Level II

Equity

FinQuiz Notes 2021

Book 4

FinQuiz
CFA PROGRAM EXAM PREP

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.

i) True mispricing: True (non- observable) intrinsic value "V" – observed market price "P"

ii) 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:

1. ***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.

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 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

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 24.

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 24.

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 24

Practice: Example 3 & 4, Volume 4, Reading 24.

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 – (cost of equity × 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 24.

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.

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.

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.

Practice: CFA Institute's Curriculum End of Chapter Questions & FinQuiz Question-bank (Item-sets + Questions)

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

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 as 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 ≠ 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%

Target Price = *Current Price × (1+RR) – Dividend*

Practice: Example 1, Volume 4, Reading 25.

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,

Intrinsic value = *Year ahead dividend / (RR – Expected Dividend growth rate)*

OR

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:

RR (or IRR) = *(Year ahead dividend / market price) + 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 premia+(-) Other risk premier(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 25.

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 = *[{(1+EINFL) (1+EGREPS) (1+EGPE)-1} +EINC]-Expected risk-free return*

where,

- **EINFL**= expected inflation.

  It is forecasted as {(1+YTM of 20-year maturity T-bonds) / (1+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+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:

i) Investors are risk averse.
ii) Investors make decisions based on mean return & variance of returns.
iii) 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:

Adjusted Beta = (2/3) (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 25.

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).

$$Bu = [1/\{1+ (D/E)\}] \times Be$$

where,

Bu = unlevered beta
Be = equity beta including effects of leverage
D/E= Debt to equity ratio of ***benchmark (public)*** *company*

$$Be' = [1+ (D'/E')] \times Bu$$

where,

Be' = Subject company's equity beta
D'/E' = Debt to equity ratio of ***subject*** *company*

Assumptions:

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

Practice: Example 6, Volume 4, Reading 25.

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 + (Risk premium)$_1$ + (Risk Premium)$_2$ + … + (Risk premium)$_k$

where,

- *Risk premium$_i$ = (Factor sensitivity)$_i$ × (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

$$r_i = R_f + B_i^{market} \times RMRF + B_i^{size} \times SMB + B_i^{value} \times HML$$

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 25.

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 4th factor to FFM i.e. LIQ which represents excess returns from investing in a portfolio of low liquidity stocks and shorting high liquidity stocks.

$$r_i = R_f + B_i^{market} \times RMRF + B_i^{size} \times SMB + B_i^{value} \times HML + Bi^{Liq} \times LIQ$$

- 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 25.

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 = T-bill rate + (sensitivity to confidence risk × confidence risk premium)–(sensitivity to time horizon × time horizon risk premium) – (sensitivity to inflation risk × inflation risk premium) + (sensitivity to business cycle risk × business cycle risk premium) + (sensitivity to market timing risk × market timing risk premium)

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

$r_i = r_f$ + Equity risk premium ± One or premia (discounts).

4.3.1) Build-Up Approaches for Private Business Valuation

$r_i = r_f$ + *Equity risk premium* + *Size premium*$_i$ +*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:

i) Build-up method relies on historical estimates, so it wouldn't work well when there is minimal historical data.
ii) 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 25.

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)}*rd (1-Tax rate) + {MVCE / (MVD+MVCE)}*r

where,

MVD= current market value of debt

MVCE = current market value of (common) equity

MVD + MVCE = total market value of the firm

rd *(1-Tax rate) = after tax cost of debt. rd 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 25.

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.

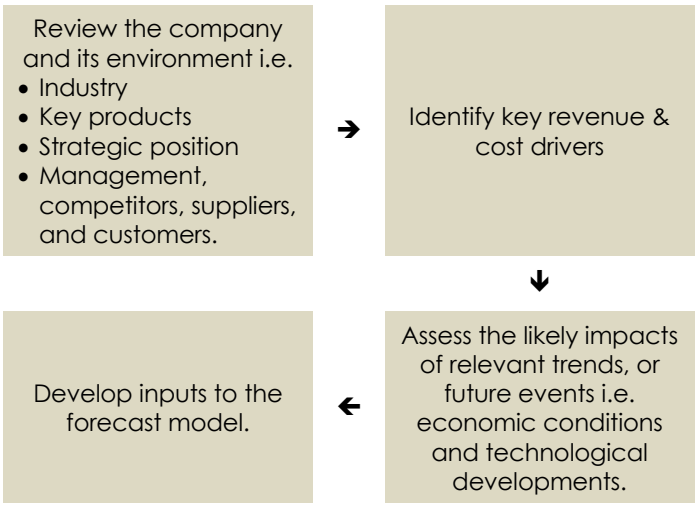
Practice Question 1 from CFAI Curriculum, Volume IV, Reading 25 as it very well explains the return measures concept.

Practice: CFA Institute's Curriculum End of Chapter Questions & FinQuiz Question-bank (Item-sets + Questions)

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 is 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 26.

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 26.

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.

Forecasted variable costs = % of revenue
Or
Forecasted variable costs = Unit volume × 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 26.

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,

COGS = Raw materials + Direct labor + 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 26.

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*:

i. **Statutory tax rate:** It is a tax rate that is applied to a company's domestic tax base.

ii. **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 26.

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.

ROIC = Operating profit / 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 26.

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/scarce 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 26.

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 26.

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 26.

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,

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 26.

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) Cyclicality 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 divesture, 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 26.

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

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 it 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.

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 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 a& 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

= **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

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)

Practice: Example 1, Volume 4, Reading 27.

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 2, Volume 4, Reading 27.

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' 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.

Residual Income = NI – (cost of equity × 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,

Value of stock = BVPS at t = 0 + PV of expected future residual earnings

where,

BVPS = *common shareholders' equity / number of common shares outstanding*

Important:

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

$\mathbf{BV_t =} BV_{t-1} + NI_t - Dividends_t$

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 27.

3.2 Multiple Holding Periods

Value of stock for 2 years holding period is

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

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 27.

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

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 27.

Negative Growth rate in dividends:

Practice: Example 9, Volume 4, Reading 27.

4.3 Share Repurchases

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

i. In the form of share repurchases (buy backs).
ii. 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 27.

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:

i. 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.
ii. Analyst can evaluate whether the growth rate used to estimate P/E is reasonable or not.

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

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

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 27.

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 27.

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 ➔ 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%.

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

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 27.

5.2 Valuing a Non-dividend Paying Stock

Practice: Example 15, Volume 4, Reading 27.

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.

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

or

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

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 27.

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 27.

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 27.

Estimating Growth rate:

There are two approaches to estimate "g".

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

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

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)*

or

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

g = PRAT i.e.

g = profit margin (P) × retention rate (R) × asset turnover (A) × 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 ROE = r
c) Assuming ROE = Median industry ROE.

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

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

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

ROE = Net profit margin × Asset Turnover × Leverage

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

Practice: Example 20, Volume 4, Reading 27.

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 27.

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 27.

Terminal Stock Value

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

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

a) Using Gordon Growth Model.
b) 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 27.

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: CFA Institute's Curriculum End of Chapter Questions & FinQuiz Question-bank (Item-sets + Questions)