate of return is derived as

$$r = \left[ \left( \frac{D_0}{P_0} \right) \times \{ (1 + g_L) + H \times (g_S - g_L) \} \right] + g_L$$

- For **two-stage model**, trial & error method is used to estimate  $r$ .

**Practice:** Example 22,  
Volume 4, Reading 29.



## Terminal Stock Value

Terminal value represents a large percentage of total value in DDMs.

There are **two** ways to estimate it:

- Using Gordon Growth Model.
- Applying a multiple (e.g. P/E) to a forecasted fundamental e.g. BVPS, EPS etc. as of the terminal date.

**Practice:** Example 14,  
Volume 4, Reading 29.



## 5.7 Multi-stage DDM: Concluding Remarks

### Limitation of Multistage models:

- Large percentage of total value depends on terminal value; terminal value is very sensitive to minor changes in growth rate and required rate assumptions.
- Technological innovations can highly affect the assumptions of the model regarding life-cycle.

**Practice:** Example 23 & 24,  
Volume 4, Reading 29.



### How to evaluate the value of stock using DDM estimates of Value:

When market price of stock > justified Price (price implied by DDM)	• Stock is Overvalued
When market price of stock < justified Price (price implied by DDM)	• Stock is Undervalued
When market price of stock = justified Price (price implied by DDM)	• Stock is Fairly valued

**Practice:** End of Chapter Practice  
Problems for Reading 29 & FinQuiz  
Item-set ID# 11259.



## 2.

## FCFF AND FCFE VALUATION APPROACHES

## 2.1

## Defining Free Cash Flow

Free Cash Flow to the Firm (FCFF)<sup>1</sup>

FCFF is the cash generated from operations, which is available to be distributed among firm's suppliers of capital (debt & equity) after paying for operating expenses (e.g. taxes) and operating investments (both Working capital and Fixed capital investments).

## Free Cash Flow to Equity (FCFE):

FCFE is the cash available to common shareholders after all operating expenses, interest and principal payments, necessary capital requirements and working capital needs have been met.

**Free cash flow models are most appropriate to use when:**

- The company is non-dividend paying.
- Dividends are not related to earnings/profitability of the company.
- Free cash flows appear to be reasonable representative of company's earnings and profitability.
- The investor has a controlling share in the company i.e. has influence & control over company's policies. (or when a company is target for takeover).

**Problem in applying Free Cash Flow Approach:**

- Rapidly growing companies have higher capital expenditures and thus, have negative expected free cash flows far into the future. Discounting the negative cash flows will lead to a negative value, which is not meaningful.

**Important Facts:**

**FCFF** is discounted at **WACC** since it is the after-tax cash flow going to all suppliers of capital to the firm.

**FCFE** is discounted at **required rate of return for equity** since it is the cash flow going to common stockholders.

Since **WACC < r**. Therefore,

- Using WACC to discount FCFE will *overestimate* equity value.
- Using required rate of return (r) to discount FCFF will *underestimate* firm value.

**FCFE** model helps analysts in evaluating the company's investment and financing as well as dividend policy.

**FCFE** is a more direct and simple way of valuing equity. Therefore, it should always be preferred to FCFF model when the company's capital structure is relatively *stable*.

**FCFF** is preferred when:

- Company has volatile capital structure. (*required rate of return on equity is more sensitive to changes in capital structure than changes in WACC*).
- Company is highly leveraged i.e. large % of debt in capital structure.
- Company has negative FCFE.

## 2.2

## Present Value of Free Cash Flow

## 2.2.1) Present Value of FCFF

General formula is:

$$\text{Firm Value} = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1 + WACC)^t}$$

where,

FCFF = Free cash flow to the firm

WACC = Weighted average cost of capital

- **Value of Equity** = Total Firm Value – Market value of Debt – Preferred Stock
- **Value per share** = Value of equity / Number of common shares outstanding

$$WACC = \left[ \frac{MVD}{MVD + MVCE} \times \{r_d \times (1 - \text{Tax rate})\} \right] + \left[ \frac{MVCE}{MVD + MVCE} \times (r_e) \right]$$

where,

- **MVD** = current market value of debt (not BV)
- **MVCE** = current market value of (common) equity (not BV)
- **MVD + MVCE** = total market value of the firm
- **$r_d (1 - \text{Tax rate})$**  = after tax cost of debt.  $r_d$  is estimated using expected YTM of the company's debt based on current market values.
- **r** = cost of equity.
- **Tax rate** = Marginal tax rate is used instead of effective tax rate, since; marginal tax rate better reflects a company's future cost in raising funds.
- Analysts should use **target capital structure** weights of debt & equity when those weights are known and they are different from market value weights.

### 2.2.2) Present Value of FCFE

General formula is:

$$\text{Equity value} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+r)^t}$$

where,

FCFE = Free cash flow to Equity

r = required rate of return on equity

#### NOTE:

Constant growth free cash flows model in private company valuation is known as **Capitalized cash flow models**.

**Practice: Example 1,**  
**Volume 4, Reading 30.**



### 2.3 Single-stage (Constant growth) FCFF and FCFE Models

#### Assumptions of the model:

- FCFF grows at a constant rate (g) forever.
- g < WACC

#### 2.3.1) Constant-Growth FCFF valuation Model:

$$\text{Firm Value} = V_0 = \frac{FCFF_1}{WACC - g} = \frac{FCFF_0 \times (1 + g)}{WACC - g}$$

where,

FCFF<sub>1</sub> = expected Free cash flow to firm at t=1

FCFF<sub>0</sub> = FCFF at t=0

g = constant expected growth rate in FCFF (it can be same or different for FCFF & FCFE)

WACC = weighted average cost of capital

#### 2.3.2) Constant-Growth FCFE valuation Model

$$\text{Equity Value} = V_0 = \frac{FCFE_1}{r - g} = \frac{FCFE_0 \times (1 + g)}{r - g}$$

where,

FCFE<sub>1</sub> = expected Free cash flow to equity at t = 1

FCFE<sub>0</sub> = FCFE at t = 0

g = constant expected growth rate in FCFE (it can be same or different for FCFF & FCFE)

r = cost of equity

## 3. FORECASTING FREE CASH FLOW

### 3.1 Computing FCFF from Net Income

$$\text{FCFF} = \text{NI} + \text{NCC} + \text{Int} \times (1 - \text{Tax rate}) + \text{Preferred stock dividends} - \text{FCInv} - \text{WCInv}$$

where,

**NCC** = Noncash charges i.e. they reduce reported NI but do not actually result in cash outflow.

**Int × (1 – tax rate)** = after tax interest savings

**FCInv** = Fixed capital investment \* i.e.

a) When no long-term assets are sold during the year:

$$\text{FCInv} = \text{capital expenditures} = \text{Ending gross PPE} - \text{Beginning gross PPE}$$

b) When long-term assets are sold during the year:

$$\text{FCInv} = \text{Capital expenditures} - \text{proceeds from sale of long-term assets}$$

Or

$$\text{FCInv} = (\text{Ending gross PPE} - \text{Beginning gross PPE}) - \text{Proceeds from sale of long-term assets}$$

\*Capital expenditures include intangible assets e.g. trade marks and cash acquisition of another company etc.

**WCInv = Working capital investment \*\***

- Reduction in WC means cash inflow and it is added back to NI.
- Increase in WC means cash outflow and it is subtracted from NI.

\*\*Working capital investment = change in Current assets excluding cash & cash equivalents – change in Current liabilities excluding short-term debt i.e. Notes payable and Current portion of long-term debt e.g.

$$\text{WCInv} = (A/R_{2009} + \text{Inv}_{2009} - A/P_{2009}) - (A/R_{2008} + \text{Inv}_{2008} - A/P_{2008})$$

**Preferred Stock Dividends:** Unlike interest payments on debt, preferred stock dividends paid are not tax deductible

Items	Adjustments to NI to arrive at FCFF
<b>Noncash Items</b>	
Depreciation	Added back
Amortization	Added back

<b>Restructuring charges (expense)</b>	Added back
<b>Restructuring charges (income from reversal)</b>	Subtracted
<b>Losses on sale of fixed assets etc.</b>	Added back
<b>Gains on sale of fixed assets etc.</b>	Subtracted
<b>Amortization of long-term bond discounts</b>	Added back
<b>Amortization of long-term bond premiums</b>	Subtracted
<b>Deferred taxes (Liability)</b>	<b>Added back</b> (if a company is growing & has the ability to indefinitely defer its tax liability)*
<b>Deferred taxes (Assets)</b>	<b>Subtracted</b> (if it is not expected to reverse in near future)
*If deferred tax liability is not expected to reverse in the near future	

Other items	Adjustments to NI to arrive at FCFF
<b>After-tax interest expense</b>	Added back
<b>Preferred stock dividends</b>	Added back
<b>FCInv</b>	Subtracted
<b>WCInv</b>	Subtracted

Practice: Example 2  
Volume 4, Reading 30.



**3) Cash flow from financing activities (CFF):** It is the net amount of cash generated from company's financing activities i.e. raising or repaying capital.

IFRS v/s U.S. GAAP treatment of Interest, Dividends & Options granted to employees			
		IFRS	U.S. GAAP
1.	Interest received	Operating or Investing	Operating
2.	Interest paid	Operating or Financing	Operating
3.	Dividends received	Operating or Investing	Operating
4.	Dividends paid	Operating or Financing	Financing
5.	Cash received from exercise of Options granted*	Financing	Financing
6.	Tax benefit from issuing options	Financing	Financing

\* These CF's should not be used for forecasting cash flows when they are not expected to persist in the future.

\*When computing equity value, analysts are allowed to use the number of shares **expected** to be outstanding (based on the exercise of employee stock options) instead of the number of shares currently outstanding.

In case of U.S. GAAP, FCFF is estimated as follows:

$$\text{FCFF} = \text{CFO} + \text{Int} (1 - \text{Tax rate}) - \text{FCInv}$$

Practice: Example 3, 4 & 5  
Volume 4, Reading 30.



### 3.2 Computing FCFF from the Statement of Cash Flows

Three components of Cash Flow Statement are:

**1) Cash Flow from operating activities (CFO):** It is the net amount of cash generated by the company's operations i.e. cash received from customers, cash paid to suppliers, taxes paid etc.

$$\text{CFO} = \text{NI} + \text{NCC} - \text{WCInv}$$

#### NOTE:

Cash Flow from Operations (CFO) is not free cash flow

**2) Cash flow from investing activities (CFI):** It is the amount of cash used for (or generated from) company's investments in (or sales of) long-term assets (e.g. PPE).

### 3.4 Computing FCFE from FCFF

$$\text{FCFE} = \text{FCFF} - \text{Int} \times (1 - \text{Tax rate}) - \text{preferred stock dividends}^* + \text{Net Borrowing} + \text{issuance of preferred stocks} - \text{redemption of preferred stock}$$

\*unlike interest payments on debt, preferred stock dividends paid are not tax deductible.

$$\text{FCFE} = \text{NI} + \text{NCC} - \text{FCInv} - \text{WCInv} + \text{Net Borrowing} + \text{issuance of preferred stocks} - \text{redemption of preferred stock}$$

$$\text{FCFE} = \text{CFO} - \text{FCInv} + \text{Net Borrowing} + \text{issuance of preferred stocks} - \text{redemption of preferred stock}$$

**Total value of Equity (common)** = Total Firm value –  
Market value of Debt –  
Preferred stock

Practice: Example 6 & 13,  
Volume 4, Reading 30.



### 3.5 Finding FCFF and FCFE from EBIT or EBITDA

**FCFF** = EBIT (1 – Tax rate) + Dep – FCInv – WCInv

**FCFF** = EBITDA (1 – Tax rate) + Dep (Tax rate) – FCInv – WCInv

**FCFE** = FCFF – Int (1 – Tax rate) + Net borrowing +  
issuance of preferred stocks – redemption of  
preferred stock

Practice: Example 7,  
Volume 4, Reading 30.



### 3.6 FCFF and FCFE on a Uses-of-Free Cash-Flow Basis

#### Uses of Positive FCFF:

Increase (or minus decrease) in cash balances

Plus: Net payments to providers of debt capital, which are calculated as:

- Plus: Interest expense × (1 – Tax rate)
- Plus: Repayment of principal
- Minus: New borrowing

Plus: Payments to providers of equity capital, which are calculated as:

- Plus: Cash dividends.
- Plus: Share repurchases
- Minus: New share issuance

#### NOTE:

Uses of FCFF must equal the sources of FCFF

#### Sources of covering negative free cash flows:

- Draw down cash balances
- Borrow additional cash
- Issue equity

#### NOTE:

**Company's leverage is increased when a company:**

- Increases cash by doing additional borrowings.
- Pays cash dividends.
- Repurchases shares.

**Company's leverage is decreased when a company:**

- Increases cash from issuing net new shares.
- Uses cash to make principal payments in excess of new borrowings.

#### Uses of FCFE:

Plus: Increase (or minus decrease) in cash balances

Plus: Payments to providers of equity capital, which are calculated as:

- Plus: Cash dividends
- Plus: Share repurchases
- Minus: New share issuance

#### NOTE:

Uses of FCFE must equal the sources of FCFE

### 3.7 Forecasting FCFF and FCFE

Two methods are used to forecast future FCFF and FCFE.

**1)** In the first method, historical growth rate is used as a future growth rate. A constant growth rate to a current level of free cash flow is applied and it is assumed that historical relationship between free cash flow and fundamental factors is expected to continue in the future.

Practice: Example 8  
Volume 4, Reading 30.



**2)** The second method is a complex approach in which each component of free cash flow is forecasted individually i.e. EBIT (1 – Tax rate), non cash charges, FCInv, WCInv are forecasted.

#### Major Assumptions made in simple sales-based forecasting method for FCFF and FCFE:

- 1) Investment in fixed capital in excess of depreciation (FCInv – Dep) and investment in working capital (WCInv) both are assumed to have a constant relationship to forecasted increase in sales (which represents increase in the size of the company).
- 2) Capital structure, which is represented by the debt ratio (DR) i.e. Debt/(Debt + Equity) is constant.

- 3)  $(FCInv - Dep)$  = net new investment. It represents capital expenditures required for growth in fixed capital.
- 4)  $(FCInv - Dep)$  and  $WCInv$  is financed based on target DR.
- 5) Depreciation is the only noncash charge.

Following Inputs are required for valuation:

- a) Forecasts of sales growth rates.
- b) Forecasts of the after tax operating margin (for FCFF forecasting) or, Forecasts of the profit margin (for FCFE forecasting)
- c) Estimates of the relationship of incremental  $FCInv$  to sales increases.
- d) Estimates of the relationship of  $WCInv$  to sales increases.
- e) Estimates of DR.

**Forecasted FCFF** = Forecasted EBIT  $\times (1 - \text{Tax rate}) - FCInv - WCInv$

Incremental fixed capital expenditures as a proportion of sales increases are calculated as follows:

$$\frac{\text{Capital expenditures} - \text{Depreciation expense}}{\text{Increase in sales}}$$

Incremental working capital expenditures as a proportion of sales increases are calculated as follows:

$$\frac{\text{Increase in working capital}}{\text{Increase in sales}}$$

Capital expenditures have two components:

- a) Expenditures necessary to maintain existing capacity i.e. fixed capital replacement: These are related to *current* level of sales.
- b) Incremental expenditures necessary for growth: These are related to *forecast* of sales growth.

**FCFE** = NI -  $(FCInv - Dep)$  -  $WCInv$  + Net borrowing

where,

Net borrowing =  $DR \times (FCInv - Dep) + DR \times (WCInv)$

or

**FCFE** = NI -  $(FCInv - Dep)$  -  $WCInv$  +  $(DR) \times (FCInv - Dep)$  +  $(DR) \times (WCInv)$

or

**FCFE** = NI -  $\underbrace{(1-DR) \times (FCInv - Dep)}_{\text{Financed by Equity}} - \underbrace{(1-DR) \times (WCInv)}_{\text{Financed by Equity}}$

In case of FCFE, analyst should start with NI and have to forecast any net new borrowing or net preferred stock issue.

**Practice: Example 11**  
Volume 4, Reading 30.



#### NOTE:

When all noncash charges are incorporated into the valuation of stock instead of assuming that depreciation is the only noncash charge; then it is more appropriate to forecast each individual component separately for forecasting FCFE.

### 3.8 Other Issues in Free Cash Flow Analysis

#### 3.8.1) Analyst Adjustments to CFO:

- Less transparent financial statements and poor quality of accounting disclosures make it difficult for analysts to adjust CFO for free cash flow analysis.
- Existence of complicated transactions also makes adjustments to CFO difficult.
- Factors which lead to discrepancies between changes in balance sheet and changes in statement of cash flows include:
  - i. Acquisitions and divestitures.
  - ii. Presence of non-domestic subsidiaries.
  - iii. Currency translation of earnings of non-domestic subsidiaries.

#### Important:

Transactions between company and its shareholders i.e. cash dividends, share repurchases, and share issuances do not affect free cash flow.

Changes in leverage i.e. use of more debt financing affect free cash flow because they increase after tax interest expense and reduce the cash flow available to equity.

However, increase in leverage do not affect FCFF. It affects FCFE in two ways:

- i. It increases FCFE by the amount of debt issued (in the year when it is issued).
- ii. After debt is issued, FCFE is then reduced by the after-tax interest expense (when interest is paid) and principal repayment.

**Practice: Example 9 & 10**  
Volume 4, Reading 30.



**Practice: Example 12,**  
Volume 4, Reading 30.



### 3.8.2) Free Cash flow v/s Dividends and other Earnings components

Dividends are cash flows that are actually paid to shareholders whereas free cash flow to equity is the cash flow that is available to be distributed to shareholders without impairing the company's economic value.

DDM and FCFF/FCFE values usually differ. However, DDM and FCFE model result in identical value of stock when the inputs used in the valuation are same and mutually consistent.

The economic forces (e.g. growth, business & industry life cycle phase etc.) have similar effects on both FCFF/FCFE and dividends i.e.

- Rapidly growing company has higher retention and low payout ratio. Similarly, rapidly growing company has high capital expenditures, which lead to low FCFF/FCFE.
- Mature company has fewer investment opportunities, thus, it pays high dividends and has high FCFF/FCFE.

FCFF/FCFE can be easily used in a DCF valuation model to value the firm or to value equity.

**CFO, NI, EBIT, EBITDA** etc. should not be used as cash flow measures since they either double count or omit cash flows. These measures do not account for the reinvestment in capital assets and working capital, different capital structures, after tax interest expenses, preferred dividends, or funds that bondholders supply to finance investments in operating assets.

**EBITDA is a poor proxy for free cash flow to the firm:**

- It does not account for working capital and fixed capital expenditures.
- It does not account for depreciation tax shield.
- It is a poor proxy for FCFE or cash available to company's investors.
- It is before tax measure; therefore, before tax rate should be used to discount it instead of WACC, which is after tax rate.

## 4.

### FREE CASH FLOW MODEL VARIATIONS

The free cash flow models are much more complex than the dividend discount models because in order to estimate FCFF and FCFE various things should be taken into account i.e. sales, profits, investments, financing costs etc.

#### 4.1 An international application of the Single-stage model

- When inflation rates are high and volatile, real cash flows should be used instead of nominal cash flows.
- It is more preferable to use real values (and real discounts rates) instead of nominal values (and nominal discount rates) for valuing international stocks.

**Challenges in valuing equities from multiple countries:**

- Macroeconomic factors i.e. interest rates, inflation rates, growth rates etc. are difficult to incorporate.
- Analysts have to deal with various accounting standards of different countries.

**Modified Build-Up method to estimate real discount rate:**

Country return (Real) [in %]  
 +/- Industry Adjustment [in %]  
 +/- Size Adjustment [in %]  
 +/- Leverage Adjustment [in %]  
Required rate of return (real) [in %]

While using the above mentioned adjustments, real growth rates are used for FCFE.

**Single-Stage FCFF and FCFE Model for International Valuation:**

$$\text{Value of firm} = V_0 = \frac{FCFF_0 \times (1 + g_{real})}{WACC_{real} - g_{real}} = \frac{FCFF_1}{WACC_{real} - g_{real}}$$

$$\text{Value of Stock} = V_0 = \frac{FCFE_0 \times (1 + g_{real})}{r_{real} - g_{real}} = \frac{FCFE_1}{r_{real} - g_{real}}$$

**Practice: Example 13**  
**Volume 4, Reading 30.**

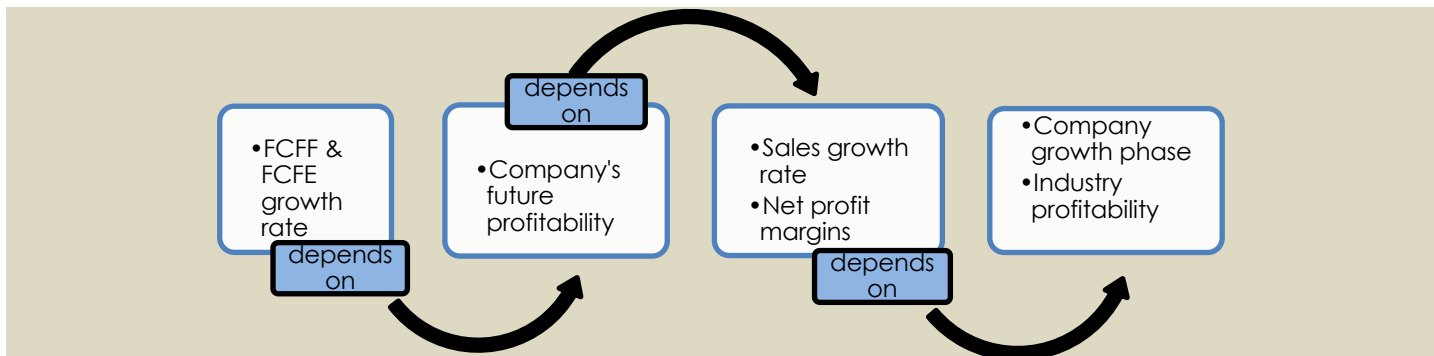


#### 4.2 Sensitivity Analysis of FCFF and FCFE Valuations

**Sensitivity Analysis:** It shows how sensitive an analyst's valuation results are to changes in each input of a model. Some variables have greater effect on valuation results than others.

There are two sources of error in valuation analysis:

- Errors in estimating the future growth rate of FCFF and FCFE. Since, growth rates and duration of growth are difficult to forecast.
- Errors in choosing correct (representative) base years for the FCFF and FCFE growth forecasts.



A highly profitable company in a growing industry has high growth in profits for few years. As competition increases and fewer opportunities are available for expansion of market size & market share, profit margins start falling.

**Practice:** Example 15,  
Volume 4, Reading 30.



### Types of Two-Stage Model

#### 4.3.1) Fixed Growth rates in Stage 1 and Stage 2:

**Practice:** Example 16,  
Volume 4, Reading 30.



#### 4.3.2) Declining Growth rate in Stage 1 and constant growth in Stage 2:

**Practice:** Example 17,  
Volume 4, Reading 30.



#### Two-stage model of FCFE with declining Sales growth rate in Stage 1:

**Practice:** Example 18,  
Volume 4, Reading 30.



**Doing Valuation for large companies:** In order to value a large company, analyst estimates sales, profits, investments and financing for each division/subsidiary and then add up the cash flows for all divisions/subsidiaries to get the total free cash flows of the whole company.

### 4.4 Three-Stage Growth Models

- Constant growth rate for each stage.
- Constant growth rate in stage 1 and 3 and a linearly declining growth rate in Stage 2.

#### Approaches for estimating Terminal Value in a Multi-Stage Valuation Model

There are two basic approaches to estimate terminal value:

- Using Single-Stage (constant-growth) Model.

### 4.3 Two-Stage Free Cash Flow Models

In two-stage free cash flow models, the growth rate in the second stage is long-term sustainable growth rate.

- For a declining industry, the second-stage growth can be slightly < GDP growth rate.
- For an industry with future growth rate higher than the overall economy, the second-stage growth rate can be slightly > GDP growth rate.

#### NOTE:

In DDMs the growth rate is the dividend growth rate; while in FCF models, the growth rate can be the growth rate of FCFF, FCFE, NI, EBIT, sales etc.

#### Two-stage FCFF valuation model equation is:

$$\text{Firm Value} = \sum_{t=1}^n \frac{\text{FCFF}_t}{(1 + \text{WACC})^t} + \underbrace{\frac{\text{FCFF}_{n+1}}{(\text{WACC} - g)}}_{\text{Terminal Value}} \times \underbrace{\frac{1}{1 + \text{WACC}^n}}_{\text{Discount factor}}$$

#### Two-stage FCFE valuation model equation is:

$$\text{Equity Value} = \sum_{t=1}^n \frac{\text{FCFE}_t}{(1 + r)^t} + \underbrace{\frac{\text{FCFE}_{n+1}}{(r - g)}}_{\text{Terminal Value}} \times \underbrace{\frac{1}{(1 + r)^n}}_{\text{Discount factor}}$$

## 2) Using a Multiple Approach: For Example,

Terminal value in year n = (trailing P/E) × (earning in year n)

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

**NOTE:**

Terminal Value is very sensitive to growth rate assumption since it represents a large percentage of total value estimated.

## 5. NON-OPERATING ASSETS AND FIRM VALUE

**Value of Firm** = Value of Operating Assets + Value of Non-operating Assets

where,

Value of Operating Assets = value estimated by discounting FCFF

Non-operating assets are:

- Excess cash\*
- Excess marketable securities
- Land held for investment

\* Excess cash can be estimated by finding any amount in excess of the amount predicted by multiplying total assets by the industry median level of the ratio of cash to total assets i.e.

**Excess Cash**

= Total Cash Available

$$- \left[ \text{Total Assets of Firm} \times \frac{\text{Median level of Industry cash}}{\text{Median level of Industry Total Asset}} \right]$$

**NOTE:**

Non-current investments in stock and bonds, which are financial investments not operating subsidiaries, should be reflected at their market value instead of book values.

**Practice:** End of Chapter Practice Problem: Q1, Q10 & FinQuiz Item-set ID#11270& 16095.



**Price Multiples:** Price multiples are ratios of a stock's market price to some measure of fundamental value per share e.g. P/E, P/CFs, P/Sales, P/Net assets etc.

**Enterprise Value Multiples:** Enterprise Multiples are ratios of the total market value of all sources of a company's capital (enterprise value) to a measure of fundamental

value for the entire company e.g. EV(Enterprise value)/EBITDA, EV/sales, EV/CFO etc.

**Momentum Indicators:** They relate either price or a fundamental i.e. earnings to time series of its own past values or to its expected value.

## 2. PRICE AND ENTERPRISE VALUE MULTIPLES IN VALUATION

There are two methods used in Price and Enterprise multiple valuations.

### 2.1 The Method of Comparables

When asset valuation is based on multiples of comparable/similar or benchmark assets, this method is known as method of comparables. The similar assets are also known as the *comparables*, the *comps* or the *guideline assets* (or guideline companies in case of equity valuation).

**Example:**

$P/E \text{ of benchmark} = 25x$

$EPS \text{ of a company} = \$ 1.75$

$\text{Value of a company stock} = 1.75 \times 25 = \$ 43.75$

**NOTE:**

$P/E = 25x$  means it takes 25 units of currency to buy 1 unit of earnings.

Or

$P/B \text{ of peer group} = 2.2x$

Book Value per Share (BVPS) of a company = \$23

Fair value of stock =  $2.2 \times \$23 = \$50.60$ . This value is compared to stock's actual market price i.e.

If fair value > actual market price → stock is undervalued.  
If fair value < actual market price → stock is overvalued.

**Relative v/s Absolute valuation:** The terms undervalued & relatively undervalued have different meanings. When a comparison is made to stock's own intrinsic value, then we use the term "under/over valued". While comparing a stock with another stock (Benchmark), we use a term "Relatively under/over valued".

**Practice:** Example 1,  
Volume 4, Reading 31.



#### Choices used for the Benchmark Value:

- Closely matched individual stock.
- Average or median value of the multiple for the stock's industry peer group.
- Average or median value of the multiple for the stock's industry or sector.
- The Multiple of a representative equity index.
- Average past value of the multiple for the stock.

**NOTE:**

*Economic Rationale behind the method of comparables is the "Law of one price".*

### 2.2 The Method Based on Forecasted Fundamentals

When asset valuation is based on multiples that are derived from forecasted fundamentals/characteristics of a business (i.e. related to profitability, growth, or financial strength) this method is known as method of Forecasted Fundamentals.

**Example:**

*Intrinsic Value estimated by DCF model = \$10*

*Forecasted EPS = \$1.5*

*Forward P/E =  $\$10 / \$1.5 = 6.67x$ .*

*Thus, price multiple of an asset is related to its expected future cash flows.*

When justified P/E > actual P/E → stock is undervalued.  
When justified P/E < actual P/E → stock is overvalued.

## 3. PRICE MULTIPLES

### 3.1 Price to Earnings

**Rationales for using P/E multiples:**

- Earning power is a major driver of investment value.
- P/E ratio is widely known and used by investors.

- Differences in stock's P/E can be used to explain differences in long-term average returns on investments in those stocks.

**Drawbacks of using P/E multiples:**

- EPS can be zero, negative or very low relative to

price. Thus, when it is used as a denominator in P/E it does not make any economic sense.

- It is difficult to distinguish between transient and recurring/ongoing components of earnings.
- EPS may be distorted by management, which does not reflect accurate economic performance and makes comparison difficult.

### 3.1.1) Alternative Definitions of P/E:

The numerator in P/E is the current market price of a common stock. However, when using EPS (used in denominator), the following two issues must be considered:

- The time horizon over which earnings are measured.
- Adjustments made to accounting earnings.

**Alternative Definitions of P/E are as follows:**

**1) Trailing P/E or Current P/E:** It is also known as trailing 12 months EPS (TTM).

$$= \frac{\text{Current Market Price per share}}{\text{most recent 4 Quarters' EPS}}$$

**2) Forward P/E or Leading P/E or Prospective P/E:**

$$= \frac{\text{Current Market Price per share}}{\text{Next Year's Expected Earnings}}$$

*Valuation is a forward looking process; therefore, analysts usually prefer to use forward P/E.*

**3) Normalized P/E:** When EPS is negative or does not represent company's earning power due to business cycles, then, P/E based on longer run average expected EPS is used. This is known as normalized P/E.

#### NOTE:

- Forward P/E will be smaller than the trailing P/E when company's earnings are rising.
- When earnings are difficult to predict, trailing P/E is more appropriate to use than forward P/E.
- When company's financial/operating structure is expected to change in future then forward P/E is more appropriate to use than trailing P/E.

**Other definitions include:**

- P/last reported annual EPS.
- P/ EPS forecasted for one year to three years ahead
- Median P/E: Rounded average of the four middle values of the range of annual average P/Es over the past 10 years.

### 3.1.2) Calculating the Trailing P/E:

The analyst must consider the following when using trailing earnings in P/E.

## 1) Potential Dilution of EPS

### Basic EPS

$$= \frac{\text{Total Earnings}}{\text{Weighted Average number of shares actually outstanding during the period}}$$

### Diluted EPS

$$= \frac{\text{Total Earnings}}{\text{number of shares outstanding when holders of i.e. executive stock options, equity warrants, convertible bonds * exercised their options to obtain common stock}}$$

*\*when convertible bond is converted, it affects both earnings and number of shares i.e. earnings are increased since issuer is no longer required to pay interest on bonds and number of shares outstanding are increased as issuer issues the required number of shares.*

### 3.1.2.1 (#2) Transitory, non-recurring components of earnings, which are company-specific.

The analyst focuses on earnings, which are expected to persist in the future i.e. earnings that exclude non-recurring items. These earnings are called:

- Underlying Earnings
- Persistent Earnings
- Continuing Earnings
- Core Earnings

Analyst studies income statement, footnotes to the income statement and MD&A to identify non-recurring items.

- **Non-recurring items include:** Gains/losses from sale of assets, write-downs, goodwill impairment, provisions for future losses and changes in accounting estimates (i.e. change in useful lives of assets, amount of uncollectible receivables etc.).
- Cash Flow component of earnings should be assigned a greater weight than the accrual component of earnings in valuation.

**Practice: Example 3, Volume 4, Reading 31.**



### 3.1.2.2 (#3) Transitory components of earnings due to Business & industry cyclicality.

In cyclical businesses e.g. automobiles, heavy machinery manufacturers etc., the most recent four quarters of earnings may not reflect the average or long-term earning power of a company due to business cyclical effects inherent in such businesses e.g.

*Trailing EPS is often low or negative at bottom of a cycle and high at the top of a cycle. This is known as the Molodovsky effect.*

This problem is removed by normalizing EPS. Two most common methods used to calculate normalized EPS are as follows:

**i. The method of Historical average EPS:** Normalized EPS is calculated as average EPS over the most recent full cycle.

**Drawback:** This method does not account for changes in a business's size.

**ii. The method of average return on equity:** Normalized EPS is calculated as:

- Average ROE from the most recent full cycle × Current Book Value per Share (BVPS)
- Average ROA × Total Assets Or Average ROE × Total Shareholder's equity

Useful for company which has reported a loss

**Advantage:** This method more accurately reflects the effect of changes in company size on its EPS.

**Practice:** Example 4, Volume 4, Reading 31.



**3.1.2.3 (#4) Differences in accounting methods:** For example, company that uses LIFO cannot be compared with company that uses FIFO. Thus, analyst is required to adjust earnings for these accounting methods to do ratio comparison and valuation analysis.

**3.1.2.4 Dealing with Extremely Low, Zero or Negative Earnings:**

- The security with the lowest positive P/E has the lowest purchase cost per currency unit of earnings i.e. securities are ranked from the lowest to the highest P/E ratio.
- When earnings are zero, P/E cannot be calculated.
- When earnings are negative, P/E is negative. This negative P/E is actually the most expensive in terms of earnings purchased. Negative P/E is not meaningful.
- Negative EPS can be handled by either using normalized EPS or using Earnings Yield (inverse price ratio i.e. E/P). When earnings yield is used, securities are ranked from the highest to the lowest.
- Earnings yield can also be used in case of extremely low earnings.
- Earnings yield (Inverse price ratio) has distribution, which is less vulnerable to outlier-induced skewness.

**See:** Exhibit 3, Volume 4, Reading 31.



### 3.1.3) Forward P/E

In forward P/E, following definitions of expected EPS are used by analysts.

- i. The next four quarters EPS:** i.e. forecasted EPS for the next 4 quarters.
- ii. The next 12 months (NTM) EPS:** i.e. combination of annual EPS estimates from two fiscal years, which are weighted to reflect the relative closeness of the fiscal year.
- iii. The next fiscal year EPS:** i.e.

- a) Current fiscal year EPS (FY1 = Fiscal year 1).
- b) Following Fiscal Year (FY2 = Fiscal year 2).

**Practice:** Example 5 & 6, Volume 4, Reading 31.



### 3.1.4) Valuation based on Forecasted Fundamentals

When the stock price used in the P/E ratio is calculated using the DCF model, analyst can determine what value the market should place on a unit of EPS on the basis of fundamentals i.e. company's profitability, growth and cost of capital etc.

#### 3.1.4.1 Justified P/E:

By using Gordon Growth model (constant growth model) P/E of a stock is calculated as follows:

$$\text{Justified Forward P/E} = P_0/E_1 = \frac{D_1/E_1}{r-g} = \frac{1-b}{r-g}$$

$$\text{Justified Trailing P/E} = P_0/E_0 = \frac{D_0(1+g)/E_0}{r-g} = \frac{(1-b) \times (1+g)}{r-g}$$

where,

$P$  = price

$E$  = earnings

$D$  = dividends

$r$  = required rate of return

$g$  = dividend growth rate

$b$  = retention rate

- All else equal, the higher the expected dividend growth rate and the higher the stock's intrinsic value the higher its justified P/E.
- All else equal, the lower the stock's required rate of return, the higher the stock's intrinsic value and the higher its justified P/E.

**Practice:** Example 7 & 8, Volume 4, Reading 31.



### 3.1.4.2 Predicted P/E based on Cross-sectional Regression

To understand this concept,

**Practice:** Example 9,  
Volume 4, Reading 31.



#### Advantages of Cross-sectional regression:

- It summarizes a large amount of data in a single equation.
- It can provide a useful additional viewpoint on a valuation.

#### Limitations of the Cross-sectional regression model:

- The predictive power of the regression for a different stock and different time period is unknown.
- The regression coefficients and explanatory power of regressions tend to change substantially over a number of years.
- Interpretation of individual regression coefficients is difficult due to the presence of multicollinearity.

### 3.1.5) Valuation based on Comparables

In this approach, stock's actual price multiple is compared with the benchmark multiple or the company's stock value is estimated by applying a benchmark multiple to the company's actual or forecasted earnings.

It involves the following steps:

- 1) Select and calculate the price multiple.
- 2) Select the benchmark asset and calculate its price multiple.
- 3) Compare stock's price multiple with benchmark multiple (or equivalently, use the adjusted benchmark multiple to estimate the value of a company's stock).
- 4) Assess the difference between the stock multiple and benchmark multiple and see whether it can be explained by differences in the fundamentals (or equivalently, assess differences between the estimated value of the company's stock and the current price of the company's stock).

**Rule:** When a company's P/E < (>) peer's P/E, company is relatively undervalued (overvalued).

#### Choices for benchmark assets:

- Average or median value of the P/E for the stock's peer group of companies in the industry.
- Average or median value of the P/E for the stock's industry or sector.
- The P/E of a representative equity index.

- Average past value of the P/E for the stock.
- Closely matched individual stock's P/E.

Financial ratio analysis can be used to evaluate the differences between company's multiple and the benchmark market value of the multiple.

#### Important:

When a stock is compared to its benchmark, analysts should make sure that it has similar expected growth rate and similar risk.

#### 3.1.5.1 Peer Company Multiples:

Companies operating in the same industry as the subject company i.e. peer group are frequently used as comparison assets. The subject stock's P/E is compared with the median or mean P/E for the peer group to arrive at a relative valuation i.e.

When stock's P/E < the median or mean P/E for the peer group → Stock is Undervalued

When stock's P/E > the median or mean P/E for the peer group → Stock is Overvalued

Or

Benchmark P/E × EPS of a Company = Fair value of stock  
→ This fair value is compared with its actual market price.

The following relationships for P/E hold, all else equal:

- If the subject stock's expected earnings growth > average or median expected earnings growth of benchmark then, a stock's P/E > benchmark P/E is justified.
- If the subject stock's operating & financial risk > average or median operating and financial risk of benchmark then, stock's P/E < benchmark P/E is justified.
- The stock with the greatest expected growth rate or the lowest risk (all else equal) is the most attractively valued.

**Practice:** Example 10,  
Volume 4, Reading 31.



#### PEG ratio:

It is a ratio that represents a stock's P/E per percentage point of expected growth i.e.

$$\text{PEG ratio} = \frac{\text{Stock's P/E}}{\text{Expected Earnings Growth Rate in \%}}$$

- The lower the PEG ratio, the more attractive the stock is, all else equal.
- PEG ratio < 1 is considered an indicator of attractive value level.

**Limitations of PEG ratio:**

- PEG assumes a linear relationship between P/E and growth and does not incorporate compounding effects.
- PEG ratio does not take into account the differences in risk of stocks, which is an important determinant of P/E.
- PEG ratio does not take into account the differences in duration of growth i.e. if short term growth rate is used in denominator then it does not capture differences in long term growth prospects.

**Practice:** Example 11,  
Volume 4, Reading 31.

**NOTE:**

When stock has higher growth than median peer group but risk is similar to that of median peer group, then, it should be traded at a premium to the median P/E of its peer group.

**3.1.5.2 Industry and Sector Multiples:**

Median or mean P/Es for industries and for economic sectors are frequently used in relative valuations. Using industry and sector P/Es also help analysts in determining whether the peer group comparison assets are themselves appropriately priced.

**NOTE:**

Median P/Es are insensitive to outliers unlike Mean P/Es.

**Overall Market Multiple:**

Analyst can also use equity market indices as comparison assets.

**Practice:** Example 12,  
Volume 4, Reading 31.



- Higher than average P/E of a stock can be due to:
  - Lower than average interest rates.
  - Higher than average expected growth rates.
  - Market as a whole is overvalued.
  - Earnings are abnormally low.
- The time frame for comparing average multiples is important.

**The Fed Model:**

There is an inverse relationship between value and interest rates. It can be observed from the expression of P/E i.e. we know that P/E is inversely related to required rate of return and that risk free rate is one component of the required rate of return.

The Fed Model developed a relationship between Earnings yield (E/P) \* on the S&P 500 & the yield to maturity on 10-yr U.S. treasury bonds i.e.

- When market's current earnings yield > 10-yr U.S. Treasury Bonds yield → Stock market is undervalued.
- When market's current earnings yield < 10-yr U.S. Treasury Bonds yield → Stock market is overvalued.
- The justified or fair value P/E for S&P 500 = 
$$\frac{1}{10\text{-year Treasury Bond Yield}}$$

\* Next 12 months earnings are used in calculation.

**The Yardeni Model:**

$$CEY = CBY - (b \times LTEG) + \text{Residual}$$

where,

CEY = current earnings yield on the market index i.e. E/P.

CBY = current Moody's investors service A-rated corporate bond yield.

LTEG = consensus 5-year earnings growth rate forecast for the market index.

b = coefficient which measures the weight the market gives to 5-year earnings projections.

By taking inverse of the above equation the equation becomes:

$$\frac{P}{E} = \frac{1}{CBY - b \times LTEG}$$

- Higher corporate bond yields imply → lower justified P/E
- Higher expected long-term growth rate results → higher justified P/E

**Drawbacks of the Fed Model:**

- It inadequately reflects the effects of inflation.
- It incorrectly incorporates the differential effects of inflation on earnings and interest payments.
- The relationship between interest rates and earning yields is assumed to be linear.

**3.1.5.4 Own Historical P/E:**

Past values of the stock's own P/E can also be used as a basis for comparison i.e.

**Justified price** = Benchmark value of own historical P/Es × Most recent EPS

When EPS is negative, normalized EPS can be used in the above equation.

**Practice:** Example 15,  
Volume 4, Reading 31.



**Limitations of using Historical P/Es:**

- Historical P/E leads to incorrect valuation when:
  - company's business has changed over time.
  - financial leverage has changed over time.
  - changes in the interest rate environment and economic fundamentals i.e. inflation occurs over different time periods.
- Changes in company's ability to pass through cost inflation to higher prices over time may also affect the reliability of use of Historical P/E.

**3.1.6) P/Es in Cross-Country Comparisons**

The following factors should be considered when comparing P/Es of different companies.

- The effect of differences in accounting standards on EPS.
- The effect of differences in macroeconomic situations on market wide benchmarks e.g. differences in inflation rates and in the ability of companies to pass through inflation in their costs in the form of higher prices to their customers.

**Practice:** Example 16,  
Volume 4, Reading 31.



- When cost pass-through percentage < 100%  
→ Justified P/E is inversely related to Inflation rate.
- When cost pass-through percentage = 100%  
→ Justified P/E is not affected by Inflation rate.
- The higher the inflation rate, the greater will be the impact of incomplete cost pass-through on P/E.

**3.1.7) Using P/Es to obtain Terminal Value in Multistage Dividend Discount Models**

Terminal value of a stock is an important component of total value of a stock. Terminal value should reflect a sustainable long-run earnings growth rate.

**Approaches for estimating Terminal Value in a Multi-Stage Valuation Model**

There are two basic approaches to estimate terminal value:

- 1) Using Single-Stage (constant-growth) Model.
- 2) Using a Multiple Approach which is known as terminal price multiple: There are two methods of estimating Price Multiple i.e.
  - i. Based on Fundamentals
  - ii. Based on Comparables

**1. Terminal Value based on Fundamentals:**

**Terminal value in year n** = (justified trailing P/E) × (forecasted earnings in year n)

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

**2. Terminal Value based on Comparables:**

**Terminal value in year n** = (Benchmark trailing P/E) × (forecasted earnings in year n)

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

**NOTE:**

*Terminal Value is very sensitive to growth rate assumption since it represents a large percentage of total value estimated.*

**Terminal Price Multiple based on Comparables:** Various choices are available to be used as benchmark value i.e.

- Median industry P/E
- Average industry P/E
- Average of stock's own past P/Es

**Advantages of Using a Comparables Approach:**

- It is based on market data unlike Gordon Growth model that is based on forecasted values of required rate, growth rate, payout ratio etc.

**Disadvantage of Using a Comparables Approach:**

- If the benchmark value that is used in calculation is mispriced, this mispricing is also transferred to terminal value of a stock.

**Practice:** Example 17,  
Volume 4, Reading 31.

**3.2****Price to Book Value**

$$P/B = \frac{\text{Price per Share}}{\text{Book Value per Share}}$$

where,

Book value per share (BVPS) for equity shareholders =

$$\frac{\text{total assets} - \text{total liabilities} - \text{preferred stock}}{\text{number of common stock shares outstanding}} =$$

$$\frac{\text{shareholders' equity} - \text{total value of equity claims that are senior to common stock}^*}{\text{number of common stock shares outstanding}}$$

\* It includes preferred stock and dividends in arrears on preferred stock.

$$\text{BVPS for whole company} = \frac{\text{total assets} - \text{total liabilities}}{\text{number of shares outstanding}}$$

#### Rationale for using P/B ratio:

- BV is generally positive even when EPS is zero or negative.
- BVPS is more stable than EPS.
- BVPS is appropriate to use for companies with liquid assets e.g. finance, investment, insurance and banking institutions.
- BVPS can be used for liquidating companies.
- Differences in P/Bs can be used to explain differences in long-term average returns.

#### Drawbacks of using P/B ratio:

- It does not take into consideration human capital i.e. value of skills and knowledge of workforce as part of assets.
- It is a misleading valuation indicator when the companies have different business models and their levels of the assets being used are different from each other.
- Accounting effects make P/Bs less useful i.e. differences in the treatment of intangible assets, R&D etc.
- Presence of inflation and technological changes make BVPS a poor representative of value of shareholders' investments.
- Share repurchases or issuances may distort historical comparisons i.e. when a company repurchases shares at a price > current BVPS, it lowers the overall BVPS for the company.

**Practice:** Example 18 & 19, Volume 4, Reading 35.



#### Adjustments made to P/B to make it more useful include:

Computing Tangible BVPS i.e.

Common shareholders' equity – reported intangible assets on Balance Sheet e.g. goodwill.\*

\*Goodwill: excess of the purchase price of an acquisition over the fair value of acquired tangible assets and specifically identifiable intangible assets.

Adjusting BVPS by restating BV of the company using LIFO to FIFO basis.

Adjustments made to BV for off-balance sheet assets and liabilities e.g. operating lease etc.

Analysts should also take into consideration the differences in accounting standards regarding how assets and liabilities are valued in financial statements i.e.

- Financial assets (marketable securities) are reported at Fair value.
- Investments classified as "held to maturity" and reported on a historical cost basis are an exception.
- Some financial liabilities are also reported at fair value.
- Non-financial assets e.g. land and PPE are reported at historical acquisition costs.

#### Rule for Impairment:

When reported amount (Carrying Value\*) of an asset > recoverable amount

\*Carrying value of an asset is reduced and that reduction is shown as impairment loss. (Both IFRS & U.S. GAAP).

U.S. GAAP does not allow upward revaluation. However, IFRS allow companies to report either a revalued amount or an amount based on historical cost.

**Practice:** Example 20, Volume 4, Reading 35.



### 3.2.2 Valuation based on Forecasted Fundamentals

$$\text{Justified P/B} = P_0/B_0 = \frac{ROE - g}{r - g}$$

- The larger the ROE is as compared to  $r$ , the higher is the justified P/B.
- All else equal, when the two stocks have same P/B, then, the stock which has higher ROE is relatively undervalued.
- When doing relative valuation, analysts should consider the differences in ROE, risk and expected earnings growth rates.

#### Justified P/B based on residual income model is:

$$\text{Justified P/B} = P_0/B_0 = 1 + \frac{\text{Present value of expected future residual earnings}}{B_0}$$

- When  $ROE = r$ , PV of expected future residual earnings = 0 and Justified P/B = 1.
- When  $ROE > r$ , PV of expected future residual earnings is positive and Justified P/B > 1.
- When  $ROE < r$ , PV of expected future residual earnings is negative and Justified P/B < 1.

#### NOTE:

Mostly Trailing BV is used in P/B ratio.

**NOTE:**

- EPS is a *flow* variable relating to Income Statement.
- BVPS is a *stock or level* variable relating to Balance Sheet.

**Valuation based on Comparables**

When a company's P/B < (>) peer's P/B, company is relatively undervalued (overvalued).

**Practice: Example 21,**  
**Volume 4, Reading 35.**

**3.3 Price to Sales**

P/S ratio has long been used in the valuation of privately held companies i.e. investment companies and companies in partnership form. It is also used for the equity valuation of public companies

$$P/S = \frac{\text{Price per share}}{\text{Annual net sales per share*}}$$

\*Net Sales = Total Sales – returns– customer discounts

**Rationale for using P/S ratio:**

- Sales are less subject to distortion or manipulation by management.
- Sales are positive even when EPS is negative.
- Sales are generally more stable than EPS, which reflects operating and financial leverage.
- P/S ratio is useful for valuing stocks of mature, cyclical and zero-earnings companies.
- Differences in P/S can be used to explain differences in long-term average returns.

**Drawbacks of using P/S ratio:**

- High sales growth does not indicate whether a company is operating profitably or not.
- In P/S ratio, share price reflects the effect of financial leverage on profitability and risk of a company whereas the sales measure is a pre-financing income measure. Thus, EV/Sales ratio is preferred to P/S.
- P/S does not account for the differences in cost structures among different companies e.g. a firm with high variable cost v/s firm with high fixed costs.
- Revenue recognition practices by management can distort P/S.

**NOTE:**

When two stocks have same P/E then the stock with the higher P/S has a higher (actual/forecasted) Net Profit Margin. It is calculated as:

$$\frac{P/S}{P/E} = \frac{E}{S}$$

**Practice: Example 22,**  
**Volume 4, Reading 35.**

**3.3.2 Valuation based on Forecasted Fundamentals**

P/S can be stated in terms of Gordon Growth Model i.e.

$$\text{Justified P/S} = \frac{P_0}{S_0} = \frac{\left(\frac{E_0}{S_0}\right)(1-b)(1+g)}{(r-g)}$$

where,

$E_0/S_0$  = Business's profit margin

- The greater the Net Profit margin and the lower the required rate of return → the higher is the P/S ratio.
- The higher the earnings growth rate (g) → the higher the Justified P/S.

$$g = \text{Retention rate (b)} \times \text{ROE}$$

OR

$$g = b \times PM_0 \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Shareholders' Equity}}$$

where,

$PM_0$  = Profit Margin at  $t = 0$

**NOTE:**

Increase (decrease) in Profit Margin leads to higher sustainable growth rate as long as sales do not decrease (increase) proportionately.

**Practice: Example 26,**  
**Volume 4, Reading 35.**

**3.3.3) Valuation Based on Comparables**

When a company's P/S < (>) peer's P/S, company is relatively undervalued (overvalued).

**NOTE:**

P/S ratios are mostly reported on the basis of trailing sales.

**Practice: Example 27,**  
**Volume 4, Reading 35.**

**3.4 Price To Cash Flow**

$$\text{Price-to-Cash Flow} = \frac{\text{Price per share}}{\text{Earnings plus noncash charges}}$$

Or

$$\text{Price-to-Cash Flow} = \frac{\text{Price per share}}{\text{Cash flow from Operations}}$$

Or

$$\text{Price-to-Cash Flow} = \frac{\text{Price per share}}{\text{FCFE}}$$

Or

$$\text{Price-to-Cash Flow} = \frac{\text{Price per share}}{\text{EBITDA*}}$$

\*It is an estimate of pre-interest, pre-tax operating cash flow

- The greater the growth rate of FCFE or CFO the higher the P/Cash Flow ratio.
- The lower the required rate, the higher the P/Cash Flow ratio.

**NOTE:**

Mostly analysts use *trailing* Price-to-cash flow ratios i.e.

$$\text{Trailing Price-to-Cash Flow} = \frac{\text{Current Market Price per share}}{\text{Sum of the most recent 4 quarters' Cash Flow per share}}$$

**Rationale for using P/Cash Flow ratio:**

- Cash flow is less subject to manipulation by management than earnings.
- Cash flow is generally more stable than earnings.
- P/CF helps analysts in determining the differences in quality of earnings.
- Differences in P/CFs can be used to explain differences in long-term average returns.

**Drawbacks of using P/CF ratio:**

- When earnings plus non-cash charges are used as a cash flow measure, it neglects non-cash revenues and net changes in working capital.
- FCFE better represents cash flows but it is more volatile than CFO and it is usually a negative value.
- Companies can manage cash flow measures as well i.e. CFO is enhanced by securitizing accounts receivable or by outsourcing the payment of accounts payable etc. These practices are known as Opportunistic Accounting choices.

**Practice:** Example 28 & 29,  
Volume 4, Reading 35.

**Adjustments to CFO:**

- Adjustments are made to CFO for the items which are non-recurring.
- Adjustments are made to CFO for the different accounting standards used by different companies e.g. IFRS allow interest expense to be

reported as either Operating or Financing but U.S. GAAP requires companies to report interest expense as operating Cash flows.

**3.4.2) Valuation Based on Forecasted Fundamentals**

Justified price to Cash flow based on fundamentals is calculated as follows:

- 1) Value of stock is found by using most suitable DCF model.
- 2) Then that calculated value is divided by cash flow (e.g. CFO, FCFE, EBITDA, Earnings-plus-noncash-charges etc.).

- The lower the stock's required rate of return, the higher is the Justified P/CF, all else equal.
- The higher the growth rate of expected future cash flows, the higher is the Justified P/CF, all else equal.

**Practice:** Example 30,  
Volume 4, Reading 35.

**3.4.3) Valuation based on Comparables**

When a company's P/CF < (>) peer's P/CF, company is relatively undervalued (overvalued).

**Practice:** Example 31,  
Volume 4, Reading 35..

**3.5 Price to Dividends and Dividend Yield**

We know,

Total Return on Equity Investment = Capital Appreciation + Dividend Yield

$$\text{Dividend Yield} = \frac{D}{P} = \frac{\text{Dividend per share}}{\text{Price per share}}$$

$$\text{Trailing Dividend Yield} = \frac{\text{Dividend Rate*}}{\text{Current market Price per share}}$$

**Leading Dividend Yield =**

$$\frac{\text{Forecasted Dividend per share over the next year}}{\text{Current market Price per share}}$$

\***Dividend Rate:** It is the annualized fixed amount of the most recent dividends.

For Companies paying Quarterly Dividends:

**Dividend Rate =** 4 × most recent quarterly per share dividend

For Companies paying Semi-annual Dividends:

**Dividend Rate** = the most recent annual per share dividend

$$\text{Justified Dividend Yield} = \frac{D_0}{P_0} = \frac{r-g}{1+g}$$

#### Rational for using Dividend Yield:

- Dividend yield is a part of total return.
- Dividends are assumed to be a less risky and more certain part of total return than capital appreciation.

#### Drawbacks of using Dividend Yield:

- Dividend yield represents just one component of total return. Thus, total expected return is unknown.
- Receiving higher dividends today leads to lower earnings in future (higher dividends lead to slower growth in earnings). This concept is known as **Dividend Displacement of Earnings**.
- Dividends are considered to have lower risk as compared to capital appreciation return. This is based on the assumption that market is biased in its risk assessment of return.

**Practice:** Example 32,  
Volume 4, Reading 35.



#### 3.5.2) Valuation Based on Forecasted Fundamentals

By using Gordon Growth Model, Dividend Yield is calculated as follows:

- The greater the required rate of return, the higher is the Dividend Yield.
- The lower the growth rate of earnings, the higher is the Dividend Yield.

#### Important:

Stocks with higher dividend yields reflect Value Investment Style.

#### 3.5.3) Valuation Based on Comparables

When Company's Dividend Yield > (<) benchmark's Dividend Yield → stock is undervalued (overvalued), all else equal.

It should be assessed whether companies have different dividend yields because of differences in their growth rates.

#### Safety of Dividend:

- A high payout ratio as compared to other companies operating in the same industry indicates a less secure dividend.
- Interest coverage ratio and ratio of net debt to EBITDA are also used to determine safety of dividends.

**Practice:** Example 33,  
Volume 4, Reading 35.



### 4. Enterprise Value Multiple

Enterprise Value Multiples are multiples that relate the enterprise value of a company to some measure of value. For example

- EV/EBITDA (useful for Capital intensive Companies)
- EV/EBITDAR (R stands for rent and this measure is usually used for analysis of Airline industry)
- EV/EBITA (useful for license-based companies e.g. Telecom)
- EV/EBIT (useful for Service-based companies e.g. Banks)
- EV/Sales
- EV/FCFF

**See:** Exhibit 20,  
Volume 4, Reading 35.



Market value of debt – Cash & Investments

where,

- Market Value of Common equity = Number of shares outstanding × Price per share
- Cash & Investments = cash, cash equivalents, short term investments etc.
- \*If minority interest exists and it is not included elsewhere, then it should be added back.

**Minority Interest:** It refers to that portion of equity in the subsidiary that is not owned by the parent.

**Practice:** Example 34,  
Volume 4, Reading 35.



**Enterprise Value** = Market Value of Common equity +  
Market value of preferred stock\* +

### 4.1.2) Valuation based on Forecasted Fundamentals

- The higher the expected growth rate in FCFF, the higher is the Justified EV/EBITDA based on fundamentals.
- The higher the business's **WACC**, the lower is the Justified EV/EBITDA based on fundamentals.
- Justified EV/EBITDA based on fundamentals is positively related to expected profitability i.e. return on invested capital (ROIC)

$$\text{ROIC} = \frac{\text{Operating profit after tax}}{\text{Total invested Capital}}$$

### 4.1.3) Valuation Based on Comparables

When a company's EV/EBITDA < (>) peer's EV/EBITDA, company is relatively undervalued (overvalued).

#### NOTE:

An alternative to Enterprise Value is Total Invested Capital (TIC)

**TIC** = Market Value of Common equity + Market value of preferred stock + Market value of debt

**Practice:** Example 35,  
Volume 4, Reading 35.



## 4.2 Other Enterprise Value Multiples

### Rationale for using EV/EBITDA & EV/Sales:

- EV/EBITDA is preferred to P/EBITDA since EV (enterprise value) includes the value of debt and EBITDA is a pre-interest measure and represents a cash flow to both debt and equity.
- EBITDA is useful for capital intensive companies.
- EBITDA is usually positive even when EPS is negative.
- EV/EBITDA is more appropriate than P/E when companies being compared have different capital structures i.e. amount of debt/financial leverage.
- EV/Sales is preferred to use than P/S when companies being compared have different capital structures, amount of debt/financial leverage.

### Drawbacks of using EV/EBITDA:

- EBITDA overstates CFO when working capital is rising.
- EBITDA ignores revenue recognition policies.

**Practice:** Example 36,  
Volume 4, Reading 35.



## 5. INTERNATIONAL CONSIDERATIONS WHEN USING MULTIPLES

Comparing companies across borders frequently involves dealing with differences in:

- Accounting methods
- Cultural differences
- Economic differences
- Differences in risk and growth opportunities.

#### Important:

- P/CFO and P/FCFE are *least* affected by accounting differences.
- P/B, P/E and P/EBITDA are *most* affected by accounting differences.

## 6. MOMENTUM VALUATION INDICATORS

Momentum Valuation Indicators relate either price or a fundamental to the time series of their own past values price or to the fundamental's expected values. It includes:

- Earnings surprise (or unexpected earnings)
- Standardized unexpected earnings (SUE)
- Relative strength (also known as Technical indicators or Price momentum)

#### Earnings surprise

$$UE_t = EPS_t - E(EPS_t)$$

where,

$UE_t$  = unexpected earnings for quarter  $t$

$EPS_t$  = reported/actual EPS for quarter  $t$

$E(EPS_t)$  = expected EPS for the quarter

$$\text{Percent Earnings Surprise} = \frac{\text{Earnings Surprise}}{\text{Expected EPS}}$$

$$\text{Scaled Earnings Surprise} = \frac{\text{Earnings Surprise}}{\text{S.D of analysts' earnings forecast}}$$

- EPS forecast error of a given size in relation to the mean is more meaningful when there is less disagreement among analysts' forecasts.

- Economic rationale behind Earnings Surprise is that Positive surprises may lead to persistent positive abnormal returns in future.

**Practice: Example 37,  
Volume 4, Reading 35.**



### Standardized Unexpected Earnings (SUE)

$$SUE_t = \frac{EPS_t - E(EPS_t)}{\sigma [EPS_t - E(EPS_t)]}$$

where,

$EPS_t$  = reported/actual EPS for time  $t$

$E(EPS_t)$  = expected EPS for the time  $t$

$\sigma [EPS_t - E(EPS_t)]$  = S.D of  $[EPS_t - E(EPS_t)]$  over some historical time period.

- The smaller (larger) the historical size of forecast errors, the more (less) meaningful a given size of EPS forecast error is.

**Practice: Example 38,  
Volume 4, Reading 35.**



### Relative strength

- Relative strength allows comparison of a stock's performance during a period with its own past performance.
- Relative strength allows comparison of a stock's performance during a period with the performance of some group of stocks e.g.

$$\text{Relative strength indicator} = \frac{\text{Stock's performance}}{\text{Performance of an Equity Index}}$$

- When value of this ratio increases, stock price increases relative to the index.
- Relative-strength indicator is scaled to 1.00 at the beginning of the study period.

**Practice: Example 39,  
Volume 4, Reading 35.**



## 7. VALUATION INDICATORS: ISSUES IN PRACTICE

### 7.1 Averaging Multiples: The Harmonic Mean

#### Harmonic Mean

It is the reciprocal of the arithmetic mean of the reciprocals i.e.

$$X_H = \frac{n}{\sum_{i=1}^n \left(\frac{1}{X_i}\right)}$$

#### Weighted Harmonic Mean:

It is the most appropriate measure.

$$X_{WH} = \frac{1}{\sum_{i=1}^n \left(\frac{w_i}{X_i}\right)}$$

where,

$w_i$  = portfolio value weights

For example:

- There are two stocks in a portfolio i.e. A & B.
- Stock A market capitalization = \$715 million
- Stock B market capitalization = \$585 million
- Stock A Earnings = \$71.50 million
- Stock B Earnings = \$29.25 million
- Weight of stock A =  $715 / (715 + 585) = 55\%$
- Weight of stock B =  $585 / (715 + 585) = 45\%$
- A's P/E =  $\frac{715}{71.5} = 10$
- B's P/E =  $\frac{585}{29.25} = 20$

$$1) \text{ Portfolio P/E} = \frac{(715 + 585)}{(71.50 + 29.25)} = 12.90$$

$$2) \text{ Arithmetic Mean (A.M) P/E} = \frac{10 + 20}{2} = 15$$

$$3) \text{ Weighted A.M P/E} = (0.55 \times 10) + (0.45 \times 20) = 14.5$$

$$4) \text{ Harmonic Mean P/E} = \frac{1}{\left[ \frac{0.5 \times \left(1 + \frac{P}{E} \text{ of A} \right)}{(0.5 \times 0.10)} + \frac{0.5 \times \left(1 + \frac{P}{E} \text{ of B} \right)}{(0.5 \times 0.05)} \right]} = 13.33$$

$$5) \text{ Weighted Harmonic Mean P/E} = \frac{1}{\left[ \frac{0.55 \times \left(1 + \frac{P}{E} \text{ of A} \right)}{(0.55 \times 0.10)} + \frac{0.45 \times \left(1 + \frac{P}{E} \text{ of B} \right)}{(0.45 \times 0.05)} \right]} = 12.90$$

Thus, it can be observed that Weighted H.M P/E is the same as Portfolio P/E calculated above.

- H.M < A.M
- H.M gives less weight to higher P/Es and more weight to lower P/Es.
- For an equal weighted Portfolio, H.M and weighted H.M will be equal.
- H.M mitigates the impact of large outliers.
- H.M aggregates the impact of small outliers but such outliers are bounded by zero on the downside.

## 7.2 Using Multiple Valuation Indicators

### Screening:

It is the method of selecting stocks based on a set of criteria which reduces an investment universe to a smaller set of investments. Criteria may consist of the following:

*Market capitalization from \$3 to \$7 million*  
*Dividend Yield  $\geq 4.5\%$*   
*P/E  $\leq 10$*

### Limitations of Screening:

- User has lack of control in the calculation of important inputs.
- Screening is based on quantitative factors; thus, Qualitative factors are absent.

### Growth Factors:

- *Five-year EPS growth rate.*
- *Five-year Sales per share growth rate.*
- *Five-year internal growth rate.*
  - *Internal growth rate:  $ROE \times \text{Earnings retention rate}$*

### Value Factors:

- *P/BV*
- *P/S*
- *P/CF*
- *Dividend Yield*

**Practice:** Example 41,  
Volume 4, Reading 35.



### Definitions:

- **Look Ahead Bias:** A bias caused by using information which was not available on the day of calculation or valuation.
- **Sector Rotation Strategy:** An investment Strategy that over-weights those economic sectors which are expected to outperform the overall market.

**Practice:** End of Chapter Practice Problems: Q1-3; Q6-7; Q9; Q12-13; Q16-17 & FinQuiz Item-set ID# 16130.



## 1.

## INTRODUCTION

Residual Income is the residual or remaining income after taking into consideration the costs of all of a company's capital.

Company's income statement includes a charge for the cost of debt capital in the form of interest expense, but it does not include a charge for the cost of equity capital. Thus, a company can have positive net income but if net income is not enough to pay for the cost of equity capital, it does not add value for shareholders. This means that accounting income may overstate return from the equity investors' perspective. The rationale for using the Residual Income model is that it takes into account all costs of the capital used in generating income.

**NOTE:**

In this whole Reading, it is assumed that Clean Surplus Accounting holds; which means Income reflects all changes in the BV of equity other than ownership transactions i.e.

**Ending BV of equity** = Beginning BV of equity + Earnings - Dividends

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

&amp;

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

## 2.

## RESIDUAL INCOME

Following are two approaches used to estimate Residual Income:

$$\begin{aligned} \text{1) Residual Income (RI)} &= \text{Net Income} - \text{Equity Charge} \\ &= \text{Net Income} - (\text{Equity Capital} \times \text{Cost of Equity Capital}^*) \end{aligned}$$

*\*Cost of equity capital is a finance concept, which measures shareholders' opportunity costs. The cost of equity is the marginal cost of equity, which is also referred to as the required rate of return on equity.*

**Practice:** Example 1,  
Volume 4, Reading 32.



$$\begin{aligned} \text{2) Residual Income} &= \text{NOPAT} - \text{Total Capital Charge} \\ &= \text{NOPAT} - \text{Debt Charge} - \text{Equity Charge} \\ &= \text{NOPAT} - (\text{after-tax cost of debt} \times \text{Debt Capital}) - (\text{cost of equity capital} \times \text{Equity Capital}) \end{aligned}$$

where,

NOPAT = Net Operating Profit After Taxes

These two approaches provide the same results when two assumptions hold:

- Marginal Cost of debt = Current Cost of Debt\*  
\*Current Cost of debt is the cost that is used to estimate Net Income.
- Weights of debt & equity are estimated from the book value of debt and equity. These weights are used to calculate the capital charge.

When a company has preferred stock financing as well, then

$$\text{Residual Income (RI)} = \text{Net Income} - \text{Equity Charge} - \text{Preferred Stock Dividends}$$

Residual Income (RI) can also be calculated as follows:

$$RI = (\text{ROIC}^* - \text{Effective Capital Charge}) \times \text{Beginning Capital}$$

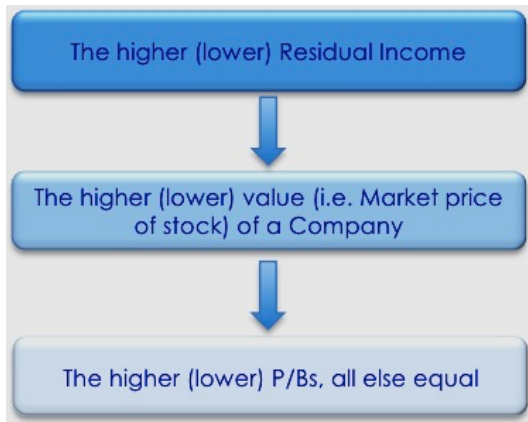
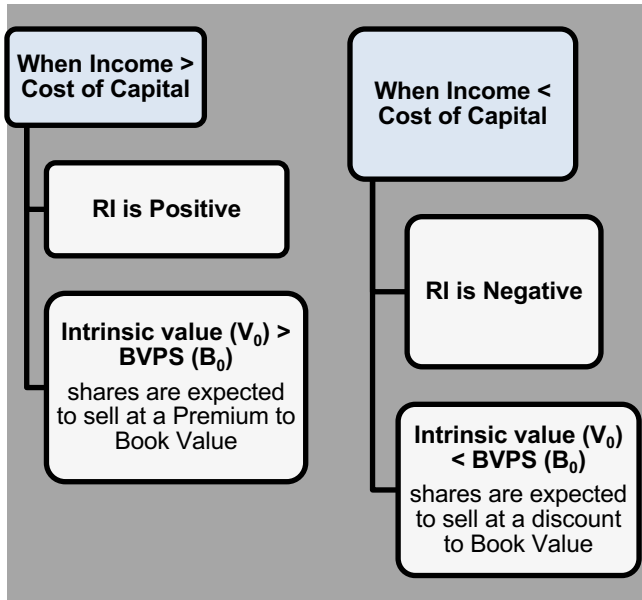
where, ROIC = Return on Invested Capital

When Company's capital charge > After-tax Return on Total Assets (or Capital)



Company is not Economically Profitable

## 2.1 The Use of Residual Income in Equity Valuation



### Uses of Residual Income Models:

- RI models are used to value both individual stocks and the DOW Jones Industrial Average.
- RI models are used to measure Goodwill impairment.
- RI commercial implementations (as discussed

below) are used to measure internal corporate performance and executive compensation.

- RI models can be used to estimate justified market multiples e.g. P/E, P/B etc.

### Variety of names of Residual Income:

- Economic Profit
- Abnormal Earnings (in forecasting future RI)
- Discounted Abnormal Earnings Model
- Edwards-Bell-Ohlson Model

## 2.2 Commercial Implementations

### 1) Economic Value Added (EVA)

It measures the value created by firm/management for the shareholders *during a given year*.

$$EVA = NOPAT - (C\% \times TC)$$

Or

$$EVA = [EBIT (1 - t)] - (WACC \times \text{invested capital})$$

where,

NOPAT = Net Operating Profit After Taxes

C% = cost of capital

TC = Total capital

t = marginal tax rate

WACC × invested capital = dollar cost of capital

Invested capital = net working capital + net fixed assets

= BV of long-term debt + BV of equity

### Adjustments made to NOPAT & TC include:

- R&D expenses are capitalized and amortized i.e. added back to earnings to compute NOPAT.
- Capital charge on strategic investments is not expensed.
- Goodwill is capitalized.
- Amortization expense on Goodwill is added back when computing NOPAT.
- Accumulated amortization expense on Goodwill is added back to capital.
- Only cash taxes are taken as expense and Deferred taxes are ignored.
- Inventory LIFO reserve is added back to capital.
- Increase in inventory LIFO reserve is added back when computing NOPAT.
- Non-recurring items are adjusted.
- Operating leases are treated as capital leases.

### 2) Market Value Added (MVA)

It measures the value created by management's decisions since the *firm's inception*.

$$MVA = \text{Market value of the company} - \text{Accounting book value of total capital}$$

$$= \text{Market value of the company} - (\text{BV of Debt} + \text{BV of Equity})$$

- When Market value > accounting BV of capital, then a Company has Positive Economic Profit.

### 3. THE RESIDUAL INCOME MODEL

$$\text{Residual Income} = RI_t = E_t - (r \times B_{t-1}) = (ROE - r) \times B_{t-1}$$

where,

$RI_t$  = expected per-share residual income in year  $t$ ,  
 $r$  = required rate of return on equity investment (cost of equity)

$E_t$  = expected EPS for period  $t$

$B_{t-1}$  = ending book value of equity in year  $t-1$

$ROE$  = expected return on equity

According to the RI model, the intrinsic value of stock/equity is the sum of two components i.e.

- Current Book Value of Equity that is  $B_0$ .
- Present value of expected future residual income i.e.

$$\left\{ \frac{RI_1}{(1+r)^1} + \frac{RI_2}{(1+r)^2} + \frac{RI_3}{(1+r)^3} + \dots \right\}$$

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r)^t} = B_0 + \sum_{t=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}$$

$$V_0 = B_0 + \left\{ \frac{RI_1}{(1+r)^1} + \frac{RI_2}{(1+r)^2} + \frac{RI_3}{(1+r)^3} + \dots \right\}$$

where,

$V_0$  = value of a share of stock today  $t = 0$

$B_0$  = current per-share book value of equity

$B_t$  = expected per-share book value of equity at any time  $t$

$r$  = required rate of return on equity investment (cost of equity)

$E_t$  = expected EPS for period  $t$

$B_{t-1}$  = ending book value of equity in year  $t-1$

$RI_t$  = expected per-share residual income in year  $t$ ,

**Practice:** Example 2 & 3,  
Volume 4, Reading 32.



**Practice:** Example 4 & 5,  
Volume 4, Reading 32.



#### 3.2 Fundamental Determinants of Residual Income

Residual income valuation is most closely related to P/B. Using Gordon Growth model (constant-growth) and sustainable growth rate ( $g = b \times ROE$ ), justified P/B ratio is calculated as follows:

$$\text{Justified P/B} = \frac{P_0}{B_0} = \frac{ROE - g}{r - g}$$

$$\text{Justified P/B} = \frac{P_0}{B_0} = 1 + \left( \frac{ROE - r}{r - g} \right)$$

where,

Justified Price is the stock's Intrinsic value i.e.  $P_0 = V_0$

Book value of equity =  $B_0$  = Total assets – total liabilities

**Important:**

- When PV of expected future RI is positive, Justified P/B based on fundamentals > 1.
- When PV of expected future RI is negative, Justified P/B based on fundamentals < 1.
- When PV of expected future RI is zero, Justified P/B based on fundamentals = 1.

$$\text{Tobin's } q = \frac{\text{Market Value of Debt and Equity}}{\text{Replacement cost of Total Assets}}$$

- The higher the productivity of company's assets, the higher is the Tobin's  $q$ , all else equal.
- Tobin's  $q$  is only useful for manufacturing or capital intensive companies i.e. Textile, sugar mills etc.
- Assets are valued at replacement cost rather than historical cost because replacement cost takes into account the effects of inflation.
- In technology or Service based companies, firm value can be greater than replacement cost of Total assets.

#### 3.3 Single-Stage Residual Income Valuation

##### Single-Stage Residual Income Valuation

**Assumptions:**

- Constant ROE
- Constant Earnings growth rate

#### 3.1 The General Residual Income Model

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - r) \times B_{t-1}}{(1+r)^t}$$

**NOTE:**

In this formula, ROE uses Beginning BV of equity; unlike Financial statement analysis in which ROE is estimated using average BV of equity.

$$V_0 = B_0 + \left( \frac{ROE - r}{r - g} \right) \times B_0$$

$\left( \frac{ROE - r}{r - g} \right)$  = It represents additional value expected due to the company's ability to generate returns greater than cost of equity

#### Important:

- When  $ROE = r$ ,  $RI = 0$  and  $V_0 = B_0$
- When  $ROE > r$ ,  $RI$  is positive and  $V_0 > B_0$
- When  $ROE < r$ ,  $RI$  is negative and  $V_0 < B_0$

**Practice:** Example 6 & 7,  
Volume 4, Reading 32.



#### Drawbacks of Single-stage model:

- Model assumes that the excess ROE above  $r$  will persist indefinitely: In reality, company's ROE will revert to mean value of ROE with passage of time. Also ROE will decline to the cost of equity in a competitive environment and RI eventually becomes zero.

#### Implied Growth rate in RI:

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

#### Assumption:

**Intrinsic value** = market price

### 3.4 Multi-Stage Residual Income Valuation

Like other valuation models, multi-stage RI model is used to forecast RI for a certain time horizon and after that period, a terminal value is forecasted based on continuing RI\* at the end of that time horizon.

**\*Continuing Residual Income:** It is the RI after the forecast horizon.

In Residual Income Model, Intrinsic value is the sum of three components:

$$V_0 = B_0 + (\text{PV of interim high-growth RI}) + (\text{PV of continuing residual income})$$

#### Steps to estimate value of stock/equity:

- Current BV per share is calculated.
- RI is calculated from year 1 to T-1 (during interim high-growth period).
- These RI is discounted at " $r$ " to get PVs of RI.
- PV of continuing RI is calculated at the end of T-1 using the following formula:

$$\text{PV of continuing RI in year T-1} = \frac{RI_T}{1+r-\omega}$$

where,

$\omega$  = persistence factor,  $0 \leq \omega \leq 1$

#### Persistence factor( $\omega$ ):

- It is i.e.  $\leq \omega \leq 1$ . For Example,  $\omega = 0.62$  means RI will decay at an average rate of 38% a year.
- The more sustainable the competitive advantage of a company, the higher is the persistence factor.
- The better the industry prospects, the higher is the persistence factor.
- The higher the persistence factor ( $\omega$ ), the higher is the value.
- Persistence factor varies from company to company.

#### Assumptions about the Continuing Residual Income:

**1) Residual Income is at a positive level currently and it will persist at this level in the future indefinitely.**

$$\text{PV of continuing RI in year T-1} = \frac{RI_T}{1+r-\omega} = \frac{RI_T}{1+r-1} = \frac{RI_T}{r}$$

**2) Residual Income will become zero from the terminal year forward.**

$$\text{PV of continuing RI in year T-1} = \frac{RI_T}{1+r-\omega} = \frac{RI_T}{1+r-0} = \frac{RI_T}{1+r}$$

**3) Residual Income declines to zero as ROE approaches  $r$  over time (and RI will become zero eventually). i.e.  $0 \leq \omega \leq 1$**

$$\text{PV of continuing RI in year T-1} = \frac{RI_T}{1+r-\omega}$$

**4) Residual Income declines to long-run mean level of mature industry.**

$$\text{PV of continuing RI in year T} = P_T - B_T$$

where,

$$P_T = B_T \times (\text{forecasted P/B ratio})$$

$$\text{PV of continuing RI in year T-1} = \frac{(P_T - B_T) + RI_T}{1+r}$$

#### NOTE:

- The longer the forecast period, the greater is the probability that company's RI will approach zero. Thus, for longer periods, RI can be treated as zero while for shorter forecast periods, forecasted premium is calculated.

**Practice:** Example 8, 9 & 10,  
Volume 4, Reading 32.



**Residual Income Persistence is lower when:**

- ROE is at an extreme level.
- Extreme levels of non-recurring and other special items.
- Extreme level of Accounting Accruals.

**Residual Income Persistence is higher when:**

- Dividend payout ratio is low.
- High historical RI persistence exists in the industry.

**4.****RESIDUAL INCOME VALUATION IN RELATION TO OTHER APPROACHES**

- RI model gives similar value as other valuation models e.g. DDM and free cash flow models when assumptions used in the valuation are similar.
- Value is recognized earlier in RI models as compared to other PV approaches. Thus, RI model has advantage over other approaches as it is less sensitive to terminal value estimates.

**Practice:** Example 11,  
Volume 4, Reading 32.

**Weaknesses of Residual Income Models:**

- 1) RI model requires detailed knowledge of accrual accounting.
- 2) RI model cannot be used in case of higher degree of distortion and poor quality of accounting disclosure
- 3) RI model is based on accounting data, which is highly subject to management manipulation and requires significant adjustments.
- 4) RI model is appropriate only when clean surplus relation holds. When this relation does not hold, then analysts are required to make appropriate adjustments.
- 5) RI model is based on the assumption that interest expense accurately reflects cost of debt.

**RI model is most appropriate to use when:**

- The company does not pay dividends.
- The company pays dividends but these are not predictable.
- The company's expected free cash flows are negative within the analyst's forecast horizon.
- High uncertainty exists in forecasting terminal values using other PV models.
- Company has transparent financial reporting and high quality earnings.

**RI model is least appropriate to use when:**

- Clean surplus accounting does not exist.
- There is higher degree of distortion and poor quality of accounting disclosure.
- Two Principal drivers of RI i.e. ROE & Book Value are not predictable.

**4.1 Strengths and Weakness of the Residual Income Model****Strengths of Residual Income Models:**

- 1) Unlike DDM or Free cash flow models where large fraction of a stock's total value is represented by the expected terminal value, terminal value in RI model is a small portion of total value.
- 2) RI models use accounting data that is readily available.
- 3) RI model can be easily applied to non-dividend paying companies or to companies with negative free cash flows.
- 4) RI model can be used when it is difficult to forecast cash flows.
- 5) RI model focuses on economic profit.

**5.****ACCOUNTING AND INTERNATIONAL CONSIDERATIONS**

RI model is based on accrual accounting data; therefore, this model is very sensitive to accounting choices. If aggressive accounting policies are used by a company, then using RI model without adjustments will lead to errors in valuation.

In order to apply the RI model accurately, analysts need to adjust book value of common equity for off-balance sheet items and net income is adjusted to obtain comprehensive Income.

**Comprehensive Income** = Net Income + Other comprehensive income\*

*\* It includes events and transactions that result in a change to equity but are not reported on income statement (other than contributions by, and distributions to, owners).*

Book value and future earnings have balancing effects on each other, provided the clean surplus relationship is followed, i.e. companies which make aggressive

(conservative) accounting choices will report higher (lower) book values and lower (higher) future earnings.

For example

- When a company capitalizes expenditure instead of expensing it, current-year earnings & current book value (BV) are overstated.
- If capitalization of expenditures continues over time for a sizeable company, ROE will decline as earnings will be normalized over long-term due to amortization and BV will be overstated.
- For growing company where expenditures are increasing, ROE will remain at higher level and will not decline.

**Accounting issues in applying RI model include:**

### 5.1 Violations of Clean Surplus Relationship

This occurs when items are charged directly to shareholders' equity, bypassing income statement. Items that usually bypass the income statement include:

- Foreign currency translation adjustments.
- Certain pension adjustments.
- Fair value changes of some financial instruments e.g. in available for sale investments (both IFRS & U.S. GAAP), change in market value is reflected directly in equity instead of income statement.
- Some changes in fair value of fixed assets (i.e. IFRS permits revaluation of fixed assets).

#### NOTE:

When items bypass income statement, only net income is affected and book value of equity remains accurate.

Valuation is biased only when the present expected value of clean surplus accounting violations do not net to zero.

It is more appropriate to calculate historical ROE on aggregate level i.e. NI/shareholders' equity instead of using per share values i.e. EPS & BVPS when share issuance and share repurchases occur.

Growth rate in RI is generally not equal to the growth rate of net income or dividends.

**Practice:** Example 12 & 13, Volume 4, Reading 32.



Balance sheet assets & liabilities should be adjusted to fair value when possible.

Items to be reviewed for balance sheet adjustments include:

- **Inventory:** LIFO based inventories should be adjusted to FIFO.
- **Deferred tax assets & liabilities:** When deferred tax liability is not expected to reverse, it should be reported as equity.
- **Operating leases:** They should be treated as finance lease i.e. by increasing assets & liabilities by PV of expected future operating lease payments.
- **Special-purpose entities:** They should be consolidated in the financial statements of the parent company.
- **Reserves and allowances:** e.g. Bad debts allowances should reflect the expected losses.
- **Pension assets or liabilities:** They should be adjusted to reflect the Funded status i.e. Projected benefit obligation (PBO) – fair value of plan assets

(Refer to Reading 20, Financial Reporting & Analysis, Volume 2, Curriculum for detail).

### 5.3 Intangible Assets

*Goodwill* should be included on the balance sheet to calculate BV of equity. Also, any amortization of *Goodwill* previously recorded should be removed when calculating ROE.

Value of *Identifiable intangible* assets (that can be sold or separated from equity) should be included in BV of equity.

When value of *Identifiable intangible* assets is declining over time, then they should be amortized as an expense over time.

Advertising expenditures are not capitalized. Rather these are recorded as expense.

RI is lower when R&D expenditures of a company are unproductive.

RI is higher when R&D expenditures of a company are productive.

When purchased in-process R&D is capitalized (as in IFRS) and amortized in a short period, overall value is not affected as compared to immediate expensing (as in U.S. GAAP).

When purchased in-process R&D is expensed immediately; this results in immediately lower ROE as compared to capitalizing R&D.

However, in future years, when purchased in-process R&D is expensed immediately; this results in slightly higher ROE as compared to capitalizing R&D, in future years.

### 5.2 Balance Sheet Adjustments of Fair Value Title

In order to estimate an accurate BV of equity:

Balance sheet should be adjusted for off-balance sheet items.

## 5.4 Nonrecurring Items

Companies often report nonrecurring charges as part of earnings or classify non-operating income as part of operating income. This misclassification leads to overestimations and underestimations of future RI. Analysts should remove effects of these nonrecurring items from operating income when forecasting residual income.

### NOTE:

*Book value is not affected by these items; therefore, no adjustments are required to be made to book value.*

Items that need adjustments to determine recurring earnings include:

- Unusual items
- Extraordinary items
- Restructuring charges
- Discontinued operations
- Accounting changes

## 5.5 Other Aggressive Accounting Practices

Analysts are required to evaluate a company's accounting policies carefully. They should examine whether a company engages in such accounting practices, which lead to overstatement of assets (book value) and/or overstatement of earnings. These practices include:

- Accelerating revenues i.e. bill & hold sales.
- Deferring expenses i.e. capitalizing expenditures.
- Use of "cookie jar" reserves, which are created to record excess losses or expenses in an earlier period and then used to increase income or cover expenses in future periods.

## 5.6 International Considerations

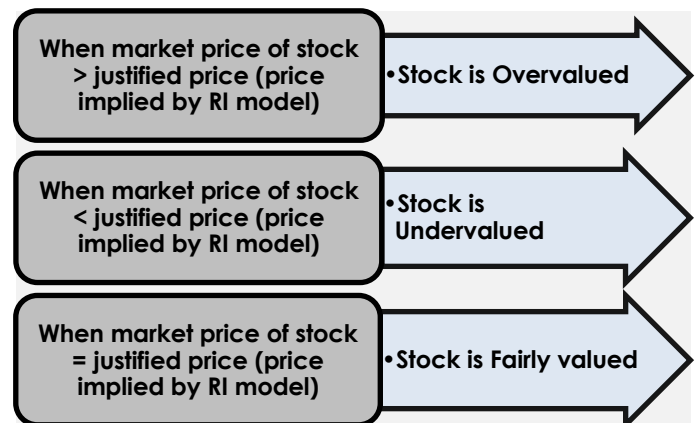
Accounting standards differ internationally and these differences lead to different measures of book value and earnings internationally and thus, make valuation models based on accrual accounting data unreliable.

RI model can be applied internationally when:

- Reliable earnings forecasts are available.
- Systematic violations of the clean surplus assumption are limited.
- Accounting rules used are not of "poor quality" i.e. they do not result in delayed recognition of value changes.

When these conditions are not satisfied, the analyst should consider using a valuation model which is less dependent on accrual accounting data i.e. FCFE model.

**How to evaluate the value of stock using Residual Income Model estimates of Value:**



**Practice:** End of Chapter Practice  
Problem: Q 2, 5, 6, 9, 10, 15 &  
FinQuiz Item-set ID#14103.



One of the major applications of Equity Valuation is the Private companies' valuation. Private companies' valuation can be applied:

- To value a start up operations of public companies.
- To estimate a value of specific transactions i.e.

acquisitions.

- To estimate fair value of Goodwill for the purpose of impairment testing.

## 2. THE SCOPE OF PRIVATE COMPANY VALUATION

Private company can be a small firm with a single employee or unincorporated businesses, or public companies that have been taken private in management buyouts etc.

### 2.1 Private and Public Company Valuation: Similarities and Contrasts

#### 2.1.1) Company-Specific Factors

These are the factors related to the characteristics of the firm itself. These factors have both positive and negative impact on private company valuation. These include:

- life cycle stage of the firm
- size of the firm
- markets in which the firm operates
- goals of the firm
- characteristics of management of the firm

#### Stage in Life Cycle:

- Private companies are typically less mature than public companies.
- Private companies have less capital
- Private companies have fewer assets and employees.
- Private companies may also include large, stable, going concerns and failed companies in the process of liquidation.

#### Size:

- Private companies are usually smaller in size.
- Private companies have higher risk due to their smaller size.
- The higher risk inherent in private companies increases the risk premium and the required rate of return.
- Smaller size also reduces growth opportunities as these companies have limited access to capital to fund investments.
- However, smaller companies have advantage of low compliance costs.

#### Overlap of Shareholders and Management:

- Private companies have higher managerial ownership. This benefits the companies by eliminating agency costs\*. Also, management is able to focus on long-term prospects of the company instead of

being pressurized from external investors to enhance short-term profitability.

**\*Agency costs:** Issues arise from the conflicting interests of owners (principals) & managers (agents).

#### Quality/Depth of Management:

- Small private companies are less attractive to management due to their limited growth potential.
- Due to small scale of operations, there is less management depth in these companies.
- These factors further lead to higher risk and lower growth.

#### Quality of Financial and Other Information:

- There is limited availability of financial and other information for private companies.
- The unavailability of financial information leads to uncertainty in valuation of such companies, which further increases risk.
- However, in cases where "fairness opinions" are required by firms i.e. in acquisitions, analysts are provided with unlimited access to financial information.

#### Pressure from short-term investors:

- Private companies do not face pressures regarding maintaining stock price performance in the short term.
- Private companies can take longer term investment focus.

#### Tax Concerns:

- Private companies are more sensitive to reduction in reported taxable income and corporate tax payments than public companies.

#### 2.1.2) Stock-Specific Factors

These are the factors related to stock of a private company. These factors are usually negative for private company valuation. These include:

- Liquidity of equity interests in business.
- Concentration of control in private companies.
- Potential agreements restricting liquidity.

**Liquidity of Equity interests in business:**

- Private company's stock has low liquidity as compared to public company's stock.
- Private companies have small number of shareholders.

**Concentration of Control:**

- In private companies, only one or few investors have control.
- This concentration of control benefits the controlling shareholders at the cost of other shareholders.

**Potential agreements restricting liquidity:**

- Private companies may have shareholder agreements, which restrict the ability to sell shares.
- These restrictions on sale reduce the marketability of private company's stock.

**NOTE:**

There is more heterogeneity in private firm risks, discount rates and valuation methods. This creates higher uncertainty and difficulty in private company valuations.

## 2.2 Reasons for Performing Valuations

Reasons for performing private company valuation can be categorized into three types:

- **Transaction-Related:** It includes events related to ownership, sale or financing of a business i.e.
  - **Private Financing:** Development stage companies require capital, which is provided by venture capital investors. Due to high risk, these investors invest through multiple rounds based on achievement of key developments called "milestones". Due to high uncertainty related to expected future cash flows, valuations are often informal and based on negotiations between the company and investors.
  - **Initial Public Offering (IPO):** An IPO increases the liquidity of a private company. In such events,

valuation is based on any identical public company data.

- **Acquisition:** Acquisition can be an attractive liquidity option for development stage or mature companies. In such events, valuation is performed by management of the target and/or buyer.
- **Bankruptcy:** In such events, valuation is performed to evaluate whether a company is more valuable as a going concern or in liquidation.
- **Share-based payment (compensation):** These transactions valuations often have accounting and tax implications to the issuer and employee.
- **Compliance-Related:** It is related to law or regulation requirements i.e.
  - **Financial Reporting:** Valuations that are required in Financial Reporting include goodwill. Goodwill impairment test is performed by undertaking a business valuation for a cash-generated unit (IFRS) of a firm or reporting unit (U.S. GAAP). Stock option grants will regularly require valuation in the case of private companies.
  - **Tax Reporting:** Tax-related reasons for valuations include corporate and individual tax reporting e.g. property tax, corporate restructuring, estate and gift taxation etc.
- **Litigation-Related:** It includes legal proceedings, which require valuation. i.e. damages, lost profits, shareholder disputes, divorce etc.

Each of the above mentioned categories require a specialized knowledge and skills to perform valuations accurately.

- Transaction related valuations are performed by investment bankers.
- Compliance related valuations are performed by professionals with accounting or tax regulation knowledge.
- Litigation related valuations are performed by professionals in a legal setting.

## 3. DEFINITIONS (STANDARDS) OF VALUE

It is important to understand the context of the valuation and the correct definition of value before estimating a value.

Following are the major definitions of value:

- **Fair market value:** This term can be defined as the price at which asset would change hands
  - Between a Hypothetical willing and able buyer & seller.
  - At arm's length in an open and unrestricted

market.

- When neither buyer nor seller has any compulsion to buy or sell.
- When both buyer and seller have reasonable knowledge.

**Note:** Fair market value is often used for tax reporting purposes.

- **Market Value:** It is defined as "estimated amount for which asset should exchange on the date of

valuation". It is characterized by:

- A willing buyer and seller
- An arm's length transaction after proper marketing.
- Prudent buyer and seller.
- Neither buyer nor seller has any compulsion to buy or sell.
- Both buyer and seller have reasonable knowledge.

**Note:** Market value is often used for real estate and tangible asset valuations.

- **Fair value (financial reporting):** It is characterized by:
  - An arm's length transaction.
  - Neither buyer nor seller has any compulsion to buy or sell.
  - Both buyer and seller have reasonable knowledge.

**Fair Value in IFRS:** "The price that would be received for an asset or paid to transfer a liability in a current transaction between marketplace participants in the reference market for the asset or liability".

**Fair Value in U.S.GAAP:** "The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date".

- **Fair value (litigation):** The definition of fair value in a litigation context is generally similar to the fair value definitions of financial reporting. It is set forth in the United States by state statutes and legal precedent in certain litigation matters.
- **Investment value:** It is a value which is specific to a particular investor i.e. based on the investor's perspectives on future earnings, level of risk, potential synergies, return requirements and financing costs etc.

- **Intrinsic value:** It is a value, which is based on available facts & information and it is considered to be the "true" or "real" value that will become the market value when other investors reach the same conclusion.
- The investment value may not necessarily be the same as the fair market value due to synergies.
- According to U.S. GAAP, fair value is the exit price. Exit price is the price received to sell an asset or transfer a liability. It should be  $\leq$  the price paid to buy that asset (**entry price**).
- IFRS does not specify an entry or exit price perspective in fair value determination.
- Private company valuation which is performed for a specific purpose for a particular valuation date and by using specific definition of value, cannot be applied for another purpose e.g. in order to value a controlling interest, analyst should not use value used for tax reporting purposes which is from the perspective of minority shareholder.

#### 4. PRIVATE COMPANY VALUATION APPROACHES

There are three major approaches to private company valuation:

**i) The Income Approach:** In this method, asset is valued as the PV of the discounted cash flows expected to receive from that asset. It is the same as DCF or PV models used in public companies' valuation.

- It is a type of **Absolute valuation** model.
- This approach is most appropriate for companies growing rapidly.

**ii) The market approach:** In this method, value of an asset is based on price multiples from sales of assets similar to the subject asset.

- It is a type of **Relative valuation** model.
- This approach is most appropriate for stable and mature companies.

- This approach is not appropriate to apply to a small, relatively mature private firm with low growth rate.
- In order to use price multiples of public firms, risks and growth prospects should not differ materially

**iii) The asset based approach:** In this method, value of an asset is based on the values of the underlying assets of the entire firm less the value of any related liabilities.

- It is a type of **Absolute valuation** model.
- This approach is most appropriate for companies at their earliest stages of development because:
  - Going-concern view is uncertain.
  - Future expected CFs are difficult to forecast.

**Valuation Approaches are selected based on specific factors i.e.**

- The nature of operations
- Stage in Lifecycle
- Size of the company

### Non-Operating Assets and Firm Value

**Value of Firm** = Value of Operating Assets + Value of Non-operating Assets

where,

Value of Operating Assets = value estimated by discounting FCFF

Non-operating assets are

- Excess cash
- Excess marketable securities
- Land held for investment

## 4.1 Earnings Normalization and Cash Flow Estimation Issues

### 4.1.1) Earnings Normalization issues for Private Companies

Private company valuations require significant adjustments to estimate the normalized earnings of the company.

In this reading, Normalized Earnings are defined as "Economic benefits adjusted for non-recurring, non-economic, or other unusual items to eliminate anomalies and/or facilitate comparisons".

- In private company, reported earnings may reflect discretionary expenses or expenses that are not at arm's length amounts due to the concentration of control.
- Tax and other motivations also result in over or understatement of earnings which do not represent normalized earnings i.e. above-market compensation to controlling shareholders in case of higher profits help in reducing income tax expense by reducing the taxable income.
- Similarly, in case of losses or low profits, expenses can be understated in order to overstate the current income.
- Personal-use of firm's assets and excess entertainment expenses also require an adjustment by an analyst.

**Practice: Example 1**  
**Volume 4, Reading 33.**



In case of real estate owned by the firm the following adjustments are required:

- If real property is used in business operations
  - Market rental charge should be added to expenses.
  - Any income and depreciation expenses are removed from the income statement.
- Real estate value represents a non-operating asset of the entity. It has different level of risks and expected future growth rate; therefore, it should be valued separately.
- When real estate is leased to the private firm by a related party, the lease rate should be adjusted to a market rate.

Other adjustments are related to:

- Inventory accounting methods
- Depreciation assumptions
- Capitalization v/s expensing

The normalized Earnings for a strategic buyer incorporate acquisition synergies, whereas a financial (nonstrategic) transaction does not.

**Practice: Question 1**  
**Volume 4, Reading 33.**



### NOTE:

- Private Companies' financial statements are not audited. Rather they are just reviewed.
- **Reviewed Financial Statements** provide an opinion letter with representations and assurance that are less than those in the audited financial statements.
- **Compiled Financial Statements** do not provide an opinion letter.

### 4.1.2) Cash Flow Estimation Issues for Private Companies

Assessing future cash flow estimates in private companies involve greater uncertainty. One possible solution is to project the different possible future scenarios i.e.

- For a privately held development stage company, the possible scenarios are:
  - Initial public offering
  - Acquisition
  - Continued as a private company
  - Bankruptcy
- For a larger, mature company, the possible scenarios can be based on a range of levels of growth rate and profitability.

- In valuing an individual scenario, discount rate is chosen for each specific scenario. The probability of occurrence of each scenario is also estimated. The overall value is then a probability-weighted-average of the company's estimated individual scenario values.
- The other method is based on discounting future CFs under each scenario using a single discount rate.
- While undertaking valuation, appraiser should take into account the management's biases such as to overstate values i.e. in case of goodwill impairment tests or understate values i.e. in case of stock option grants.
- The process of estimating FCFF and FCFE is the same for both private and public companies.
- When a company has volatile capital structure, FCFF is preferred to FCFE.

#### Practice: Example 2 Volume 4, Reading 33.



## 4.2 Income Approach Methods of Private Company Valuation

There are three forms of income approach.

- **Free Cash Flow Method (Discounted cash flow method):** In this method, value of an asset is based on estimates of future expected CFs discounted to PV by using an appropriate discount rate. This approach is most appropriate for large & mature private companies.
- **Capitalized Cash Flow Method (capitalized income method or capitalization of earnings method):** In this method, value of an asset is estimated using a single representative estimate of economic benefits and dividing that by an appropriate capitalization rate. It is basically a single-stage model. This approach is most appropriate for smaller companies.
- **Residual Income Method (Excess Earnings Method):** It is a method in which asset is valued by estimating the value of all intangible assets of the business by capitalizing future earnings in excess of the estimated return requirements associated with working capital and fixed assets. The value of the intangible assets is then added to the values of working capital and fixed assets to arrive at the value of the business enterprise. It is sometimes categorized under asset-based approach. This approach is most appropriate for smaller companies.

### 4.2.1) Required Rate of Return: Models and Estimation Issues

Challenges in estimating required rate of return for a private company are as follows:

- **Application of Size Premiums:** Size premiums are frequently added to the required rate of return of private company due to its smaller size. Size premiums are usually based on small size public companies. But it also includes premium for distress, which may not be relevant for every private company.
- **Use of CAPM:** CAPM is not appropriate to use for private companies because they have less chances of going public or being acquired by a public company. Therefore, they are not comparable to the public companies for which market-data-based beta estimates are available. Also, high-levels of company specific risk is not incorporated in CAPM, which only takes care of systematic risks.
- **Expanded CAPM:** It adds to the CAPM a premium for small size and company-specific risk.
- **Elements of the build-up approach:** This method is appropriate when Guideline public companies (comparable public companies) are not available. **Beta is assumed to be 1** in this method and estimating risk premiums are a challenge.
- **Relative debt availability and cost of debt:** WACC for a private company is higher because:
  - Private company has less access to debt financing.
  - Due to less access to debt financing, it has to use more equity financing which is expensive than debt financing.
  - Smaller size of private company increases the operating risk and cost of debt as well.
- **Discount rate in acquisition context:** In undertaking valuation in acquisition transactions, target's cost of capital and target's capital structure (not of buyer) should be used in calculating WACC.
- **Discount rate adjustment for projection risk:** Limited amount of financial information regarding private company's operations creates uncertainty in forecasting its cash flows. This uncertainty leads to a higher required rate of return. The other issue is the managerial inexperience in forecasting future financial performance.
- **Life Cycle Stage:** Discount rate is difficult to estimate for firms in their early stage of development. These firms usually have high unsystematic risks; therefore, CAPM should not be used for such companies. Also, various discount rates are used for various life-cycle stages and it is difficult to identify the accurate stage of a company.

**Practice: Example 3**  
Volume 4, Reading 33.



#### 4.2.2) Free Cash Flow Method

- For both private and public companies, free cash flow valuation is similar. For example, individual free cash flows are forecasted for a limited time horizon and their PV is found by discounting them by appropriate discount rate. At the end of initial projection period, terminal value is discounted to the present.
- There are two ways of estimating terminal value i.e. by using constant-growth model or by using price multiples. However, care should be taken in using price multiples in a high growth industry because it incorporates high growth rate twice in the calculation of terminal value i.e. once in the CFs projection over the projection period and then in the market multiples used in calculating the residual enterprise value.

#### 4.2.3) Capitalized Cash Flow Method

Capitalized Cash Flow Method is basically a single-stage (constant-growth) free cash flow method. It is most appropriate to use:

- For valuing a private company in which it is difficult to make future projections.
- For valuing a private company which can be expected to have stable (constant) future operations.
- When market pricing and transactions related to public companies are limited.

At the Firm level, the formula for the capitalized cash flow to the firm is:

$$V_f = \frac{FCFF_1}{WACC - g_f}$$

where,

$V_f$  = value of the firm  
 $FCFF_1$  = free cash flow to the firm for next 12 months  
 $WACC$  = weighted average cost of capital  
 $g_f$  = sustainable growth rate of FCFF

**Assumption in using WACC:** Constant capital structure at market values in the future exists.

**Value of Equity = Value of Firm – Market Value of Debt**  
 $= V_f - \text{Market Value of Debt}$

To value Equity directly, formula becomes:

$$V = \frac{FCFF_1}{r - g}$$

where,

$r$  = required rate of return on equity  
 $g$  = sustainable growth rate of FCFE

**Practice: Example 4**  
Volume 4, Reading 33.



#### 4.2.4) Excess Earnings Method

This method is most appropriate to value:

- Intangible assets
- Very small businesses

The method is based on following steps:

- Values of working capital and fixed assets are estimated. Suppose these are \$200,000 and \$800,000 respectively.
- Suppose the normalized earnings estimated are \$100,000 for the year just ended.
- Discount rate is estimated for working capital & fixed assets i.e.
  - Working capital (WC) is the most liquid and has the lowest risk. Thus, it has low discount rate. Suppose 5%
  - Fixed assets are assumed to be less liquid. Thus, they have higher discount rate. Suppose 11%
  - Intangible assets are assumed to be least liquid and most risky. Thus, they require highest discount rate. Suppose 12%
- Residual income (RI) or Excess Earnings is estimated as follows:

**Excess Earnings or Residual Income = Normalized earnings – [(required return on WC × value of WC) + (required return on fixed assets × value of fixed assets)]**

Excess Earnings or Residual Income = \$100,000 – [(0.05 × \$200,000) + (0.11 × \$800,000)] = \$2000

- Total value of intangible assets is calculated as follows:

$$\text{Value of Intangible assets} = \frac{RI \times (1 + g)}{r - g}$$

where,

$RI$  = Residual income calculated in step 4  
 $r$  = required return on intangible assets  
 $g$  = growth rate

Suppose,

$g = 3\%$

$$\text{value of intangible assets} = \frac{2000 \times 1.03}{0.12 - 0.03} = \$22,889$$

- Total value of a business is estimated as follows:

**Total value of business** = value of WC + value of fixed assets + value of intangible assets

Total Value of business = \$200,000 + \$800,000 + \$22,889 = \$1,022,889

### 4.3 Market Approach Methods of Private Company Valuation

Market approach has three major variations:

1. The Guideline Public Company method (GPCM):
2. The Guideline Transaction method (GTM):
3. The Prior Transaction Method (PTM):

**Advantage of Market Approach:** Market approach is based on data, which is generated from actual market transactions unlike income and asset based approaches where data is based on forecasted values.

**Assumption of Market Approach:** Transactions through which price multiples are derived, are comparable to subject private company.

#### Challenges in using Market Approach:

- Comparable public companies are difficult to find.
- Company-specific factors of private companies lead to different risk and growth rates.
- The stock-specific factors also create uncertainties in level of risk and growth.
- Private companies have limited liquidity and marketability.

**Guideline Companies are chosen on the basis of following factors:**

- Industry membership
- Form of operations
- Trends in business life cycle
- Current operating status

#### IMPORTANT:

- **Larger Mature Private Companies:** Price multiple based on EBITDA and/or EBIT should be used. EBITDA is best compared with Market value of Invested Capital (MVIC).

$$\text{MVIC} = \text{Market value of Debt} + \text{Market value of Equity}$$

#### Note:

- Face value of debt can be used when a firm has small fraction of debt financing and its operations are stable.
  - Estimates of market value of debt (based on debt characteristics) should be used when a firm is highly leveraged and its operations are highly volatile.
- **Very small private companies (with limited asset base):** Price multiple based on net income should be used.
- **Extremely small companies:** Price multiple based on revenue should be used.

- For certain industries, non-financial metrics can be used for valuation e.g. price per subscriber in cable, price per bed for hospital etc.

#### 4.3.1 The Guideline Public Company method (GPCM)

In this method, value is estimated on the basis of observed multiples from trade data of public companies, which are comparable to subject private company. These multiples, however, are adjusted for the risks and growth prospects of the subject private company.

The process of valuation is same for both public and private companies i.e.

- Step a:** A group of Comparable public companies is identified.
- Step b:** The relevant price multiples of the guideline public companies are estimated.
- Step c:** These multiples are adjusted to reflect the risks and growth prospects of subject private company.
- Step d:** A control premium is estimated and then this premium is added to the value derived in step "c" for the valuation of controlling interest because trading of interests in public companies generally show small blocks without control of the entity.

**Control Premium:** It is a premium or amount paid for a controlling ownership interest in a business. It is added when the comparable company values are for public shares or minority interests and the target company valuation is being done for a controlling interest.

#### Factors that affect Control Premium include:

- **Type of Transaction:**  
In a Strategic Transaction (in which a buyer benefits from certain synergies by owning target firm e.g. enhanced revenues, cost savings etc.), large acquisition premiums are paid because of the expected synergies.  
  
In a Financial Transaction (in which a buyer has no synergies with the target firm i.e. when any unrelated business is acquired), acquisition premiums paid are usually smaller than in strategic transaction.
- **Industry Factors:**  
When there is high level of acquisition activities going on in the industry, it leads to rise in share prices of public companies (which reflects control premium). The amount of control premium at the date of valuation may reflect a different industry environment than the actual valuation date.
- **Form of consideration:**  
Stock based transactions are not relevant for estimating control premiums when company's shares are overvalued in the market.

**Practice: Example 5**  
Volume 4, Reading 33.



#### 4.3.2) The Guideline Transaction method (GTM)

In this method, value is estimated based on pricing multiples, which are derived from the acquisition of control in public or private companies.

**NOTE:**

Since value is estimated based on the transactions related to entire firm, there is no need to add control premium separately to the value in this method.

Following factors should be considered in assessing transaction-based pricing multiples:

- **Synergies:** Strategic transactions may already include payments for expected synergies. If the subject transaction is non-strategic while a prior transaction is strategic transaction, the analyst is required to adjust the historical multiple. The relevance of synergy payments will require evaluation on a case by case basis.
- **Contingent Consideration:** It represents future payments to the seller, which are contingent on the achievement of certain things i.e. obtaining regulatory approval, achieving target level of EBITDA. These contingencies create uncertainty in the valuation of a company.
- **Noncash Consideration:** When transaction is based on stock instead of cash payments, transaction price is uncertain. Comparing cash based transaction with the transaction based on shares leads to inappropriate valuation.
- **Availability of Transactions:** Comparable and relevant transactions for a specific private company are limited. Transactions that occurred far in the past may no longer be relevant for valuing the private company especially if industry, economy, or company conditions have changed.
- **Changes between transaction date and valuation date:** GTM is based on transactions at different points in the past. Value based on these transactions needs to be adjusted for the changes in risk and growth expectations in the marketplace i.e. (due to the changes in macroeconomic and industrial conditions).

**Practice: Example 6**  
Volume 4, Reading 33.



#### 4.3.3) The Prior Transaction Method (PTM)

In this method, value is estimated on the basis of actual transactions in the stock of the subject private company or on the basis of multiples implied from the transaction.

PTM is most relevant to use to value minority equity interest in a company. However, when relevant transactions are limited and when these transactions are at different points in time, PTM based valuation is less reliable.

#### 4.4 Asset-Based Approach to Private Company Valuation

This approach is also known as **Cost Approach**. This method is *not* commonly used in the valuation of going concerns. Of the three approaches, the asset-based approach is conceptually the weakest approach.

In this approach value is estimated as follows:

$$\text{Value} = \text{Fair value of Assets} - \text{Fair Value of Liabilities}$$

**Practice: Question 13**  
Volume 4, Reading 33.



This approach is most appropriate to use for valuing:

- An operating company with nominal profits relative to the value of assets used and without bright future prospects. In this scenario, the going concern value may be less than its liquidation value.
- Natural Resource Firms.
- Financial and Investment companies i.e. banks largely consist of loan and securities portfolios that can be priced based on market data.
- Holding Investment Companies i.e. Real estate investment trusts (REITs) and closed end investment companies (CEICs).
- Very small businesses with limited intangible assets.
- Recently formed companies or companies in their early stages, which have limited operating histories.

This approach is least appropriate to use for valuing an "on going" business due to the following reasons:

- For on-going businesses, it is difficult to value intangible assets.
- Certain tangible assets i.e. special plant & machinery are difficult to value.
- There is limited information available to value on-going businesses on asset-by-asset basis.

**Practice: Example 7**  
Volume 4, Reading 33.



## 4.5 Valuation Discounts and Premiums

### Some of the Factors that affect the lack of control & marketability discounts:

- Importance of size of shareholding.
- Distribution of shares.
- Relationships of parties.
- State law affecting minority shareholder rights.

#### 4.5.1) Lack of Control Discounts (DLOC)

Lack of control discount is the amount or percentage deducted from the pro rata share of 100% of the value of an equity interest in a company to reflect the absence of control. DLOC is applied when the comparable values are for the sale of an entire company (public/private) i.e. controlling interest basis and the valuation is being done for a minority interest in the target company.

Lack of control negatively affects investor as he/she is unable to control the operations of an entity i.e. selecting directors.

#### Discount is lower when:

- A private company is seeking an IPO.
- A private company is a strategic sale.

#### Discount is higher when:

- A private company has not paid dividends.
- A private company has no probability of going public.

#### Calculation of Lack of Control Discount (DLOC):

$$DLOC = 1 - \frac{1}{1 + \text{Control Premium}}$$

#### Example:

If Control premium = 20%, then  
 $DLOC = 1 - [1 / (1 + 0.20)] = 16.7\%$

Scenario	Comparable Data	Subject Valuation	DLOC Expected?	Method
1	Controlling Interest	Controlling Interest	None	CCM/FCF
2	Controlling Interest	Non-controlling interest	DLOC	GTM
3	Non-controlling interest	Controlling Interest	Control Premium	GPCM
4	Non-controlling interest	Non-controlling interest	None	GPCM

#### 4.5.2) Lack of Marketability Discount (DLOM)

Lack of marketability discount is the amount or percentage deducted from the value of an ownership interest to reflect the relative absence of marketability.

#### Factors Affecting Marketability

#### Factors that decrease DLOM include:

- High prospects for liquidity.
- Payments of dividends.
- Large pool of potential buyers.
- Duration of asset i.e. earlier higher payments (shorter duration).

#### Factors that increase DLOM include:

- Agreements regarding restriction on sale of shares.
- Restrictions on transferability.
- Higher risk or volatility.
- Greater uncertainty of value.
- Concentration of ownership.

#### Methods used to quantify lack of marketability discounts:

- **Restricted Stock Transactions:** In this method, lack of marketability discount is estimated as the difference between the price of a restricted stock and a price of freely traded stock.
- **Initial Public Offerings (IPO):** In this method, lack of marketability discount is estimated based on private sales of stock in companies prior to a subsequent IPO i.e. the difference between the price of a pre-IPO stock and a price of IPO stock.

**Drawback:** This method has a drawback because IPO price may reflect the increase in value due to decline in risks & decline in uncertainty of cash flows as the company progresses in development rather than only reflecting the impact of an IPO.

**Put options:** In this method, DLOM is estimated as follows:

$$DLOM = \frac{\text{Value of "at-the-money" put option}}{\text{value of stock before any DLOC}}$$

#### Assumptions:

- The time to maturity of Put option and the time to the IPO is the same.
- Volatility used can be estimated using the historical volatility of publicly traded stock or implied volatility of publicly traded options.

**Advantage of the Method:** Risk of the private company can be directly incorporated through the volatility estimate of the put option.

**Disadvantage of the Method:** Put option only provides price protection. It does not provide liquidity to the asset holding.

**Other types of Discount include:**

- Key person discounts.
- Portfolio discounts i.e. for non-homogenous assets.
- Non-voting shares discounts.

**IMPORTANT:**

When both lack of discount and lack of marketability discounts are present, then total discount is not the summation of DLOC & DLOM, rather it is estimated as follows:

$$\text{Total Discount} = [1 - (1 - \text{DLOC in \%}) \times (1 - \text{DLOM in \%})]$$

**Example:**

Assume

DLOC = 10%

DLOM = 20%

Total discount =  $[1 - (1 - 10\%) \times (1 - 20\%)] = 28\%$

**Practice:** Example 8  
Volume 4, Reading 33.



**NOTE:**

- When a business has high probability of liquidation then it is recommended to add the value of non-operating assets to the total value of a firm.
- When a business is expected to continue its operations as a private company, then it is better to exclude the value of non-operating assets from total valuation.

**4.6 Business Valuation Standards and Practices**

Business valuation standards are developed to protect investors and users of valuations. These standards typically cover the development and reporting of the valuation. Various valuation standards exist for the valuation of private companies.

**The challenges involved with Valuation Standards include:**

- There are many different valuation standards.
- Compliance is not mandatory.
- There is no way to ensure compliance to the standards.
- Standards provide very limited technical guidance on how to use them.
- Valuation is dependent on the definition of value used. This can result in different conclusions of value.

**Practice:** All questions at the end of  
Reading 33 & FinQuiz Item-set ID#  
15787

