

“CODE OF ETHICS AND STANDARDS OF PROFESSIONAL CONDUCT”

M&C = Members & Candidates
 COE = Code of Ethics
 SOPC = Standards of Professional conduct
 BOG=Board of Governors
 PDP=Professional Development Program

CFAI = CFA Institute
 PCP = Professional Conduct Program
 DRC = Disciplinary Review Committee
 PCS = Professional Conduct Statement

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- CFAI PCP \Rightarrow covered by CFAI Bylaws & Rules of Procedures for Proceeding Related to Professional Conduct.
- PCP is based on principles of fairness to M&C & confidentiality of proceedings.
- DRC of CFAI BOG \Rightarrow responsible for PCP & enforcement of code & standards.

Circumstances Which Can Prompt Inquiry

- Self disclosure by member/candidate on PCS which comprehensively questions professional conduct such as involvement in civil litigation, criminal investigation or any complaint (written) against the member/candidate etc.
- Written complaints about member/staff received by professional conduct staff.
- Evidence of misconduct by member/candidate received by professional conduct staff through public source.
- A report by CFA proctor of a possible violation during examinations.
- CFAI designated officer conducts inquiries.
- Professional conduct staff (in writing) may request explanation from subject member/candidate & may:
 - Interview the subject member/candidate.
 - Interview the complainant / third party.
 - Collect relevant document & records.
- Designated officer may decide:
 - Disciplinary sanctions are not required.
 - Issue a cautionary letter.
 - To discipline the member/candidate.
- If disciplinary sanction is proposed, the subject member/candidate may accept the sanction.
- If sanction is rejected \Rightarrow matter may be referred to CFAI panel for hearing.
- Sanctions may include:
 - Condemnation by member's peers.
 - Suspension of candidate's continued participation in CFAI program.

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- Act with integrity, competence, diligence, respect, and in an ethical manner with the public, clients, prospective clients, employers, employees, colleagues' in the investment profession, and other participants in the global capital markets.
- Place the integrity of the investment profession and the interests of clients above their own personal interests.
- Use reasonable care and exercise independent professional judgment when conducting investment analysis, making investment recommendations, taking investment actions, and engaging in other professional activities.
- Practice and encourage others to practice in a professional and ethical manner that will reflect credit on themselves and the profession.
- Promote the integrity of and uphold the rules governing capital markets.
- Maintain and improve their professional competence and strive to maintain and improve the competence of other investment professionals.

Standards of Professional Conduct

1. Professionalism 2. Integrity of Capital Markets 3. Duties to Clients 4. Duties to Employers 5. Investment Analysis, Recommendations & Actions

6. Conflicts of Interest

7. Responsibilities as a CFAI Member or CFAI Candidate

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1. Professionalism

A. Knowledge of Law

B. Independence & Objectivity

C. Misrepresentation

D. Misconduct

2. Integrity of Capital Markets

A. Material Non-Public Information

B. Market Manipulation

3. Duties to Clients

A. Loyalty, Prudence, and Care

B. Fair Dealing

C. Suitability

D. Performance Presentation

E. Preservation of Confidentiality

4. Duties to Employers

A. Loyalty

B. Additional Compensation Arrangements

C. Responsibility of Supervisors

5. Investment Analysis, Recommendations & Actions

A. Diligence & Reasonable Basis

B. Communication with Clients & prospective Clients

C. Record Retention

6. Conflicts of Interest

A. Disclosure of conflicts

B. Priority of Transactions

C. Referral Fees

7. Responsibilities as a CFAI Member or CFAI Candidate

A. Conduct as Members and Candidates in the CFA Program

B. Reference to CFA Institute, the CFA Designation, and the CFA Program

“GUIDANCE FOR STANDARDS I-VII”

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 Conduct Statement

1. Professionalism

1 A. Knowledge of Law

- M&C must understand & comply with all applicable laws, rules & regulations (including COE & SOPC).
- These rules & regulations pertain to any govt., regulatory organization, licensing agency or professional association governing their professional activities.
- Must comply with more strict law in case of conflict.
- M&C must not knowingly participate or assist & must dissociate from any violation of laws.

Guidance ⇒ Code & Standards VS Local Law

- Members must know laws & regulations related to their professional activity in all countries where they conduct business.
- Adhere to more strict rule while deciding b/w local laws & Codes & Standards of CFAI.
- Must comply with local laws related to professional activity.
- Never violate Codes & Standards even if activity is otherwise legal.

Guidance ⇒ Participation in or Association with Violation by Others

- Members must dissociate or separate themselves from any ongoing client or employee activity which is illegal or unethical.
- In extreme case they may have to leave the employer.
- May, at first, confront the individual involved.
- Approach supervisor or compliance department.
- Inaction with continued association may be construed as knowing participation.

Recommended Procedures for Compliance-Members

- Members must make themselves updated with applicable laws, rules & regulations.
- Compliance laws must be reviewed on an ongoing basis in order to ensure that they address prevailing laws, CFAI standards & regulations.
- Members should maintain current reference material for employees in order to keep up-to-date on laws, rules & regulations.
- In doubt members should seek advice of counsel or their compliance department.
- Members must document any violation when they disassociate from prohibited activity.
- Members must encourage their employers to end such activity.
- Under some circumstances it may be advisable or otherwise required by the law to report violations to governmental authorities.
- Standards (CFAI) do not require members to report violations to governmental authorities.
- CFAI encourages members, clients & public to submit written report against a CFA member or candidate involved in violation of the CFA Code & Standards

Recommended Procedure for Compliance-Firms

- Members should encourage their firms to:
 - Develop and/or adopt a code of ethics.
 - Highlight applicable laws and regulations to employees.
 - Establish written procedures for reporting suspected violation of laws, regulations or company policies.
- Members incharge of supervision, creation and maintenance of investment services should:
 - Be aware of and comply with regulations and laws in their country of origin.
 - They must be aware of and comply with regulations of countries where products/services will be sold.

1 B. Independence & Objectivity

- M&C must use reasonable care & judgment to achieve & maintain independence & objectivity in professional activities.
- Not accept any gift, or any type of consideration that may compromise their own or another's independence & objectivity.

Guidance

- Investment process must not be influenced by any external sources.
- Modest gifts by clients are permitted.
- Allocation of shares in oversubscribed IPO to personal accounts is not permitted.
- Distinguish b/w gifts from clients & entities seeking influence to the detriment of the client.
- Gifts must be disclosed to the member's employer either prior to acceptance or subsequently.

Guidance-Investment Banking Relationships

- Do not get pressurized from sell-side analyst to issue favorable research on current or prospective investment-banking client.
- Disclose conflicts and manage these appropriately while working with investment bankers in "road shows".
- Ensure effective "firewalls" b/w research/investment management & investment banking activities.

Guidance-Public Companies

- Do not limit research to discussions with company management.
- Use sources like:
 - Suppliers
 - Customers
 - Competitors
- Analyst must not be pressured to issue favorable research by the companies they follow.

Guidance-Buy Side Clients

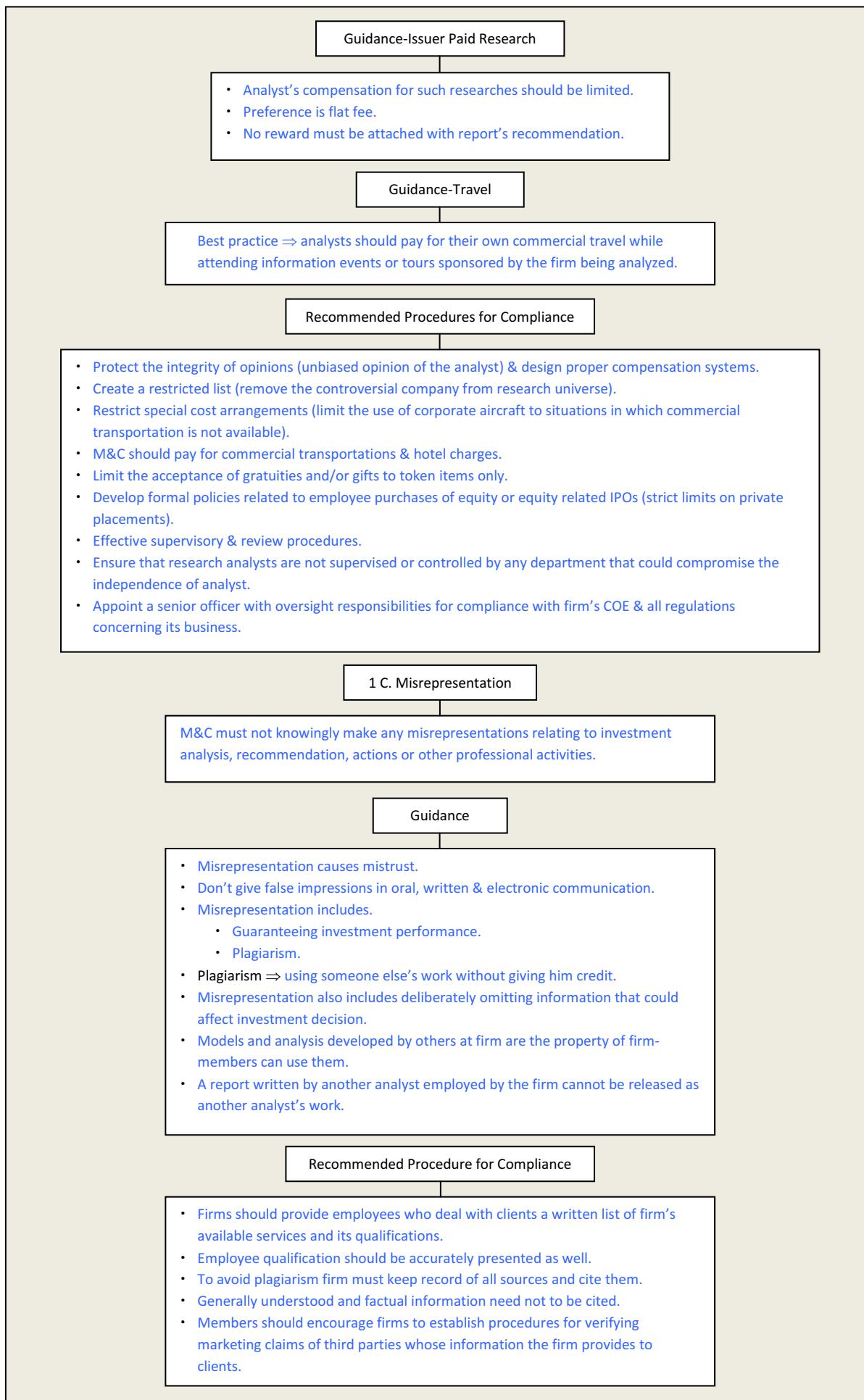
- Responsibility of portfolio managers to respect and foster intellectual honesty of sell side research.
- Portfolio managers must not pressure sell side analysts.
 - They may have large positions in particular securities; rating downgrade may adversely affect portfolio performance.

Guidance-Fund Manager Relationships

- Members responsible for selecting outside managers should not accept gifts, entertainment or travel that might be perceived to impair member's independence and/or objectivity.

Guidance-Credit Rating Agency

- Members employed by credit rating agencies make sure they prevent undue influence by security issuing firms.
- Members using credit ratings must be aware of potential conflicts of interest & therefore may consider independent validation of the rating granted.



1 D. Misconduct

M&C must not engage in dishonesty, fraud, deceit or commit any act that reflects adversely on their professional reputations, integrity or competence.

Guidance

- CFAI discourages unethical behavior in all aspects of members' and candidates' professional lives.
- Do not abuse CFAI PCP by seeking enforcement of this standard to settle personal, political or other disputes not related to professional ethics.

Recommended Procedures for Compliance

- Firms are encouraged to adopt these policies and procedures to:
 - Develop and adopt a code of ethics and make clear that unethical behavior will not be tolerated.
 - Give employees a list of potential violations and sanctions including dismissal.
 - Check references of potential employees.

2. INTEGRITY OF CAPITAL MARKETS

2 A. Material Nonpublic Information

M&C must not act or cause others to act on the information that is material nonpublic (affect the value of investments).

Guidance

- Material information \Rightarrow if disclosure would impact price of security.
 - If reasonable investor would want the information before making an investment decision.
- Nonpublic information \Rightarrow not available to the marketplace.
- Analyst conference call is not public disclosure.
- Selective disclosing causes insider-trading.
- Prohibition against acting on material nonpublic information extends to securities, swaps, and option contracts.

Guidance-Mosaic Theory

No prohibition on reaching an investment decision through public and nonmaterial nonpublic information.

Recommended Procedures for Compliance

- Make reasonable efforts to achieve public dissemination of information.
- Encourage firms to adopt procedures to prevent misuse of material nonpublic information.
- Use a "firewall" within the firm with
 - Substantial control of relevant interdepartmental communication — through a clearance like compliance/legal department.
 - Review employee trades — maintain watch, rumor, and restricted lists.
 - Monitor & prohibit proprietary trading-if a firm is in possession of material non-public information.
- Prohibiting all proprietary trading may send a signal to the market — firm should take the contra side of only unsolicited customer trades.

2 B. MARKET MANIPULATIONS

M&C must not engage in practices that mislead market participants (distort prices or artificially inflate trading volume).

Guidance

- Spreading false rumors is prohibited (which can distort market).
- Standard applies to transactions that deceive market.
- By distorting the price-setting mechanism of financial investments.
- Securing a controlling position in a financial instrument to manipulate the price of a related derivative or the asset.

3. DUTIES TO CLIENTS

3 A. Loyalty, Prudence & Care

M&C:

- Have a duty of loyalty to clients & must act with reasonable care & exercise prudent judgment.
- Must act for benefit of clients & place their clients' interests before their employer's or own interests.

Guidance

- M&C must exercise same level of prudence, judgment & care as in management & disposition of their own interests in similar circumstances.
- M&C should manage pool of assets in accordance with the terms of governing documents (e.g. trust documents).
- Determine the identity of "client" to whom duty of loyalty is owed. (May be an individual or plan beneficiaries in case of pension plan or trust).
- M&C must follow any guidelines set by their clients for the management of their assets.
- Investment decisions are judged in context of total portfolio rather than individual investments.
- Conflict arises when "soft dollars" are not used for benefits of clients.
- Cost-benefit analysis may show that voting all proxies may be not a beneficial strategy for clients.

Recommended Procedures of Compliance

- M&C with control of client assets should submit to each client at least quarterly, a statement showing funds & securities.
- In doubt, M&C should disclose the questionable matter in writing to client & obtain client approval.
- M&C should address & encourage their firms to address the following regarding duties to client:
 - Follow all applicable rules & laws.
 - Establish the investment objectives of the clients.
 - Consider all the information when taking actions.
 - Diversify investments to reduce risk of loss.
 - Carry out regular reviews.
 - Deal fairly with all clients with respect to investment actions.
 - Disclose conflict of interest & compensation arrangements.
 - Maintain confidentiality & seek best execution.

3 B. Fair Dealing

M&C must deal fairly & objectively with clients (when providing investment analysis, making recommendations, taking action or engaging in other professional activities).

Guidance

- No discrimination among clients while disseminating recommendations or taking investment decision.
- Fairly does not mean equally ⇒ difference in timings of emails & fax received by clients are normal course of business.
- Different services levels are okay as far as they do not adversely affect any client.
- Disclose different levels of services to all clients and prospects.
- Premium services should be available to all those who are willing to pay for them.

Guidance-Investment Recommendation

- All clients must be given fair opportunity to act upon every recommendation.
- Clients unaware of change in recommendation — should be advised before the order is accepted.

Guidance-Investment Actions

- Clients must be treated fairly in the light of their investment objectives and circumstances.
- Both institutional and individual clients must be treated in a fair & impartial manner.
- Member/candidates should not take advantage of their position to disadvantage clients (e.g., in IPOs).

Recommended Procedures for Compliance

- Firms are encouraged to establish compliance procedures to treat customers & clients fairly.
- Communicate recommendations simultaneously within the firm & to customers.
- M&C should consider the following:
 - Limit the no. of people who are aware that a recommendation is going to be disseminated.
 - Shorten the time frame b/w decision & dissemination.
 - Publish guidelines for pre-dissemination behavior.
 - Simultaneous dissemination (treat all clients fairly).
 - Maintain a list of clients & their holdings.
- Develop & document trade allocation procedures.
- Disclose trade allocation procedures (must be fair & equitable).
- Establish systematic account review (no preferential treatment to any client or customer).
- Disclose level of services (different levels of services are possible for same or different fees).

3 C. SUITABILITY

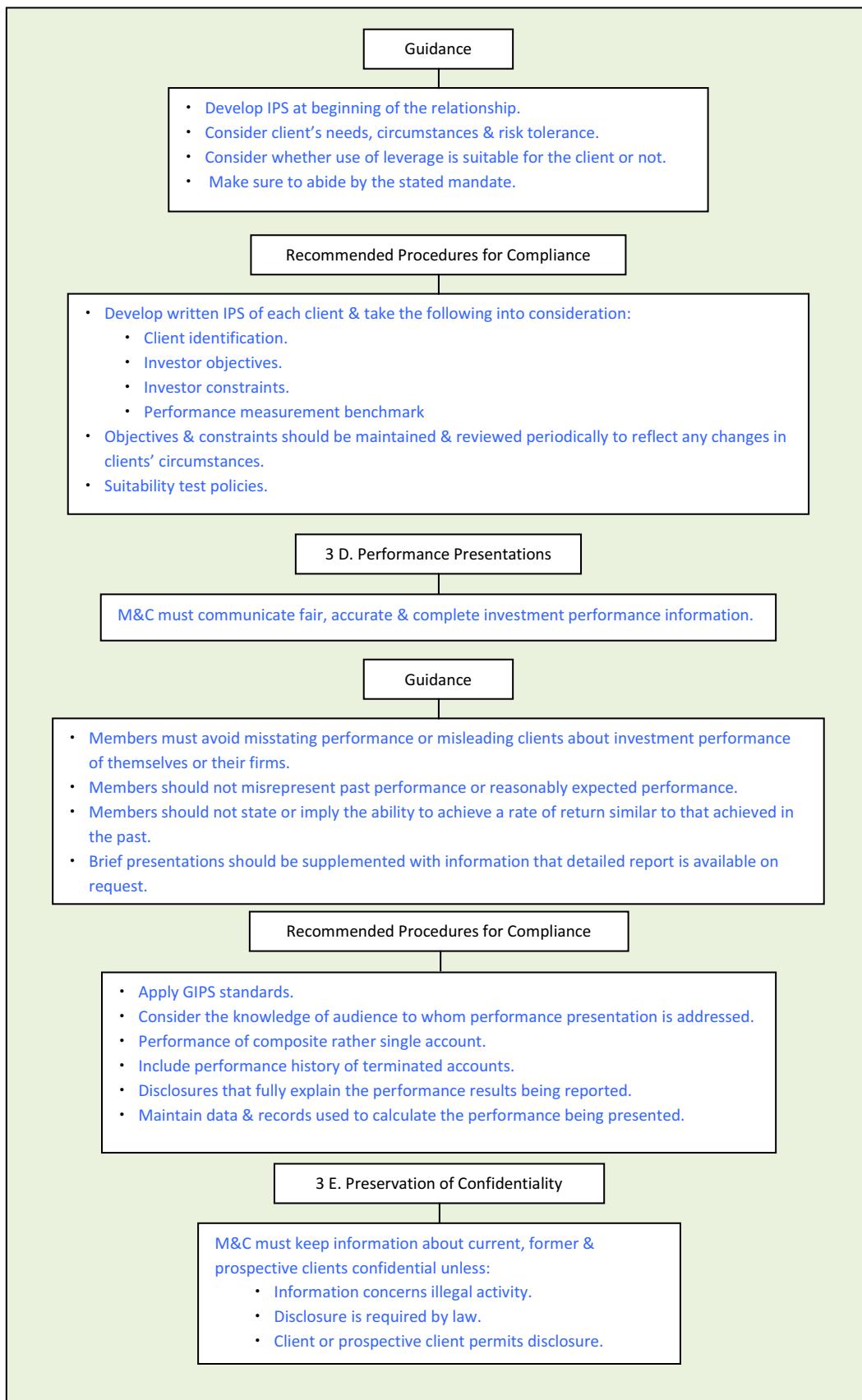
2. M&C are in advisory relationship

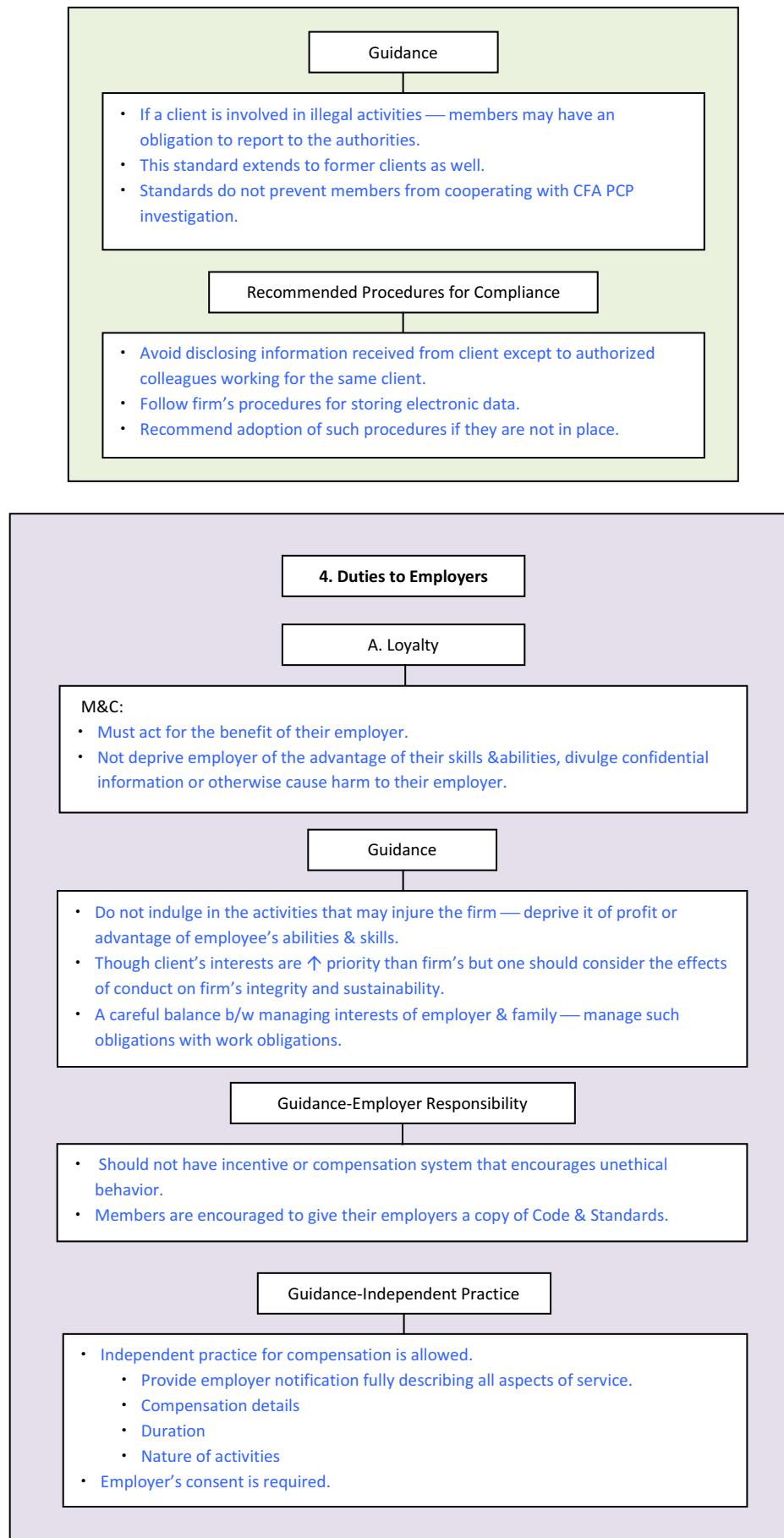
Make inquiry into client's investment experience, risk & return objectives, financial constraints & reassess & update this information regularly.

Determine investment's suitability with reference to client's objective & constraints & mandate.

Judge investment suitability in context of client's total portfolio.

1. When M&C are responsible for a portfolio with a specific mandate, strategy or style, they must take actions according to stated objectives & constraints of portfolio.





Guidance-Leaving an Employer

- Continue to act in employer's best interest until resignation is effective.
- Activities that may constitute a violation include:
 - Misappropriation of trade secrets
 - Misuse of confidential information
 - Soliciting employer's client prior to leaving
 - Self-dealing
 - Misappropriation of client lists.
- Employer records on home computers, PDA, cell phones or any other medium are property of firm.
- After leaving the organization, simple knowledge of names and existence of former clients is not confidential.
- Member/candidate can use the experience or knowledge gained with former employer at any other organization.

Guidance Whistle-blowing

- In exceptional cases, duty to the employer may be violated in order to protect a client or upholding the integrity of capital markets.
- Whistle-blowing cannot be done for personal gains.

Guidance-Nature of Employment

If members/candidates are independent contractors, they still have duty to abide by the terms of the agreement.

Recommended Procedures for compliance

- Competition policy (employer restrictions on offering similar services outside the firm).
- Termination policy (how termination is disclosed to clients & staff).
- Incident-reporting procedures.
- Employee classification (e.g. full time, part time).

4 B. Additional Compensation Arrangements

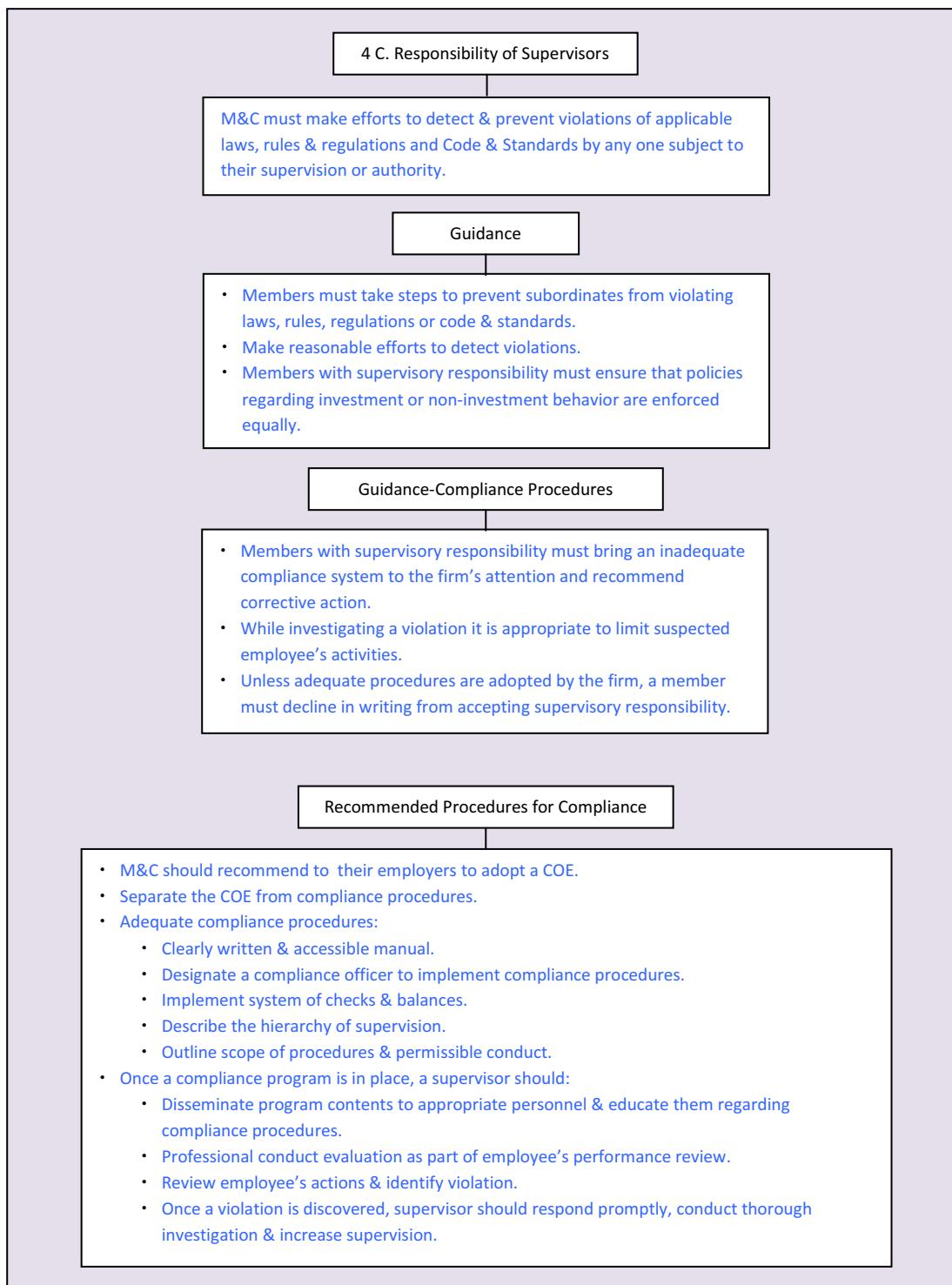
M&C must not accept gifts, benefits, compensation, or consideration that competes with or might reasonably be expected to create a conflict of interest with their employer's interest unless they obtain written consent from all parties involved.

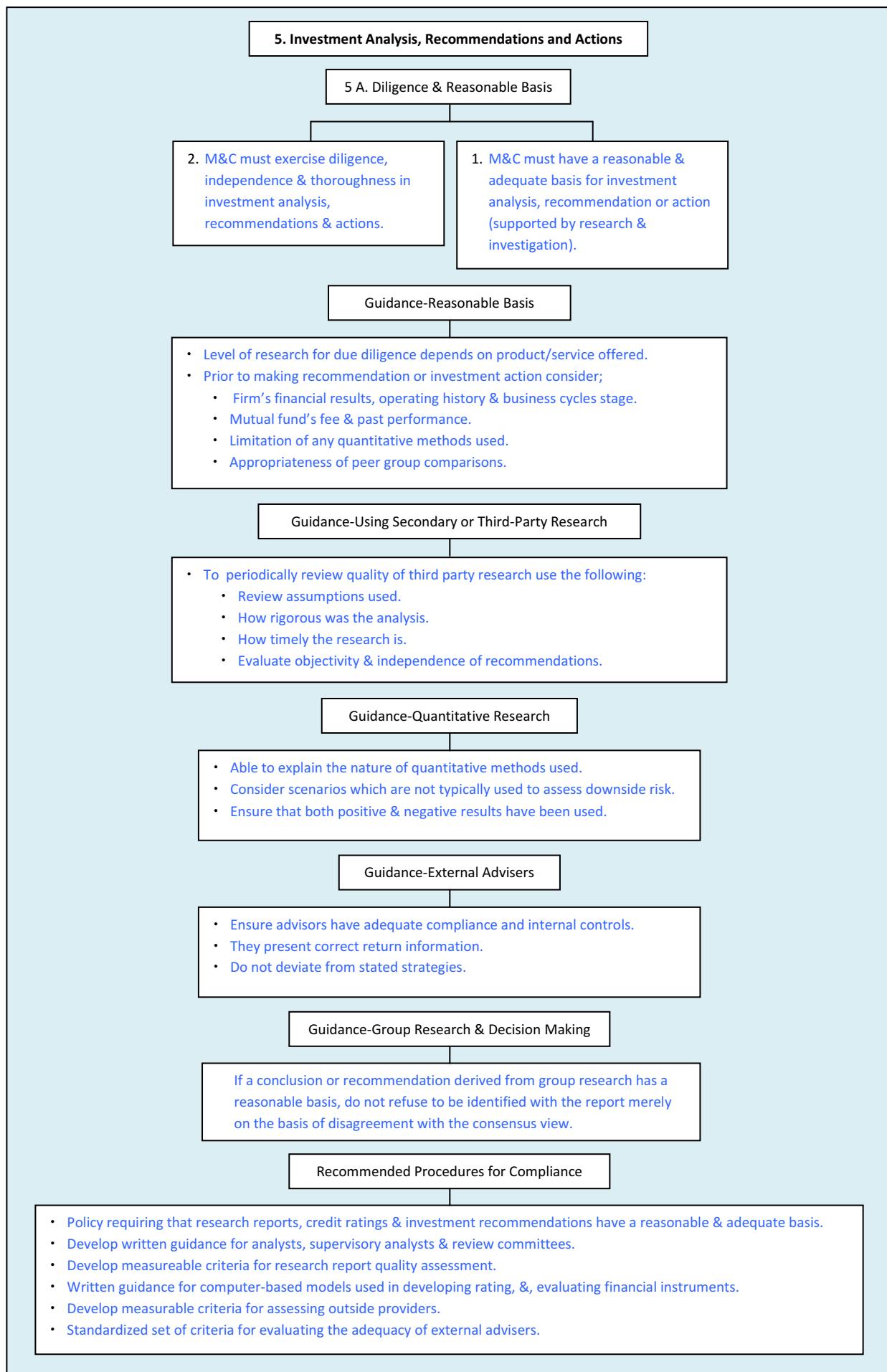
Guidance

- Compensation includes both direct & indirect form.
- Additional benefits are also included.
- Written consent from employer also includes email communication.

Recommended Procedures for Compliance

- Immediately report to employer in written form detailing any proposed compensation and services.
- Performance incentives should be verified by the offering party.





5 B. Communication with Clients and Prospective Clients

M&C must:

- Disclose to clients & prospective clients the basic format & general principals of investment processes & disclose any change that materially affects those processes.
- Identify important factors (related to investments) & communicate with clients & prospective clients.
- Distinguish b/w fact & opinion (in investment analysis & recommendations).

Guidance

- Always include basic characteristics of security identified.
- Distinguish b/w facts and opinions.
- Illustrate investment decision making process utilized.
- All means of communication should be included not only the research reports.
- Communicate any specific risk factors associated with securities.
- Clearly communicate potential gains & losses.
- Failing to illustrate model's limitations may be considered as violation.

Recommended Procedures for Compliance

Able to supply additional information if requested — maintain relevant information.

5 C. Record Retention

M&C must develop & maintain appropriate records that support investment analysis, recommendations, actions & other investment related communications with clients & prospective clients.

Guidance

- Maintain records that support conclusion or any investment action.
- Such records are property of the firm.
- In the absence of regulatory requirements, keep records for 7 years.
- Members who change firms must recreate analysis related documentation – not rely on memory or material created at previous firms.

Recommended Procedures for Compliance

Record-keeping is generally firm's responsibility.

6. Conflicts of Interest

6 A. Disclosures of Conflicts

M&C must:

- Make full & fair disclosure of all matters that impair independence & objectivity or interfere with respective duties to clients, prospective clients & employers.
- Disclosures should be prominent, delivered in plain language & communicate information effectively.

Guidance-Disclosure to Clients

- Disclose all potentially conflicting areas to existing and prospective clients to let them judge any potential bias themselves.
- If servicing as a board member — disclose.
- Disclosure of broker/dealer market making activities is included.
- Disclosure of holdings in companies that member recommends or clients hold.
- Members' compensation structure, should be disclosed if based on the recommendation issued or security sold.

Guidance –Disclosure of Conflicts to Employers

- Give employers enough information to judge the impact of conflict.
- Take reasonable steps to avoid conflict — report promptly if they occur.

Recommended Procedures for Compliance

Special compensation arrangements (bonus, commission etc) should be disclosed.

6 B. Priority of Transaction

Investment transaction priority flow:



Guidance

- Prioritize client's transactions over personal transactions & those made on behalf of the member's firm.
- Personal transactions may be undertaken after clients and member's employers have been given adequate opportunity.
- Personal transaction – member is a "beneficial owner".
- Family member accounts should not be disadvantaged to client accounts.
- Information about pending trades should not be disclosed to any other person if deemed material nonpublic.

Recommended Procedures for Compliance

- Limited participation in equity IPOs by investment personnel.
- Restrictions on private placements for investment personnel.
- Establish blackout/restricted periods for investment personnel.
- Reporting requirements for investment personnel.
 - Disclosure of holdings in which the employee has a beneficial interest.
 - Provide duplicate confirmations of transaction.
 - Preclearance procedures.
- Disclosure of policies regarding personal investing.

6 C. Referral Fees

M&C must disclose to employer, clients & prospective clients, as appropriate, any compensation, consideration or benefit received from or paid to others for recommendation of products & services.

Guidance

- Must inform employers, clients and prospects of benefits received for referrals of customers and clients.
- All types of consideration must be disclosed.

Recommended Procedures for Compliance

- Encourage firms to adopt clear procedures regarding compensation for referrals.
- M&C should update the employer (at least quarterly) regarding nature and value of referral compensation received. The clients should also be notified about approved referral fee programs.

7. Responsibilities as a CFAI Member or CFAI Candidate**7 A. Conduct as Members and Candidates in the CFA Program**

M&C must not:

- Engage in any conduct that compromises the reputation or integrity of CFAI or CFA designation.
- Violate integrity, validity or security or the CFA examinations.

Guidance

- Must not engage in any activity that undermines the integrity of CFA charter.
- Standard applies to:
 - Cheating in CFA or any exam.
 - Revealing anything about the contents & topics of exam.
 - Not following exam related rules & policies of CFA program.
 - Disclosing confidential exam related information to candidates or to public.
 - Improperly using the designation.
 - Misrepresenting information on PCS or CFAI in the Continuing Education Program.
- Members can express their opinion regarding the CFA exam or program but without disclosing actual exam specific information.
- Members voluntarily participating in the administration of the CFA exam must not solicit or reveal information about:
 - Exam question
 - Deliberation related to the exam process
 - Scoring of question

7 B. Reference to CFA Institute, the CFA Designation, and the CFA Program

M&C must not misrepresent or exaggerate the meaning or implication of membership in CFA institute, holding the CFA designation or candidacy in CFA program.

Guidance

- Do not over-promise individual competence.
- Do not over promise future investment result.
- Sign PCS annually.
- Pay CFAI membership dues annually.
- Do not misrepresent or exaggerate the meaning of the designation.
- No partial designation exists.
- Acceptable to state candidate successfully completed the program in 3 years ⇒ claiming superior ability is not permitted.
- In written/oral communications.
 - The Chartered Financial Analyst and CFA marks must be used as adjectives or after the charterholder's name.
 - Prohibited to be used as nouns.

Trade Allocation: Fair Dealing and Disclosure

FinQuiz Team recommends reading
[‘Trade Allocation: Fair Dealing and Disclosure’](#) directly from the CFA
Institute’s curriculum.

Changing Investment Objectives

FinQuiz Team recommends reading
‘**Changing Investment Objectives**’
directly from the CFA Institute’s
curriculum.

“FINTECH IN INVESTMENT MANAGEMENT”

1. INTRODUCTION

Fintech (finance + technology) is playing a major role in the fields of:

- investment management industry
- investment advisory services
- financial record keeping, blockchain and distributed ledger technology (DLT)

2. WHAT IS FINTECH

Some salient fintech developments related to the investment industry include:

- **Analysis of large data sets:**
 - traditional data sources include economic indicators, financial statements
 - non-traditional data sources (such as social media, sensor networks) to generate profits.
- **Analytical tools:** artificial intelligence (AI) helps identifying complex, non-linear relationships among gigantic datasets.
- **Automated trading:** lower transaction costs, market liquidity, secrecy, efficient trading etc.
- **Automated advice:** Robo-advisors or automated personal wealth management are low-cost alternates for retail investors.
- **Financial record keeping:** DLT provides advanced and secure means of record keeping and tracing ownership of financial assets on peer-to-peer (P2P) basis.

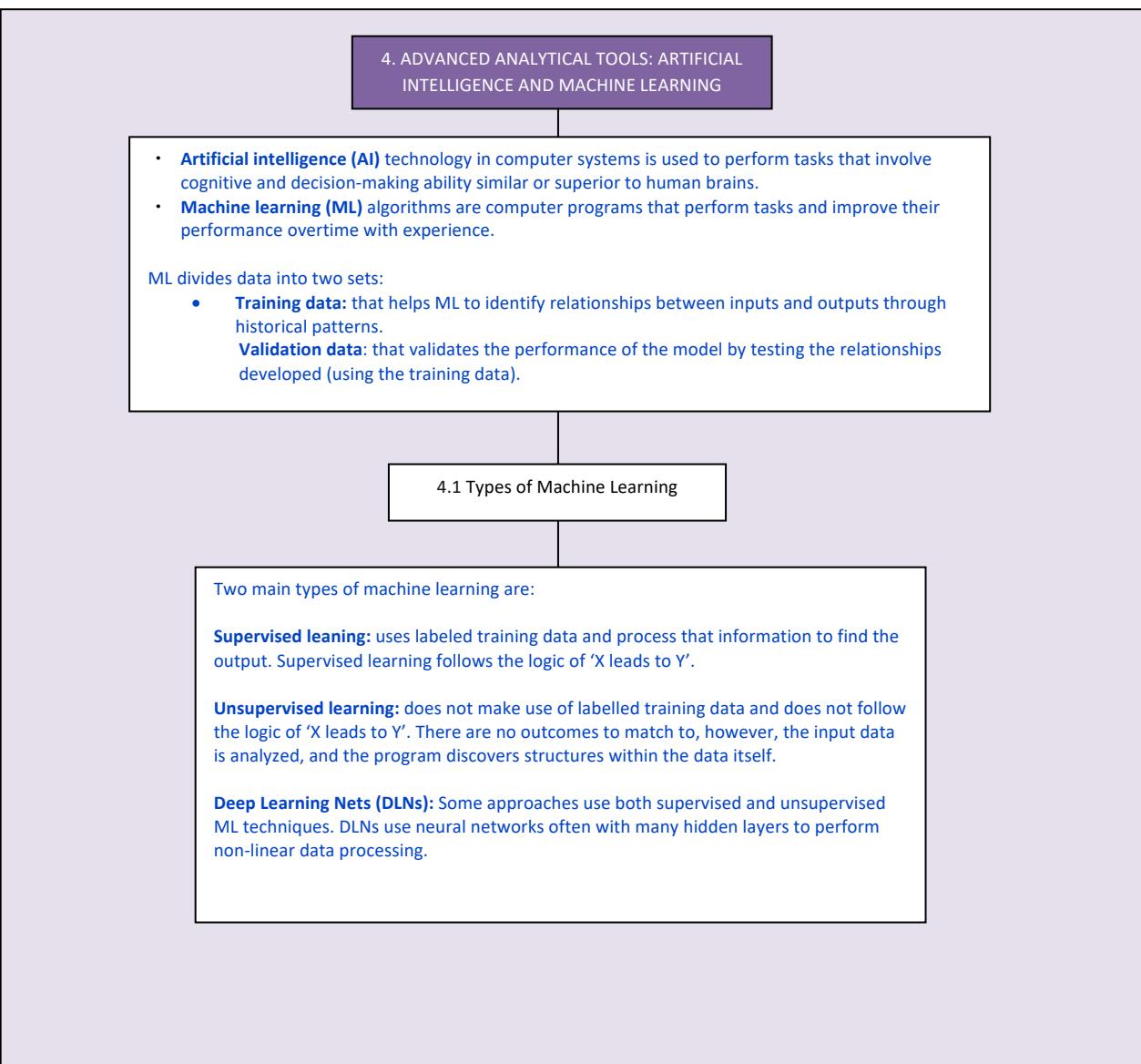
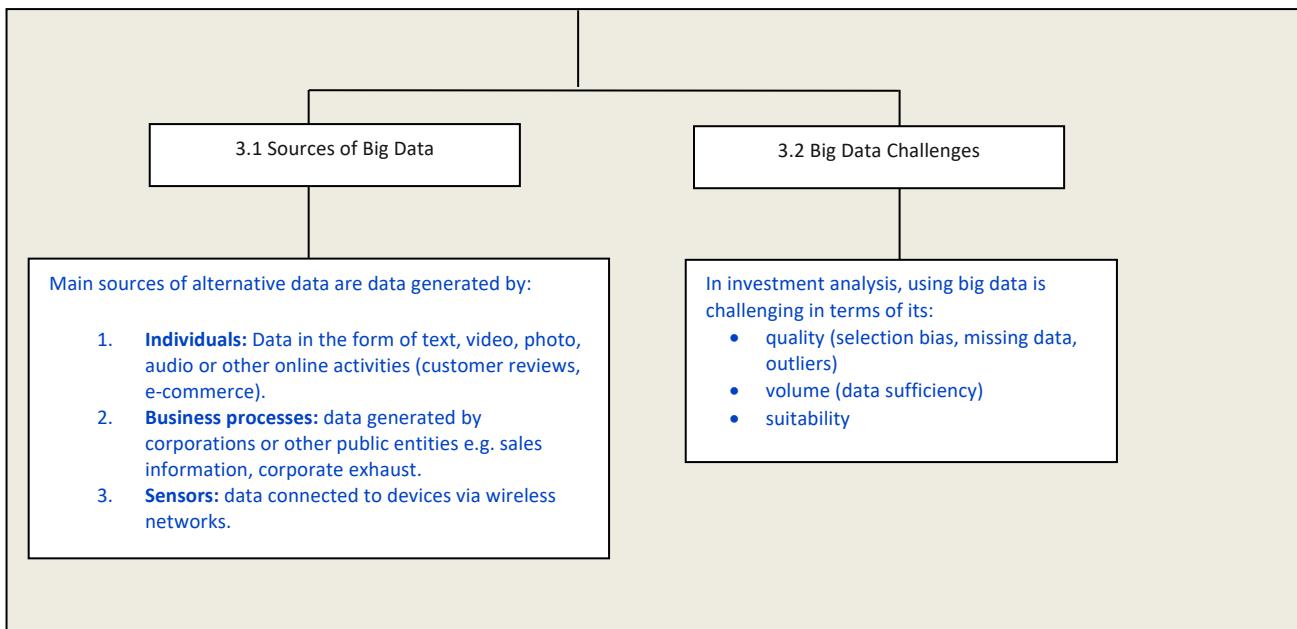
3. BIG DATA

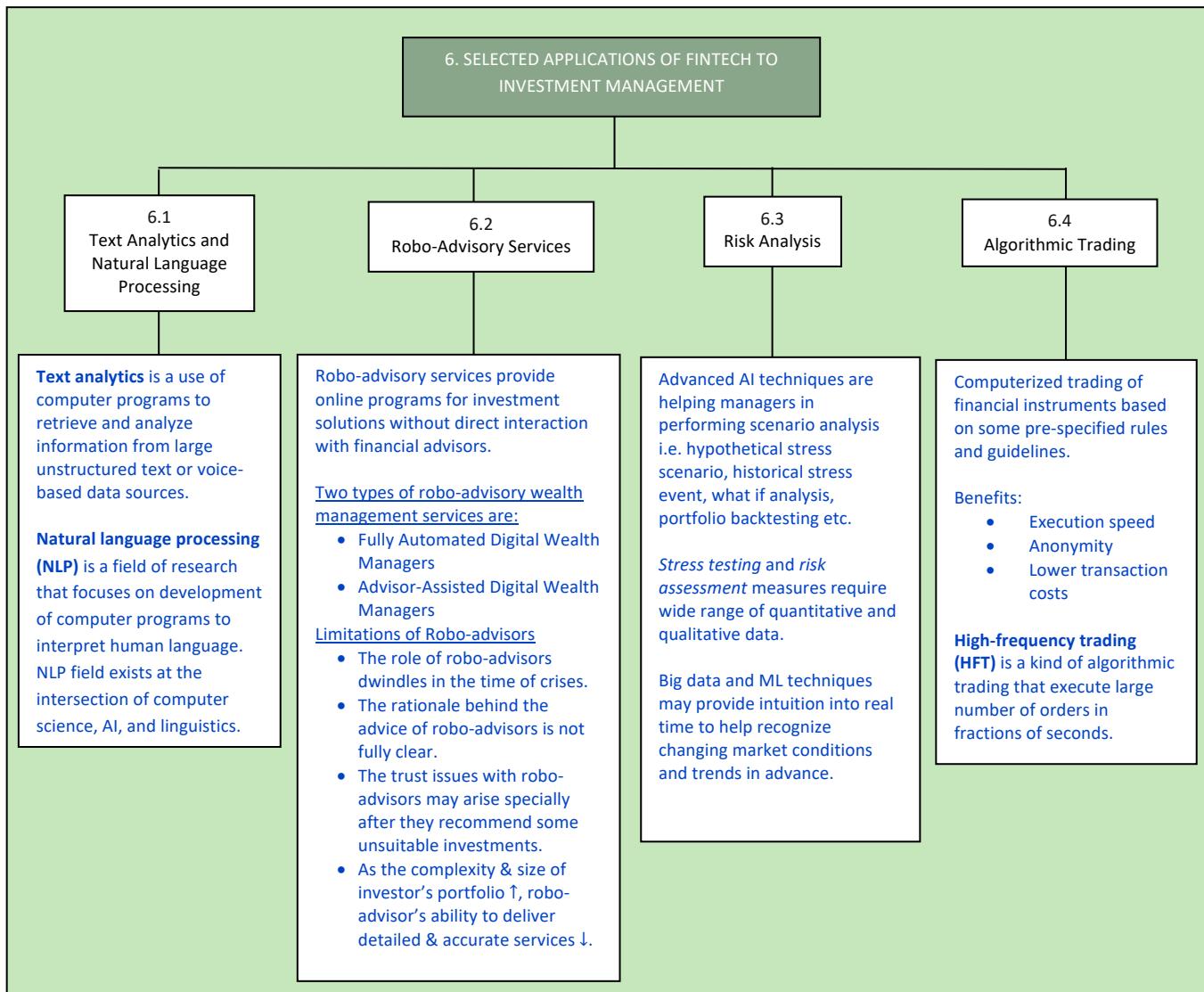
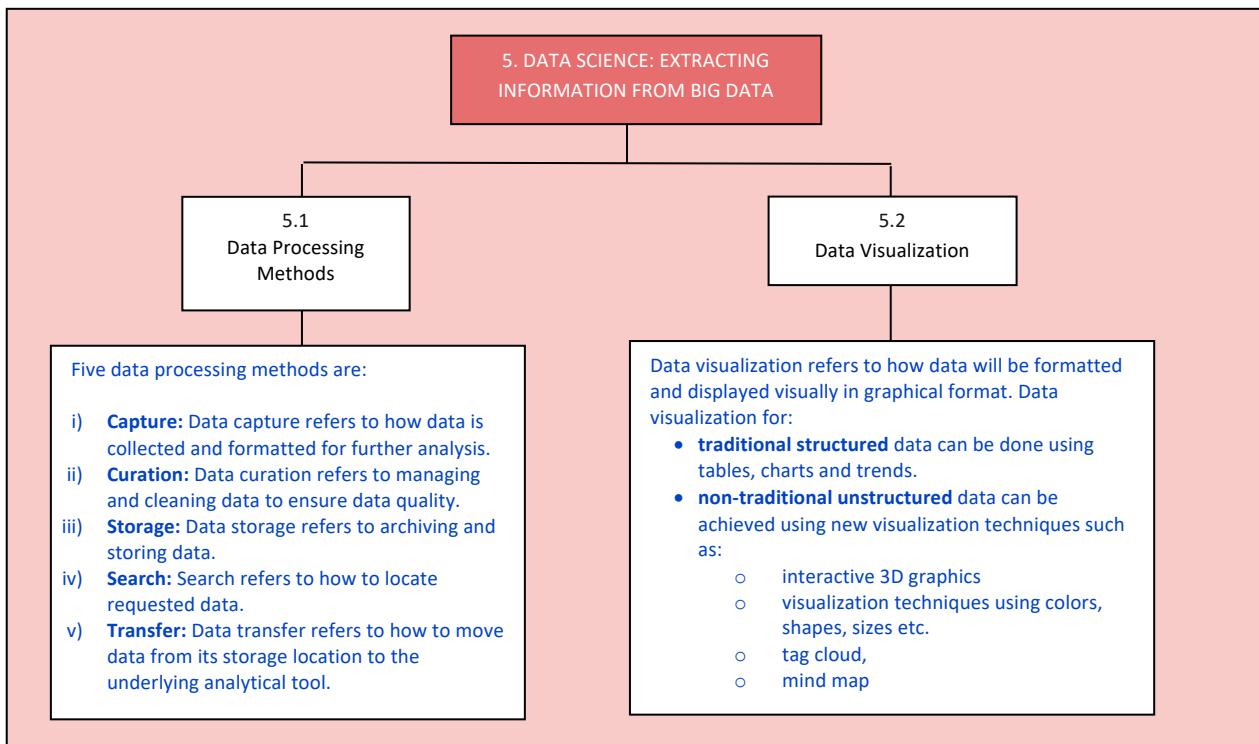
Traditional		Non-traditional (alternate)	
Sources	Institutions, Businesses, Government, Financial Markets	Sources	Social media, Sensor networks Company-used data, Electronic devices, Smart phones, Cameras, Microphones, Radio-frequency identification (RFID)
Forms of Data	Annual reports, Regulatory filings, Sales & earnings, Conference calls, Trade prices & volumes	Forms of Data	Posts, Tweets, Blogs, Email, Text messages, Web-traffic, Online news sites

Big data typically have the following features:

- Volume
- Velocity
- Variety

continue





7. DISTRIBUTED LEDGER TECHNOLOGY

Distributed ledger technology (DLT) – advancements in financial record keeping systems – offers efficient methods to generate, exchange and track ownership of financial assets on a peer-to-peer basis.

DLT advantages:

- i) Accuracy
- ii) transparency
- iii) secure record keeping
- iv) speedy ownership transfer
- v) peer-to-peer interactions

Limitations:

- i) excessive energy consumption
- ii) not fully secure technology

Three basic elements of a DLT network are:

- i. **Digital ledger** – a digital database to record & store transactions
- ii. **A consensus mechanism** - mechanism which ensures that entities verify the transactions and agree on the common state of the ledger
- iii. **Participant network** – a peer-to-peer network of nodes.

A **distributed ledger** is a digital database where transactions are recorded, stored and distributed among entities in a manner that each entity has a similar copy of digital data.

7.1

Permission and Permissionless Networks

7.2

Application of Distributed Ledger Technology to Investment Management

7.2.1

Cryptocurrencies

7.2.2

Tokenization

7.2.3

Post-trade clearing and settlement

7.2.4

Compliance

DLT networks can be permissionless or permissioned.

Permissionless networks are open to new users. Participants can see all transactions and can perform all network functions.

Permissioned networks are closed networks where activities of participants are well-defined. Only pre-approved participants are permitted to make changes.

a digital currency that works as a medium of exchange to facilitate near-real-time transactions between two parties without involvement of any intermediary.

helps in authenticating & verifying ownership rights to assets on digital ledger by creating a single digital record.

DLT provides near-real time trade verification, reconciliation and settlement using single distributed record ownership among network peers, therefore reduces complexity, time, costs, trade fails and need for 3rd party facilitation and verification.

advanced & automated compliance & regulatory reporting procedures provide greater transparency, operational efficiency & accurate record-keeping.

“CORRELATION & REGRESSION”

t = t-test Calculated
 r = Correlation Coefficient
 t_c = Critical t-value
 d_f = Degree of Freedom
 H_0 = Null Hypothesis
 H_a = Alternative Hypothesis
 b_0 = Intercept
 b_1 = Slope Coefficient (Regression Coefficient)
 ε_t = Error Term

$n(X)$ = No. of Independent Variables
 R^2 = Coefficient of Determination
 $r_{x,y}$ = Correlation Coefficient (x, y)
 CI = Confidence Interval
 $S.E$ = Standard Error
 SSE = Sum of Squared/Residual Sum of Squared Errors
 RSS = Regression Sum of squares
 k = No. of Slope Parameters

1. INTRODUCTION

Broadly, to analyze relationship b/w two/more financial variables, correlation & regression tools are used.

2. Correlation Analysis

2.1 Scatter Plots

- A graph that shows relationship b/w two data-series observations in two dimensions.
- Each observation is a point & not connected.
- Data (observations) shown in pairs.
- Relationship depicted graphically.

2.2 Correlation Analysis

- Relationship expressed using single number.
- Correlation coefficient \Rightarrow measures the direction & magnitude of linear relation b/w two variables.
- $Range = -1 \leq \text{correlation coefficient} \leq 1$.
- Correlation coefficient > 0
 - Positive relationship.
 - Both variables move in same direction.
 - $X \uparrow Y \uparrow$ & $X \downarrow Y \downarrow$.
- Correlation coefficient < 0 .
 - Negative relationship.
 - Both variables move in opp. direction.
 - $X \uparrow Y \downarrow$ & $X \downarrow Y \uparrow$.
- Correlation coefficient $= 0$.
 - No linear relationship.
- Correlation of 1 does not mean for every unit of x, y changes with 1 unit.

2.3 Calculating & Interpreting the Correlation Coefficient

- $\text{Covariance } (x, y) = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{n-1}$
- $\text{Sample variance} = S_x^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}$
- $\text{Sample standard deviation} = S_x = \sqrt{S_x^2}$.
 - Positive square root of sample variance.
- Sample correlation coefficient:

$$r = \frac{\text{Covariance } (X, Y)}{S_x S_y}$$
 - Covariance of x, y divided by product of sample s.d of x, y.
- Correlation coefficient:
 - Number without any units attached
 - Valid if means, variances and covariances of x, y finite and constant.

2.4 Limitations of Correlation Analysis

- Results may not be always reliable.
- With very low correlation, two variables can have non-linear relationship.
- Outliers can (extreme observations) make correlation an unreliable measure.
- At times, correlation that includes outliers may make more sense.
- Generally a comparison b/w correlation, with and without outliers is made and decision is taken.
- Correlation does not imply causation.

Spurious Correlation

- Correlation based on chance.
- Induced correlation through mixing 3rd variable in both variables.
- Correlations arising indirectly through relationship with 3rd variable.
- Spurious correlations may suggest investment strategies that appear profitable but actually would be not.

2.5 Uses of Correlation Analysis

See examples 1 to 6, Reading 7, Volume 1

2.6 Testing the Significance of the Correlation Coefficient

- Significance tests \Rightarrow conduct to check relationships between random variables exists or is based on chance.
- $t = \frac{r \sqrt{n-2}}{\sqrt{1-r^2}}$
- Test statistic \Rightarrow t-distribution with $(n-2)$ d.f.
- $H_0 \Rightarrow$ Correlation in population = 0 i.e no correlation ($p=0$).
- $H_a \Rightarrow$ Correlation in population $\neq 0$ i.e. there is correlation ($p \neq 0$).
- Two variables if normally distributed \Rightarrow we can test to determine hypothesis- using r.
- Magnitude of r to reject $H_0 \downarrow$ as $n \uparrow$.
 - As $n \uparrow$ $d_f \uparrow$.
 - As $n \uparrow$ absolute value of $t_c \downarrow$.
 - As n increases, absolute value of numerator and thus t-statistic increases.
- Decision rule Reject H_0 if
 $-t_c > t > t_c$
 interpretation: correlation exists $\Rightarrow p \neq 0$.

3. LINEAR REGRESSION

3.1 Linear Regressions with One Independent Variable

- Linear regression \Rightarrow allows us to use one variable to make predictions about another.
 - Test significance about relationship.
 - Quantify the strength.
 - $Y \Rightarrow$ dependent variable \Rightarrow we seek to explain.
 - $X \Rightarrow$ independent variable \Rightarrow we use to explain Y
 - Example: using growth in money supply (X) to explain inflation (Y).
- Linear regression assumes linear relation between depend & independent variable.
- $Y_t = b_0 + b_1 X_i + E_i$
where $i = 1, \dots, n$
- Two principal types of data used
 - Cross-sectional \Rightarrow involve many observations from diff. entity for same time period.
 - Time series \Rightarrow involve many observations for same entity from different time periods.
- Linear regression computes regression line that best fits the observations.
- Values of b_0 & b_1 are chosen that minimize the sum of squared vertical distance b/w observations and regression line.
- Regression Residual \Rightarrow distance b/w actual observation & regression line
- Estimated \hat{b}_0 & \hat{b}_1 are used for regression line & used for prediction.
- Analysts typically use spreadsheet or statistical package to perform linear

3.2 Assumptions of the Linear Regression Model

- The relationship between the dependent variable, Y , and the independent variable X , is linear in the parameters b_0 & b_1 .
- X is not random.
- Expected value of $E(\epsilon) = 0$.
- Variance of error term (ϵ) is same for all observation.
- ϵ is uncorrelated across observations.
- ϵ is normally distributed.

3.3 The Standard Error of Estimate

- $SEE = \left[\frac{\sum_{i=1}^n (Y_i - \hat{b}_0 - \hat{b}_1 X_i)^2}{n-2} \right]^{1/2}$
 $= \sqrt{\frac{\sum_{i=1}^n (\hat{\epsilon}_i)^2}{n-2}}$
- SEE measures s.d of $\hat{\epsilon}_i$ (the residual term).
- SEE is much similar to s.d for single variable.
- Regression residual ($\hat{\epsilon}_i$) = actual observation (Y) – predicted value (\hat{Y}).
 - Where $\hat{Y}_i = \hat{b}_0 + \hat{b}_1 X_i$
- $n-2$ is:
 - used as there are two parameters (\hat{b}_0 & \hat{b}_1).
 - also called degrees of freedom.
 - used to ensure SEE as unbiased.

3.4 The Coefficient of Determination

- Measures fraction of total variation in Y explained by X.
- for $n(X) = 1$; $R^2 = r_{x,y}^2$
 \Rightarrow When $n(x) > 1$ this method cannot be used.
- For $n(X) > 1$; $R^2 = \frac{\text{Total variation} - \text{Unexplained variation}}{\text{Total variation}}$
 $= \frac{\text{Explained variation}}{\text{Total Variation}}$
 $= 1 - \frac{\text{Unexplained variation}}{\text{Total variation}}$
- Total variation = $\sum_{i=1}^n (Y_i - \bar{Y})^2$
- Unexplained variation = $\sum_{i=1}^n (Y_i - \hat{Y}_i)^2$
- Explained variation = $\sum_{i=1}^n (\hat{Y}_i - \bar{Y})^2$

3.5 Hypothesis Testing

- It is believed that CI contains true b_1
- CI approach requires:
 - \hat{b}_0, \hat{b}_1
 - Hypothesized b_0 or b_1
 - Confidence interval
- CI requires level of significance \Rightarrow for $\hat{b}_1 = \hat{b}_1 \pm t_c S_{\hat{b}_1}$
 - Where t_c = critical value of t.
 - d_f = no of observations – no. of estimated parameters.
 - $S_{\hat{b}_1}$ = standard error of estimated coefficient.
- Decision criteria: if CI includes $\hat{b}_1 \Rightarrow$ do not reject H_0 .
- $t = \frac{\hat{b}_1 - b_1}{S_{\hat{b}_1}}$
 t -statistic $\Rightarrow (n-2) d_f$
 $\text{if } |t| > t_c \text{ reject } H_0$
- Choice of significance level is judgmental.
- \downarrow Significant level \downarrow type I error probability \uparrow type II error probability.
- P-value \Rightarrow smallest level of significance for which H_0 can be rejected.
- Stronger regression $\Rightarrow \downarrow$ S.E of parameter & tighter CI.

3.6 Analysis of Variance (ANOVA) in a Regression with One Independent

- Statistical procedure for dividing total variability of a variable into components.
- Helps determine usefulness of the independent variable in explaining the variation in the dependent variable.
- F-statistic test whether all slope coefficients are = 0.
- To conduct F-statistic we need:
 - Total observations (n).
 - Total no. of parameters.
 - $SSE \Rightarrow \sum_{i=1}^n (Y_i - \hat{Y}_i)^2$ (unexplained).
 - $RSS \Rightarrow \sum_{i=1}^n (\hat{Y}_i - \bar{Y})^2$ (explained).
- $TSS = SEE + RSS$
- F-Statistic $\Rightarrow \frac{\text{Avg. Regression sum of squares}}{\text{Avg. Sum of squared errors}}$
 $= \frac{RSS/k}{SSE/(n-k-1)}$ where k = no. of slope parameters.

3.7 Prediction Intervals

- An interval around the estimated parameters in which it will fall.
- Confidence interval is created through knowing variance of the prediction errors (S_f^2).
- $$S_f^2 = S^2 \left[1 + \frac{1}{n} + \frac{(X - \bar{X})^2}{(n-1)S_x^2} \right]$$

Where

S^2 = squared standard errors of estimate.

n = no. of observations.

\bar{X} = estimated mean of X .

S_x^2 = variance of independent variable.
- Four steps to determine the CI
 - Make the prediction.
 - Compute S_f^2
 - Choose level of significance (α) & determine critical value (t_c).
 - Compute $\hat{Y} \pm t_c S_f$
where $\hat{Y} = \hat{b}_0 + \hat{b}_1 X$

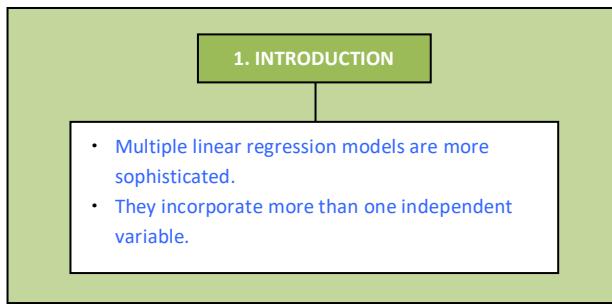
3.8 Limitations of Regression Analysis

- Parameters instability \Rightarrow regression relations can change over time.
- Sampling from more than one population in both cross-sectional and time-series data is problematic.
- Specific to investment context, public knowledge of regression relationship may negate their usefulness.
- If regression assumptions are violated results may not be valid.

“MULTIPLE REGRESSION AND ISSUES IN REGRESSION ANALYSIS”

MSR = Mean Regression Sum of Squares
 MSE = Mean Squared Error
 RSS = Regression Sum of Squares
 SSE = Sum of Squared Errors/Residuals
 α = Level of Significance
 ML = Machine Learning

F_C = Critical F taken from F Distribute Table
 H_0 = Null Hypothesis
 H_α = Alternative Hypothesis
 X = Independent Variable
 Y = Dependent Variable
 F = F Statistic (calculated)



2. MULTIPLE LINEAR REGRESSIONS

- Allows determining effects of more than one independent variable on a particular dependent variable
- $Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_nX_{ni} + E_i$
- Tells the impact on Y by changing X_1 by 1 unit keeping other independent variables same.
- Individual slope coefficients (e.g. b_1) in multiple regressions known as partial regression/slope coefficients.

2.1 Assumption of the Multiple Linear Regression Model

- Relationship b/w Y and $X_1, X_2, X_3, \dots, X_n$ is linear.
- Independent variables are not random and no exact linear relationship exists b/w 2 or more independent variables.
- Expected value of error terms is 0.
- Variance of error term is same for all observations.
- Error term is uncorrelated across observations.
- Error term is normally distributed.

2.2 Predicting the Dependent Variable in a Multiple Regression Model

- Obtain estimates of regression parameters.
- $\text{estimates} = \hat{b}_0, \hat{b}_1, \hat{b}_2, \dots, \hat{b}_n$
- $\text{regression parameters} = b_0, b_1, b_2, \dots, b_k$
- Determine assumed values of $\hat{X}_{1i}, \hat{X}_{2i}, \dots, \hat{X}_k$
- Compute predicted value of \hat{Y}_i using $\hat{Y}_i = \hat{b}_0 + \hat{b}_1\hat{X}_{1i} + \hat{b}_2\hat{X}_{2i} + \dots + \hat{b}_k\hat{X}_{ki}$
- To predict dependent variable:
 - Be confident that assumptions of the regression are met.
 - Predictions regarding X must be within reliable range of data used to estimate the model.

2.3 Testing Whether All Population Regression Coefficients Equals Zero

- $H_0 \Rightarrow$ All slope coefficients are simultaneously = 0, none of the X variable helps explain Y.
- To test H_0 F-test is used.
- T-test cannot be used.
- $F = \frac{\frac{MSR}{MSE}}{\frac{RSS/k}{SSE/(n-k+1)}}$
- Where

$$RSS = \sum_{i=1}^n (\hat{Y}_i - \bar{Y})^2$$

$$SSE = \sum_{i=1}^n (Y_i - \hat{Y}_i)^2$$
- Decision rule \Rightarrow reject H_0 if $F > F_C$ (for given α).
- It is a one-tailed test.
- d_f numerator = k
- d_f denominator = n-(k+1).
- For k and n the test statistic representing H_0 , all slope coefficients are equal to 0, is $F_{k,n-(k+1)}$
- In F-distribution table $f_0 F_{k,n-(k+1)}$ where K represents column and n-(k+1) represents row.
- Significance of F in ANOVA table represents 'p value'.
- $\uparrow F\text{-statistic} \downarrow \text{chances of Type I error.}$

2.4 Adjusted R^2

- $R^2 \uparrow$ with addition of independent variables (X) in regression
- $\text{Adjusted } R^2 (\bar{R}^2) = 1 - \left(\frac{n-1}{n-k-1} \right) (1 - R^2)$.
- When $k \geq 1 \Rightarrow R^2 > \bar{R}^2$
- \bar{R}^2 can be -ve but R^2 is always +ve.
- If \bar{R}^2 is used for comparing regression models.
 - Sample size must be the same
 - Dependent variable is defined in the same way.
- $\uparrow \bar{R}^2$ Does not necessarily indicate regression is well specified.

3. USING DUMMY VARIABLES IN REGRESSION

- Dummy variable \Rightarrow takes 1 if particular condition is true & 0 when it is false.
- Diligence is required in choosing no. of dummy variables.
- Usually $n-1$ dummy variables are used where n = no. of categories.

4. VIOLATIONS OF REGRESSION ASSUMPTIONS

4.1 Heteroskedasticity

- Variance of errors differs across observations \Rightarrow heteroskedastic
- Variance of errors is similar across observations \Rightarrow homoskedastic
- Usually no systematic relationship exists b/w X & regression residuals.
- If systematic relationship is present \Rightarrow heteroskedasticity can exist.

4.2 Serial Correlation

- Regression errors correlated across observations.
- Usually arises in time-series regression.

4.3 Multicollinearity

- Occurs when two or more independent variables (X) are highly correlated with each other.
- Regression can be estimated but result becomes problematic.
- Serious practical concern due to commonly found approximate linear relation among financial variables.

4.4 Summarizing the Issues

On page 3

On page 4

4.1.1 The Consequence of Heteroskedasticity

- It can lead to mistake in inference. Does not affect consistency.
- F-test becomes unreliable.
- Due to biased estimators of standard errors, t-test also becomes unreliable.
- Heteroskedasticity effects may include:
 - underestimation of estimated standard errors
 - inflated t-statistic
- Ignoring heteroskedasticity leads to significant relationship that does not exist actually.
- It becomes more serious while developing investment strategy using regression analysis.
- **Unconditional heteroskedasticity** \Rightarrow when heteroskedasticity of error variance is not correlated with independent variables in the multiple regression.
 - Create major problems for statistical inference.
- **Conditional heteroskedasticity** \Rightarrow when heteroskedasticity of error variance is correlated with the independent variables.
 - It causes most problems.
 - Can be tested & corrected easily through many statistically software packages.

4.1.2 Testing for Heteroskedasticity

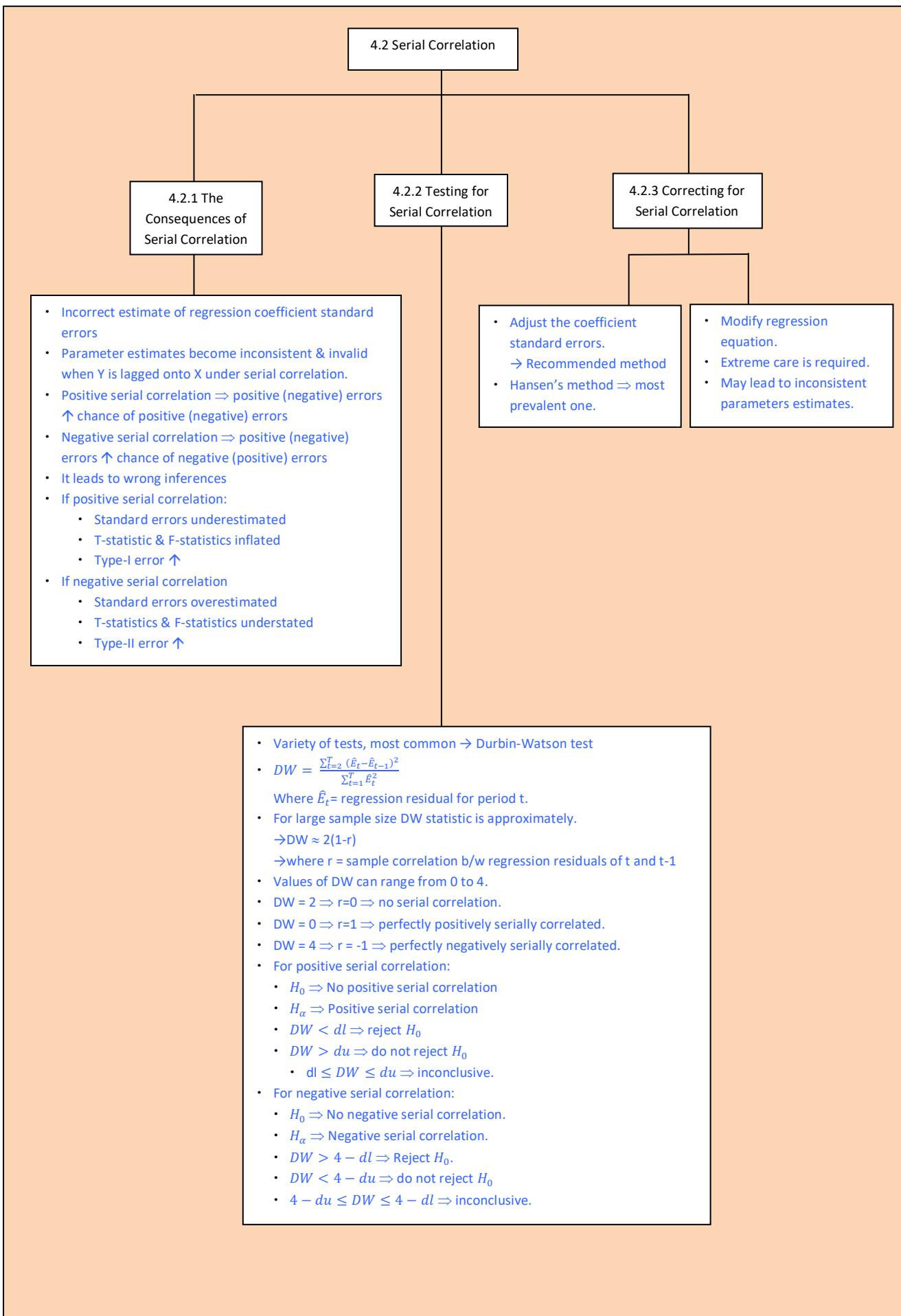
- Breush-Pagan test is widely used.
- Regression squared residuals of regression on independent variables.
 - Independent variables explain much of the variation of errors \Rightarrow conditional heteroskedasticity exists.
 - H_0 = no conditional heteroskedasticity exists.
 - H_α = conditional heteroskedasticity exist
- Under Breush-pagan test statistic = NR^2
- R^2 : from regression of squared residuals on X
- Critical value \Rightarrow calculated χ^2 distribution.
- d_f = no. of independent variables
- Reject H_0 if test-static > critical value.

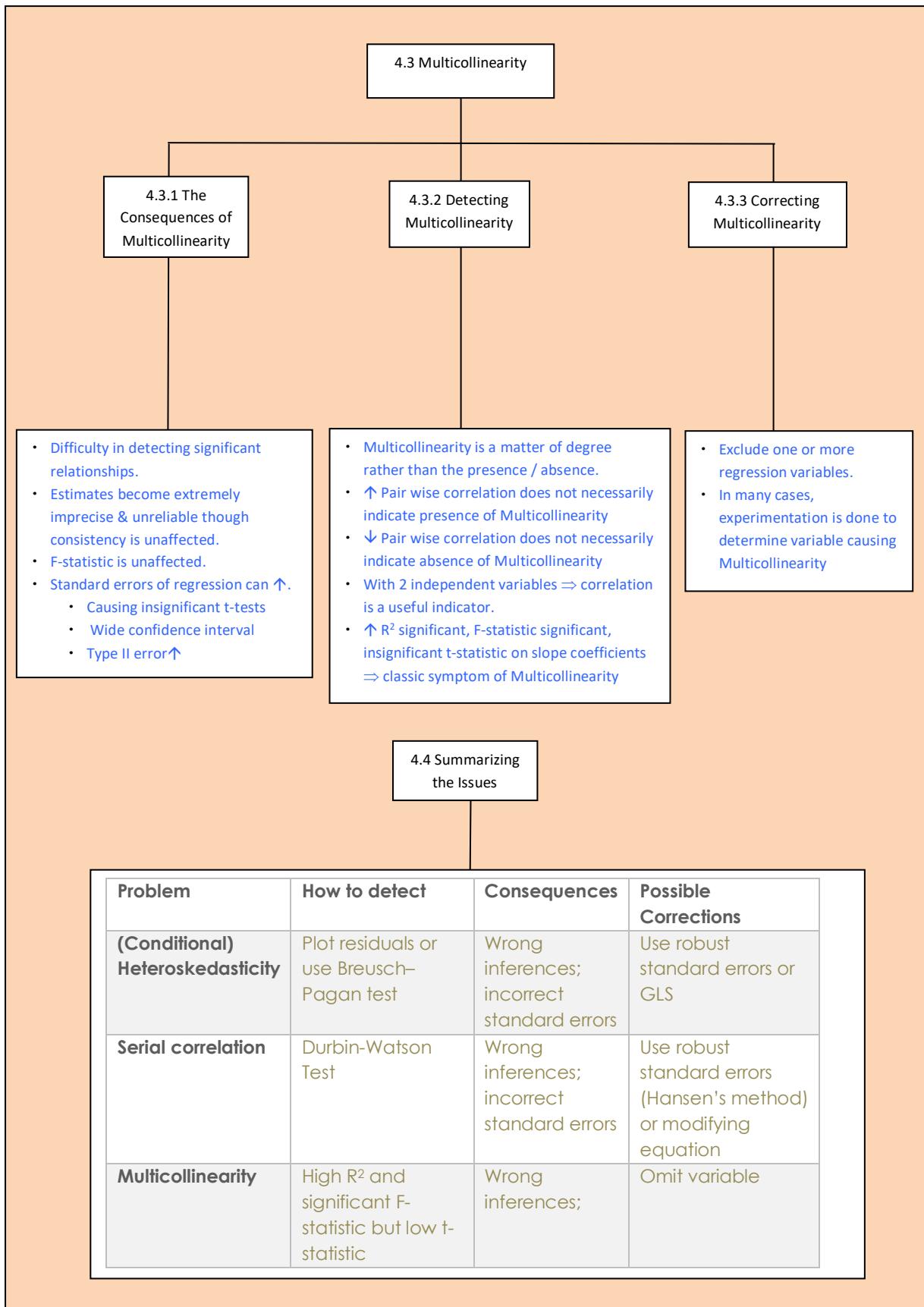
4.1.3 Correcting for Heteroskedasticity

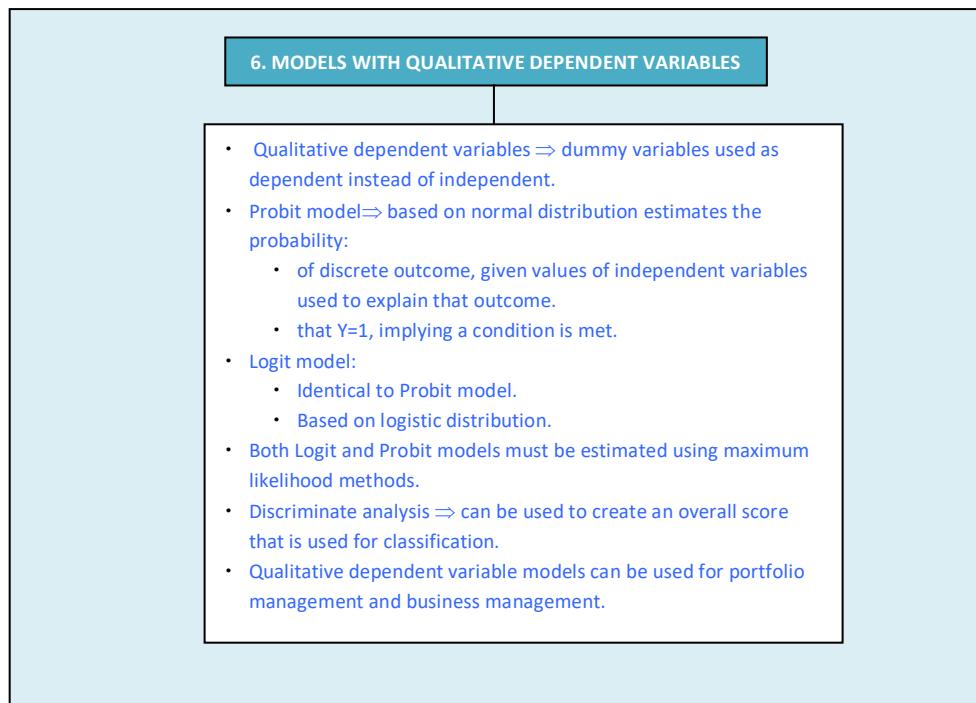
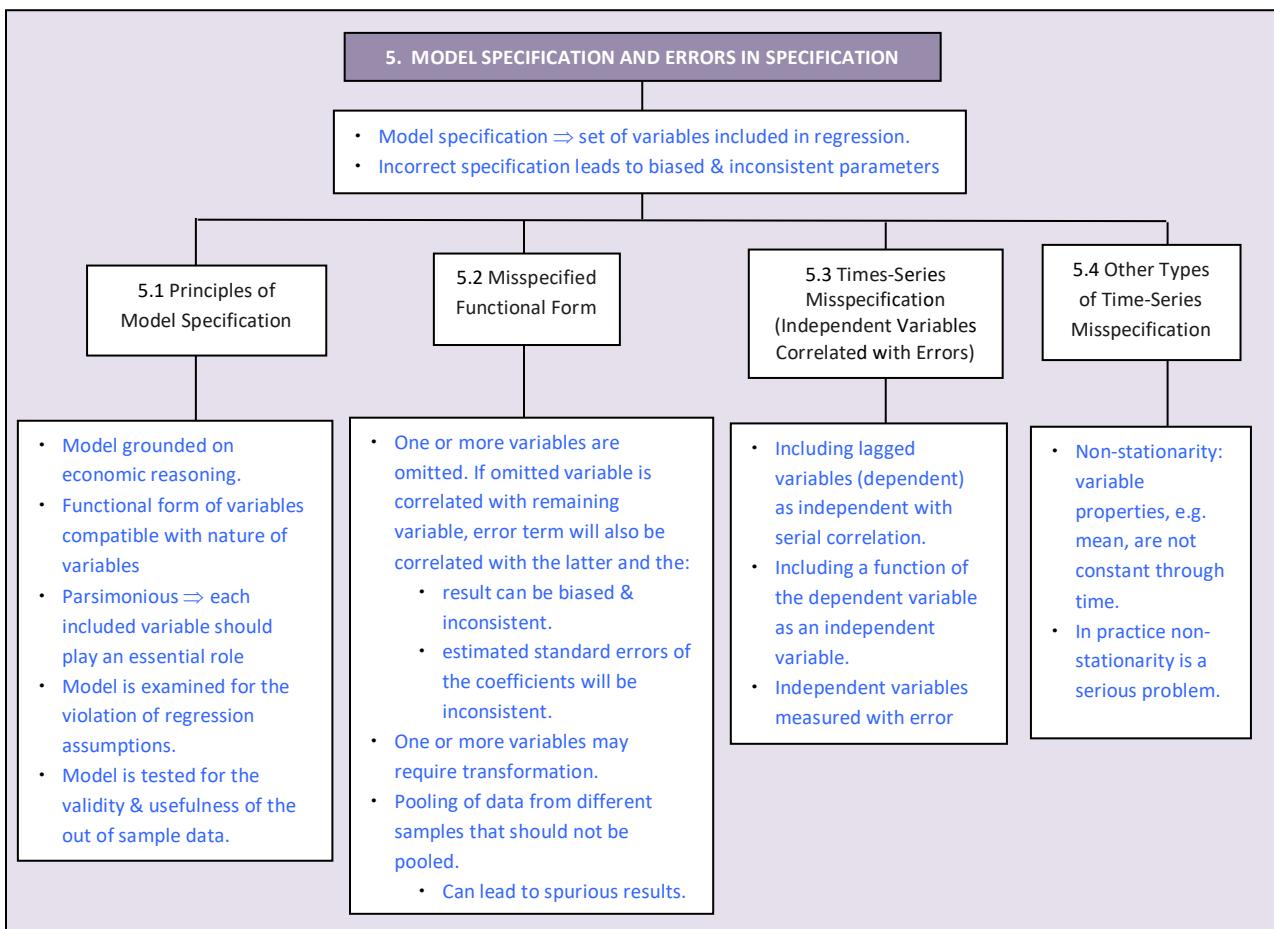
- Robust Standard Errors
- Corrects standard error of estimated coefficients.
 - Also known as heteroskedasticity consistent standards errors or white-corrected standards errors.

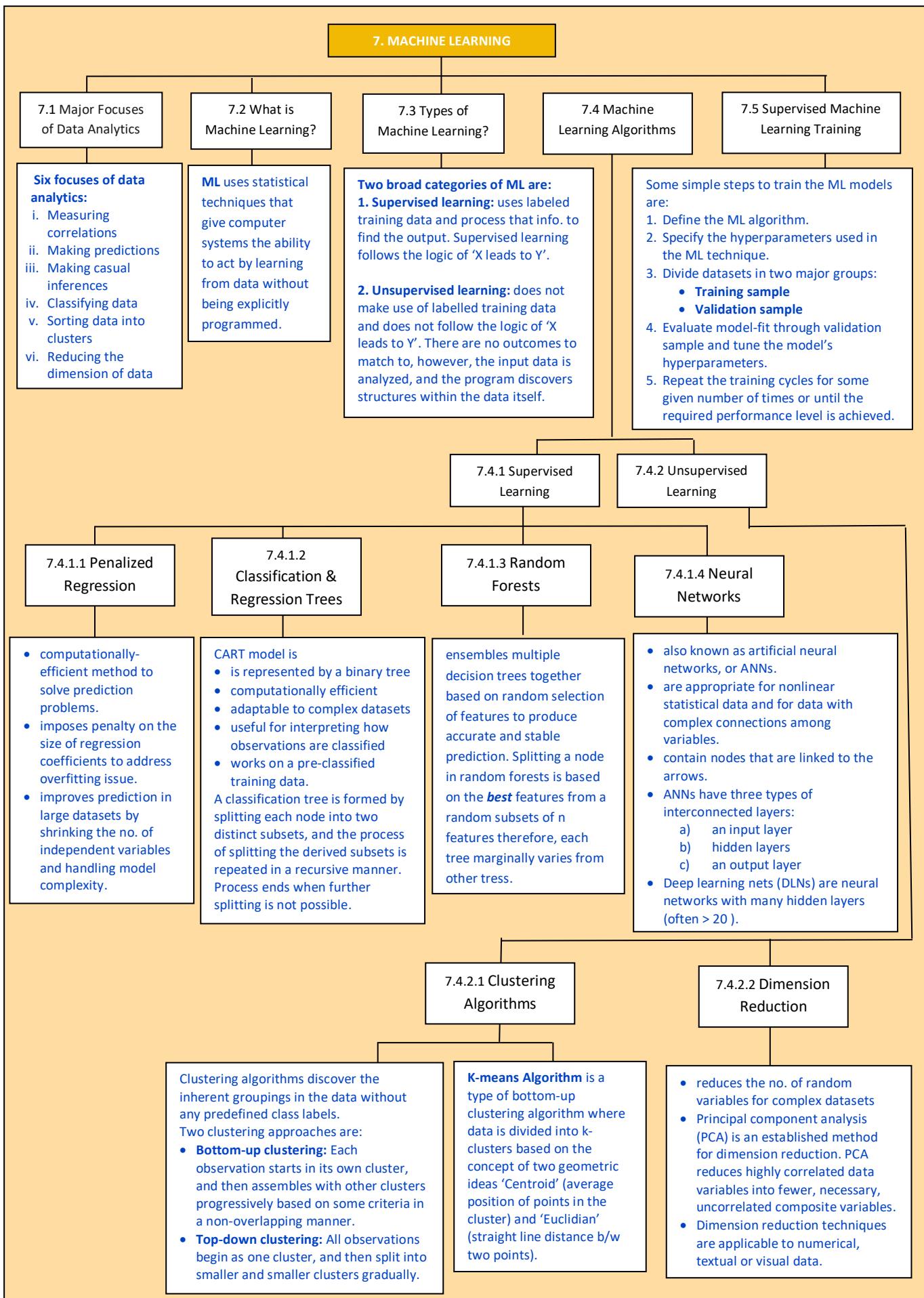
Generalized Least Squares

- Modify original equation.
- Requires economic expertise to implement correctly on financial data.









“TIME-SERIES ANALYSIS”

t = Time Independent Variable
 $E(Y_t)$ = Expected Value of Time Series
 OLS = Ordinary Least Squares Model
 RMSE = Root Mean Squared Error
 GLS = Generalized Least Squares

Y_t = Value of Time Series at t
 b_0 = Y-intercept
 b_1 = Slope Coefficient
 E_t = A random Error Term
 T = time (independent variable)

1. INTRODUCTION TO TIME-SERIES ANALYSIS

- Time series \Rightarrow set of observations on a variable's outcome in different times.
- Time-series models are used to explain the past or predict the future.

2. CHALLENGES OF WORKING WITH TIME SERIES

- Presence of serial correlation in errors in autoregressive time series causes estimates to be inconsistent.
- Regression results are invalid if mean and variance of time series changes over time.
- Time-series models are transformed to counter these problems.

3. TREND MODELS

3.1 Linear Trend Models

- Simplest trend model
- Dependent variable changes at constant rate with time.
- $Y_t = b_0 + b_1 t + E_t$

3.2 Log-Linear Trend Models

- Works well in fitting time series with exponential growth.
- $Y_t = e^{b_0+b_1 t}, t = 1, 2, \dots, T$
- Exponential growth \Rightarrow at constant rate ($e^{b_1} - 1$) with continuous compounding
- The natural log of the time series can be modeled using a linear trend.
- $\ln Y_t = b_0 + b_1 t + E_t$

3.3 Trend Models and Testing for Correlated Errors

- Regression error for one period must be uncorrelated with regression error for all other periods.
- D-W test carried on residuals.
 - D.W should not differ significantly from 2.0.
- The presence of serial correlation in trend models suggests that a better forecasting model can be built using time series.

4. AUTOREGRESSIVE (AR) TIME-SERIES MODELS

- A time series regressed on its own past values.
- ρ th-order auto regression $AR(\rho) x_t = b_0 + b_1 x_{t-1} + b_2 x_{t-2} + \dots + b_p x_{t-p} + E_t$

4.1 Covariance-Stationary Series

- Covariance stationary \Rightarrow mean & variance do not change over time.
- Three principles
 - $E(y_t)$ constant & finite
 - Variance of time series \Rightarrow constant & finite.
 - Covariance of time series with itself in the past or future for a fixed number of time periods \Rightarrow constant & finite.

4.2 Detecting Serially Correlated Errors in an Autoregressive Model

- Autocorrelation of time series \Rightarrow correlation with own past values.
- t-test involving residual autocorrelation residual and standard error of residual is used.
- DW test cannot be used.
- Standard error of residual correlation $= 1/\sqrt{T}$
- t-statistic = autocorrelation/standard error.
- t-statistic $> 2 \Rightarrow$ autocorrelation $\neq 0 \Rightarrow$ residual serially correlated \Rightarrow OCS cannot be used.
- Adding more lags \Rightarrow can remove serial correlation.

4.3 Mean Reversion

- Mean reversion:
 - Time series tends to move towards mean.
 - If time series level $>$ mean \Rightarrow falls to mean.
 - If time series level $<$ mean \Rightarrow rises to mean.
 - Mean reverting level $= x_t = \frac{b_0}{1-b_1}$

4.4 Multiperiod Forecasts and the Chain Rule of Forecasting

- Next period's predicted value is used to predict value two periods ahead. (Chain rule of forecasting)
- $\hat{x}_{t+2} = \hat{b}_0 + \hat{b}_1 \hat{x}_{t+1}$
- More uncertain than single period forecast.

4.5 Comparing Forecast Model Performance

- \downarrow Forecast error variance, \uparrow accuracy of model.
- Residuals within a sample period \Rightarrow in-sample forecast errors
- Residuals outside sample periods \Rightarrow out-of-sample forecast errors.
- RMSE \Rightarrow used for out-of-sample forecast errors.
- \downarrow RMSE, \uparrow accuracy of model.
- \downarrow RMSE of in sample data does not guarantee model has \downarrow RMSE for out-of sample data.

4.6 Instability of Regression Coefficients

- Nonstationarity: estimated coefficients of one period differ from another period.
- ↑ Periods ↑ statistical reliability \Rightarrow ↓ stability.
- ↓ Periods ↓ statistical reliability \Rightarrow ↑ stability.
- Sample selected must be covariance stationary.

5. RANDOM WALKS AND UNIT ROOTS

5.1 Random Walks

Without Drift

- $x_t = x_{t-1} + E_t$
- Best predictor of time series is current value + error term.
- Error term has $\Rightarrow 0$ mean.
 - Constant variance
 - Uncorrelated with previous value (terms)
- Special case of AR(1) with $b_0 = 0$ and $b_1 = 1$
- AR (1) & standard regression analysis cannot be used with random walk.

With Drift

- $x_t = b_0 + b_1 x_{t-1} + E_t$
- $b_0 \neq 0$ $b_1 = 1$
- First difference:
$$Y_t = x_t - x_{t-1} = b_0 + E_t$$

Correcting Random walk

Consequence of Random Walk

- By taking first difference
$$Y_t = x_t - x_{t-1} = E_t$$

- $R^2 \uparrow$ significantly.
- Statistical results \Rightarrow invalid.

5.2 The Unit Root Test of Nonstationarity

- $b_1 < 1 \Rightarrow$ AR(1) model is covariance stationary.
- With random walk:
 - t-test \Rightarrow invalid.
 - Standard errors in AR model \Rightarrow invalid.

Method I

- Examining autocorrelations of the AR model
- If non-stationary
 - Serial correlations do not \downarrow with \uparrow no. of lags
 - Serial correlation of all lags $\neq 0$

Method II

- Using Dickey-Fuller test
- $x_t - x_{t-1} = b_0 + g_1 x_{t-1} + E_t$
 - $g_1 = (b_1 - 1)$
- If $b_1 = 1, g_1 = 0 \Rightarrow$ Time series has unit root.
- $H_0 = g_1 = 0$
- $H_1 = g_1 < 0$
- t-test with revised set of critical values is used.

6. MOVING-AVERAGE TIME-SERIES MODELS

- Avg. of successive observations in time series.
- Contains lagged values of residuals.

6.1 Smoothing Past Values with an n-Period Moving Average

$$\frac{x_t + x_{t-1} + \dots + x_{t-(n-1)}}{n}$$

- Not the best predictor of future.
- Gives equal weights to observations.

6.2 Moving-Average Time-Series Models for Forecasting

- MA (q) \Rightarrow first q autocorrelation will be different from 0
- After q observations serial correlation falls to 0
- Autocorrelations of most AR(P) decline gradually

7. SEASONALITY IN TIME-SERIES MODELS

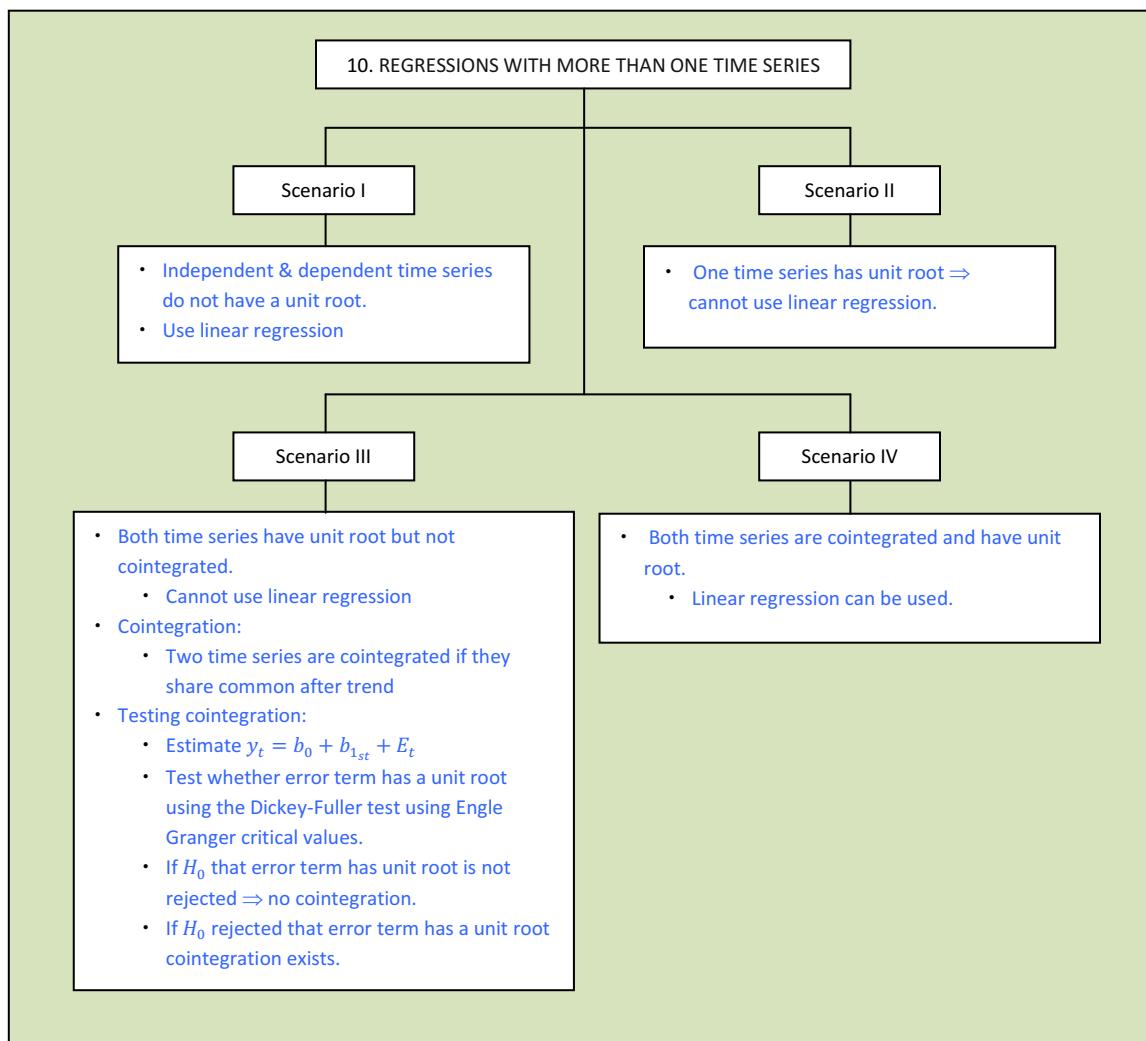
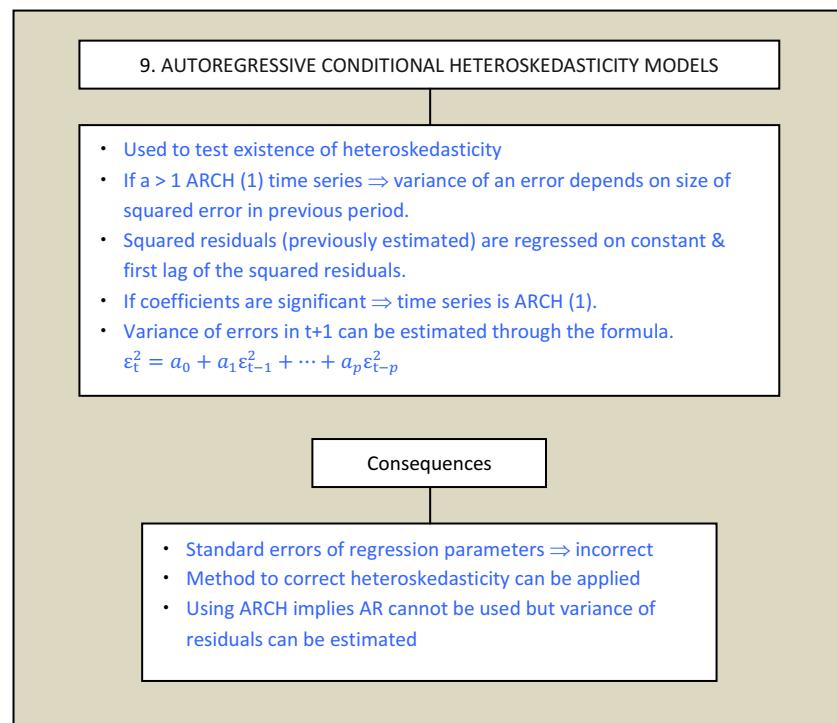
- Seasonality: a pattern repeated by time series variable at regular intervals.
- Non-constant means \Rightarrow not covariance stationary.

Detection & Correction

- Autocorrelation differ by season.
- Seasonal autocorrelation of the error term $\neq 0$; t-test is used for detection.
- Adding seasonal lags solve seasonality problem.
- $R^2 \uparrow$ with seasonal lag $\Rightarrow \uparrow$ accuracy of model.

8. AUTOREGRESSIVE MOVING-AVERAGE MODELS

- Combines autoregressive lags of dependent variable and moving average errors.
- Limitations:
 - Unstable parameters.
 - Choosing right ARMA model \Rightarrow quite difficult.
 - \uparrow Data set is required.



11. OTHER ISSUES IN TIME SERIES

- Uncertainty of time series models increases the level of due diligence required.
- Both uncertainties of estimated parameters and error term need to be considered.
- Evaluating uncertainty is complex.

12. SUGGESTED STEPS IN TIME-SERIES FORECASTING

- Determine your goal whether attempting to model relationship with same variable or other variables or with time.
- If using time series then plot variable on y-axis with time on x-axis.
 - Look for nonstationarity characteristics e.g. heteroskedasticity, non-constant mean, seasonality, and structural change.
 - Structural change: indicated by significant shift & data is divided into two or more distinct patterns.
- If no seasonality or structural shift → use trend model.
 - If data plot on straight line → use linear trend model.
 - If data plot on curve → use log-linear model.
- Test for serial correlation using Durbin-Watson test.
 - Serial correlation not detected → Model Trend can be used, if detected use other model e.g. AR.
- If residuals have serial correlation & it is not stationary use the AR model:
 - Time series has a linear trend → use first differential.
 - Time series has an exponential trend → use first differential of natural log of data.
 - If structural shift → run two different models.
 - If seasonality effect → add another lag in the AR model.
- After taking first differential if series is covariance stationary run AR(1) and test for seasonality & serial correlation
 - No remaining serial correlation → use the model.
 - If serial correlation detected → incorporate additional lags until any serial correlation is removed.
- Test for ARCH:
 - If coefficient not significantly different from zero → use the model.
 - Else use GLS or other method to correct for ARCH
- Use sample RMSE for determining the better of two statistically developed models.

“EXCERPT FROM “PROBABILISTIC APPROACHES: SCENARIO ANALYSIS, DECISION TREES, AND SIMULATIONS””

INTRODUCTION

2. SIMULATIONS

- Simulations provide a way of examining the consequences to continuous risk.
- Simulation generates hundreds of possible outcomes to provide a fuller picture of the risk in an asset or investment.

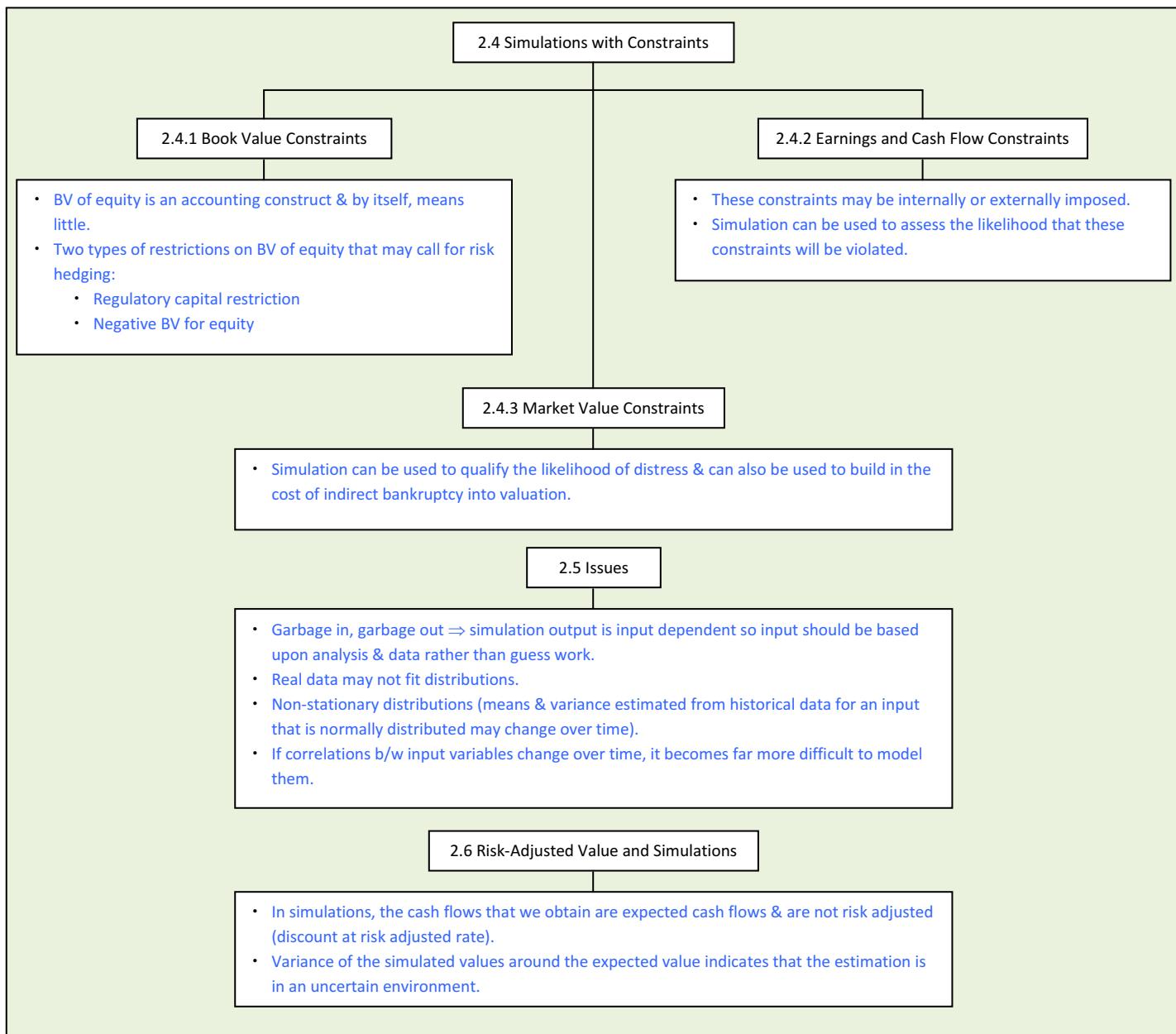
2.1 Steps in Simulation

- As compared to scenario analysis, simulations allows for more flexibility in how we deal with uncertainty.
- Steps associated with simulation includes:
 - ⇒ Determine probabilistic variables ⇒ no constraint on number of variables allowed in a simulation & we can define probability distribution in each & every input in a valuation.
 - ⇒ Define probability distribution for these variables⇒ most difficult step in the analysis & comprise of following three steps:
 - Historical data ⇒ for variables with long history, historical data is used to develop distributions.
 - Cross sectional data ⇒ substitute data on differences in specific variable across existing investments that are similar to investment being analyzed
 - Statistical distribution⇒ where historical & cross sectional data will be insufficient / unreliable, a statistical distribution that best capture the variability in input estimate the parameters for that distribution.
 - Check for correlations across variables⇒ after the distribution have been specified it is important to check correlations across variables (can be estimated by looking at past).
 - Run the simulation⇒ draw one outcome from each distribution & compute the value based upon those outcomes (process can be repeated as many times as desired). The number of simulation can be determined from the following:
 - Number of probabilistic inputs ⇒ ↑ the number of inputs, ↑ the number of simulations.
 - Characteristics of probability distribution ⇒ the greater the diversity of distribution, the ↑ the required number of simulations.
 - Range of outcome ⇒ the ↑ the potential range of outcomes, the ↑ the number of simulations required.
- Two impediments to good simulations:
 - Estimating distributions of values for each input into a valuation is difficult to do (informational).
 - Too time & resource intensive for the typical analysis (computational). Both these constraints have eased in recent years.

2.2 An Example of a Simulation

2.3 Use in Decision Making

- In ideal simulations, analysts will examine both the historical & cross sectional data on each input variable before making a judgment on distribution & parameters.
- Ideal simulation yields a distribution for expected values rather than a point estimate.



3. AN OVERALL ASSESSMENT OF PROBABILISTIC RISK ASSESSMENT APPROACHES

3.1 Comparing the Approaches

- Decision of choice b/w scenario analysis, decision trees & simulations depends on the followings:
 - Selective v/s full risk analysis \Rightarrow scenario analysis is best for selective risk analysis (usually 3 scenarios) while decision trees & simulations are used for full risk analysis.
 - Type of risk \Rightarrow scenario analysis & decision trees \Rightarrow discrete outcomes in risky events. Simulations \Rightarrow for continuous risk.
 - Correlation across risks \Rightarrow if various investment risks are correlated \Rightarrow simulation is best.

Table 6.4. Risk Type and Probabilistic Approaches

Discrete/Continuous	Correlated/Independent	Sequential/ Concurrent	Risk Approach
Discrete	Independent	Sequential	Decision tree
Discrete	Correlated	Concurrent	Scenario analysis
Continuous	Either	Either	Simulations

Reference: Level 2 Reading 10

3.2 Complement or Replacement for Risk-Adjusted Value

- Decision tree & simulations \Rightarrow used as either complements to or substitutes for risk adjusted values.
- Scenario analysis \Rightarrow always used a complement to risk adjusted value.
- All three approaches use expected rather than risk adjusted cash flows & the discount rate that is used should be a risk adjusted discount rate.

3.3 In Practice

- With the surge in data availability & computing power, the use of probabilistic approaches has become more common.
- The ease with which simulations can be implemented has allowed its use in variety of new markets including;
 - i. Deregulated electricity market.
 - ii. Commodity companies.
 - iii. Technology companies.

“CURRENCY EXCHANGE RATES: UNDERSTANDING EQUILIBRIUM VALUE”

IRP = Interest Rate Parity
 DC = Domestic Currency
 FC = Foreign Currency
 IR = Interest Rates

PPP = Purchasing Power Parity
 BOP = Balance of Payment
 EM = Emerging Markets
 ER = Exchange Rate
 E(R) = Expected Return

2. FOREIGN EXCHANGE MARKET CONCEPTS

- Two points about bid-offer quotes:
 - Offer price is always > bid price.
 - Counterparty who inquires price quote will have the option to deal at either the bid or offer price quoted to them by the dealer.
- Size of bid-ask spread depends on the following factors.
 - The currency pair involved \Rightarrow more liquid currency pairs, \downarrow bid-offer spread.
 - The time of day \Rightarrow the interbank FX markets are the most liquid when the major FX trading centers are open \Rightarrow low spreads.
 - Market volatility \Rightarrow \uparrow uncertainty about the factors influencing price, wider bid-ask spreads.
 - Size of transaction \Rightarrow larger the transactions, wider the spread (greater difficulty the dealer faces in laying off the foreign exchange risk).
 - Relationship b/w the dealer & the client can also affect the size of the bid-offer spread.

2.1 Arbitrage Constraints on Spot Exchange Rate Quotes

- Two arbitrage constraints to avoid riskless arbitrage opportunities:
 - The bid (offer) shown by a dealer cannot be higher (lower) than the current interbank offer (bid).
 - The cross rate bids (offers) posted by a dealer must be lower (higher) than the implied cross-rate offers (bids) available in the interbank market.
- Forwards \Rightarrow agreements to exchange one currency for another on a future date at an exchange rate agreed on today.
- Forward rates must satisfy an arbitrage relationship that equates the investment return on two alternative but equivalent investments.
- An investor with one unit of DC to invest for one year faces two alternatives:
 - Invest cash for one year at the domestic R_f & at the end of year, investment would be worth $(1 + i_d)$
 - Convert the DC to FC at spot rate ($S_{f/d}$), invest for one-year (i_f) & at the end of year the investor would have $S_{f/d} (1 + i_f)$. Undertake a forward at the start of the investment at $F_{f/d}$ to convert foreign investment into DC. At the end of year the investment would be worth $S_{f/d} (1 + i_f) (1 + F_{f/d})$
 - $(1 + i_d) = S_{f/d} (1 + i_f) \left[\frac{1}{F_{f/d}} \right]$
- Covered IRP $\Rightarrow F_{f/d} = S_{f/d} \left[\frac{1+i_f \left(\frac{actual}{360} \right)}{1+i_d \left(\frac{actual}{360} \right)} \right]$
 - Covered IR differential b/w two markets is zero.
- Forward premium or discount $\Rightarrow F_{f/d} - S_{f/d} = S_{f/d} \left[\frac{\frac{actual}{360}}{1+i_d \left(\frac{actual}{360} \right)} \right] (i_f - i_d)$
- Factors that determine spot bid-ask spread (e.g. liquidity, transaction size etc.) also determine bid-offer spread for forward swap.
- Mark-to-market value of forward \Rightarrow profit/loss that would be realized from closing out the position at the current market price.

3. A LONG-TERM FRAMEWORK FOR EXCHANGE RATES

- Trading decision in FX markets lays a view on future market prices & conditions.
- Decision to be fully hedged implies that future market conditions are very uncertain.
- International parity conditions \Rightarrow determine long run movements in exchange rates, IR & inflation.
- Following concepts must be clearly understood:
 - Long run v/s short run.
 - Real v/s nominal values.
 - Expected v/s unexpected changes.
 - Relative movements.

3.1 International Parity Conditions

- Key international parity conditions rarely hold in either the short or medium term.
- Two reasons to study international parity conditions:
 - Each condition reflects economic forces that should not be ignored altogether.
 - Currency positions offer profitable opportunities only when parity conditions fail to hold.

3.1.1 Covered Interest Rate Parity

- An investment in a foreign money market (completely hedged against exchange risk) should yield exactly the same return as an otherwise identical domestic money market investment.
- If this parity does not hold, arbitrage profit is possible.
- Assumptions \Rightarrow no transaction costs, identical instruments.

3.1.2 Uncovered Interest Rate Parity

- The expected return on an uncovered FC investment should be equal to the return on a comparable DC investment.
- Expected exchange rate differential = yield differential.

$$\% \Delta S_{f/d}^e = i_f - i_d$$
- Country with \uparrow IR is expected to see the value of its currency depreciate.
- This parity relationship works better over very long term horizons.

3.1.3 Forward Rate Parity

- If both covered & uncovered IR parity hold, forward exchange rate will be an unbiased forecast of the future spot exchange rate.
- Forward exchange rates are poor predictors of future spot exchange rates.
- Without using any current information to predict future spot rates, the random walk prediction can be slightly biased.

3.1.4 Purchasing Power Parity

- Law of one price \Rightarrow identical goods should trade at the same price across countries when valued in terms of a common currency.
- Absolute versions of PPP \Rightarrow equilibrium exchange rate b/w two countries is determined entirely by the ratio of their national price levels.
 - Due to significant transaction costs, this relationship does not hold.
- Relative version of PPP \Rightarrow % Δ in spot rate will be completely determined by the diff. b/w the foreign & domestic inflation rates.
- Ex-ante version of PPP \Rightarrow expected changes in the spot exchange rate being entirely driven by expected differences in national inflation rates.

3.1.5 The Fisher Effect & Real Interest Rate Parity

- International fisher effect:

$$i_f - i_d = \pi_f^e - \pi_d^e$$
 - Foreign – domestic yield spread = foreign-domestic expected inflation differential, assuming real IR are equal across markets.
 - Fisher effect examines how ER, IR, & inflation rates interact.

4. CARRY TRADE

- FX carry trade \Rightarrow it involves taking long positions in high yield currencies & short positions in low yield currencies (funding currencies).
- The idea behind this trade is that the high-yield currencies on avg. have not depreciated, & low yield currencies have not appreciated to the level predicted by IR differentials.
- During periods of low volatility, carry trades tend to generate +ve excess returns, (prone to significant crash risk in turbulent times).
- Valuation overlay approach to manage downside crash risks \Rightarrow high yielders will be overweighted & low yielders will be underweighted when ER lie inside prescribed PPP bands.
- Dangers of carry trade:
 - Create ER misalignment around the world.
 - Can cause a serious currency or financial crises.

5. THE IMPACT OF BALANCE OF PAYMENTS FLOWS

- Current a/c balance \Rightarrow sum of all recorded transactions in traded goods, services, income & net transfer payments in a country's overall BOP.
- Countries that run persistent current a/c deficits (surpluses) often see their currencies depreciate (appreciate) over time.
- The current a/c must be matched by an equal & opposite balance in capital a/c (to balance BOP account).
- Financing decisions are usually the dominant factors in determining ER movements
- There are four reasons for this:
 - Prices of real goods & services adjust more slowly than ER & other asset prices.
 - Production of real goods & services takes time.
 - It reflects financing of current expenditures & also reallocation of existing portfolios.
 - Expected ER movements can induce very large short-term capital flows.

5.1 Current Account Imbalances & the Determinations of Exchange Rates

5.1.1 The Flow Supply/Demand Channel

- Purchases & sales of internationally traded goods & services require the exchange of domestic & foreign currencies.
- Countries with persistent current a/c surpluses would see their currencies appreciate over time & vice versa.
- The amount by which ER must adjust to restore current accounts to balanced positions depends on a no. of factors:
 - Initial import & export gap.
 - Response of import & export prices to Δ in ER.
 - Response of import & export demand to Δ in import & export prices.

5.1.2 The Portfolio Balance Channel

Current a/c imbalances \Rightarrow shift financial wealth from deficit nations to surplus nations \Rightarrow lead to shifts in global asset preferences \Rightarrow exert an impact on the path of ER.

5.1.3 The Debt Sustainability Channel

Persistent current a/c imbalances \Rightarrow for deficit nations, ever-rising net external debt levels as a % of GDP \Rightarrow steady downward revision in market expectations of the currency's real long-run equilibrium value.

5.2 Capital Flows & the Determination of Exchange Rates

- Excessive surges in capital inflow to EM may cause economic or currency crises by contributing to:
 - An unwarranted real appreciation of the EM currency.
 - A huge buildup in external indebtedness by EM Govt., businesses or banks.
 - Property market or financial asset market bubble.
 - A consumption binge & overinvestment in risky projects.

5.2.1 Equity Market Trends & Exchange Rates

- The relationship b/w equity market performance & ER is not stable.
- Judgments on possible future currency moves, based solely on expected equity market performance is difficult.

6. MONETARY AND FISCAL POLICIES

6.1 The Mundell-Fleming Model

Changes in monetary & fiscal policy \Rightarrow affect the level of IR & economic activity \Rightarrow leads to changes in the direction & magnitude of trade capital flows \Rightarrow change in the ER.

Expansionary Monetary Policy

With Flexible ER

- \downarrow Domestic IR \Rightarrow capital flow to higher yielding market \Rightarrow \downarrow value of DC.
- \downarrow In currency value will \uparrow net exports.

With Fixed ER

- Monetary authority will have to buy its own currency to prevent depreciation.
- Result \Rightarrow tight domestic credit conditions to offset the intended expansionary monetary policy.

Expansionary Fiscal Policy

With Flexible ER

Upward pressure on domestic IR \Rightarrow inflow of capital from lower-yielding markets \Rightarrow upward pressures on DC.

With Fixed ER

Monetary authority will have to sell its own currency in the FX market to prevent DC appreciation.

- Some insights of this model:
 - Objectives of independent monetary policy, free capital flows & to defend fixed ER cannot be satisfied at same time.
 - Degree of capital mobility is critical to the effectiveness of monetary & fiscal policy in an open economy.

Monetary-Fiscal Policy Mix & the Determination of Exchange Rates under Conditions of High Capital Mobility

Expansionary Monetary Policy Restrictive Monetary Policy

Expansionary Fiscal Policy

Ambiguous

Domestic currency appreciates

Restrictive Fiscal Policy

Domestic currency depreciates

Ambiguous

Reference: Level II Curriculum, Volume 1, Reading 11, Exhibit 5.

Monetary-Fiscal Policy Mix & the Determination of Exchange Rates under Conditions of Low Capital Mobility

		Expansionary Monetary Policy	Restrictive Monetary Policy
		Domestic currency depreciates	Ambiguous
Expansionary Fiscal Policy	Domestic currency appreciates	Ambiguous	
	Ambiguous		Domestic currency appreciates

Reference: Level II Curriculum, Volume 1, Reading 11, Exhibit 6.

6.2 Monetary Models of Exchange Rate Determination

Under these models output is fixed & monetary policy affects ER through the price level & the rate of inflation.

The Monetary Approach with Flexible Prices

- An extension of the classical quantity theory of money to an open economy.
- According to quantity theory \Rightarrow money supply Δ are the primary determinant of price level Δ (PPP holds).
- In a pure monetary approach model, a change in the money supply future growth rate would have no immediate impact on the current ER.

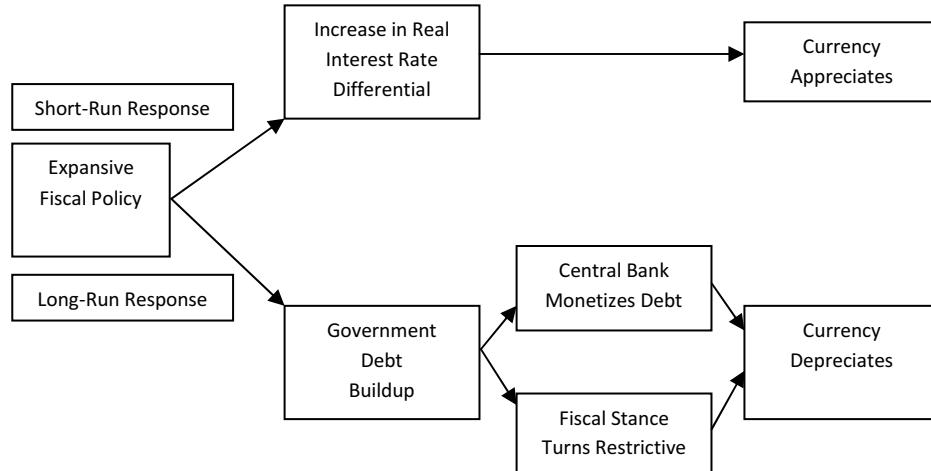
The Dornbusch Overshooting Model

- Shortcoming of pure monetary approach \Rightarrow assumption that PPP holds at all times (PPP rarely hold in short or medium run).
- Dornbusch model \Rightarrow assumes that output prices exhibit limited flexibility in short run but are fully flexible in the long run.
- Long run price level flexibility ensures that an \uparrow in domestic money supply will give rise to a proportional \uparrow in domestic prices & contribute to a depreciation of DC in long run.
- If domestic price level is assumed to be inflexible in the short run \Rightarrow the ER is likely to overshoot its long run PPP path in the short run.

6.3 Portfolio Balance Approach

- Role of monetary policy in determining ER \Rightarrow expansionary (restrictive) monetary policy downward (upward) pressure on DC value.
- Impact of fiscal policy on ER \Rightarrow ambiguous.
- Mundell-Fleming model \Rightarrow short-run model of ER determination.
- Portfolio balance approach \Rightarrow global investor will hold a diversified portfolio of domestic & foreign assets including bonds.
 - A steady \uparrow in the supply of domestic bonds outstanding \Rightarrow continued widening of the Govt. budget deficit \Rightarrow compensated in the form of $\uparrow E(R)$.
 - $\uparrow E(R)$ could come from
 - \uparrow IR / risk premium
 - Immediate depreciation of the currency to a level sufficient to generate anticipation of gains from subsequent currency appreciation.
 - Govts. that run large budget deficits on a sustained basis could eventually see their currencies \downarrow in value.
 - Combination of Mundell-fleming & portfolio balance models \Rightarrow expansionary fiscal policy may be +ve for a currency in short run but -ve in the long run.

The Short- and Long-Run Response of Exchange Rates to Changes in Fiscal Policy



7. EXCHANGE RATE MANAGEMENT: INTERVENTION AND CONTROLS

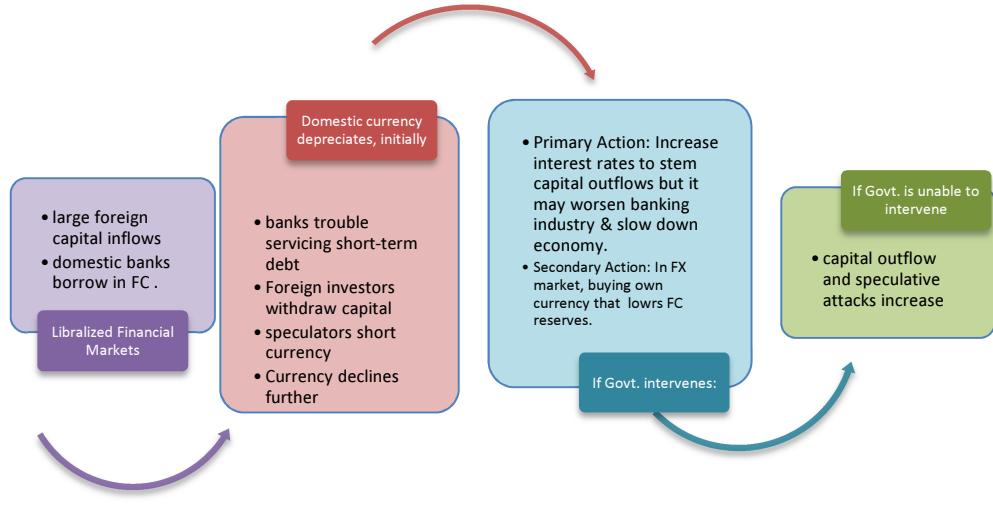
- Capital inflows \Rightarrow blessing \Rightarrow if they enable growing economies to bridge the gap b/w domestic investment & savings.
- Capital inflows \Rightarrow Curse \Rightarrow if they fuel boom like conditions, asset price bubbles & overshooting of the currency into overvalued territory.
- \uparrow in Capital inflows are caused by combination of pull and push factors.
- Push Factors:** +ve developments that attract overseas capital into the economy [relaxed regulations, liberal mkts. Flexible exchange rates, privatization of state-owned entities etc.]
- Pull Factors:** developments in other economies that cause capital to flow to a particular economy [attract high yielding economies become attractive amid low interest rates policies or ultra low interest rates in developed economies].
- Governments directly intervene to resist excessive inflows and to avoid currency bubbles.

8. WARNING SIGNS OF CURRENCY CRISES

Two school of thoughts with respect to currency crises anticipation

1. Deteriorating & weak economic conditions are warning sign for currency crises.
2. No particular factor as crises can occur out of the blue

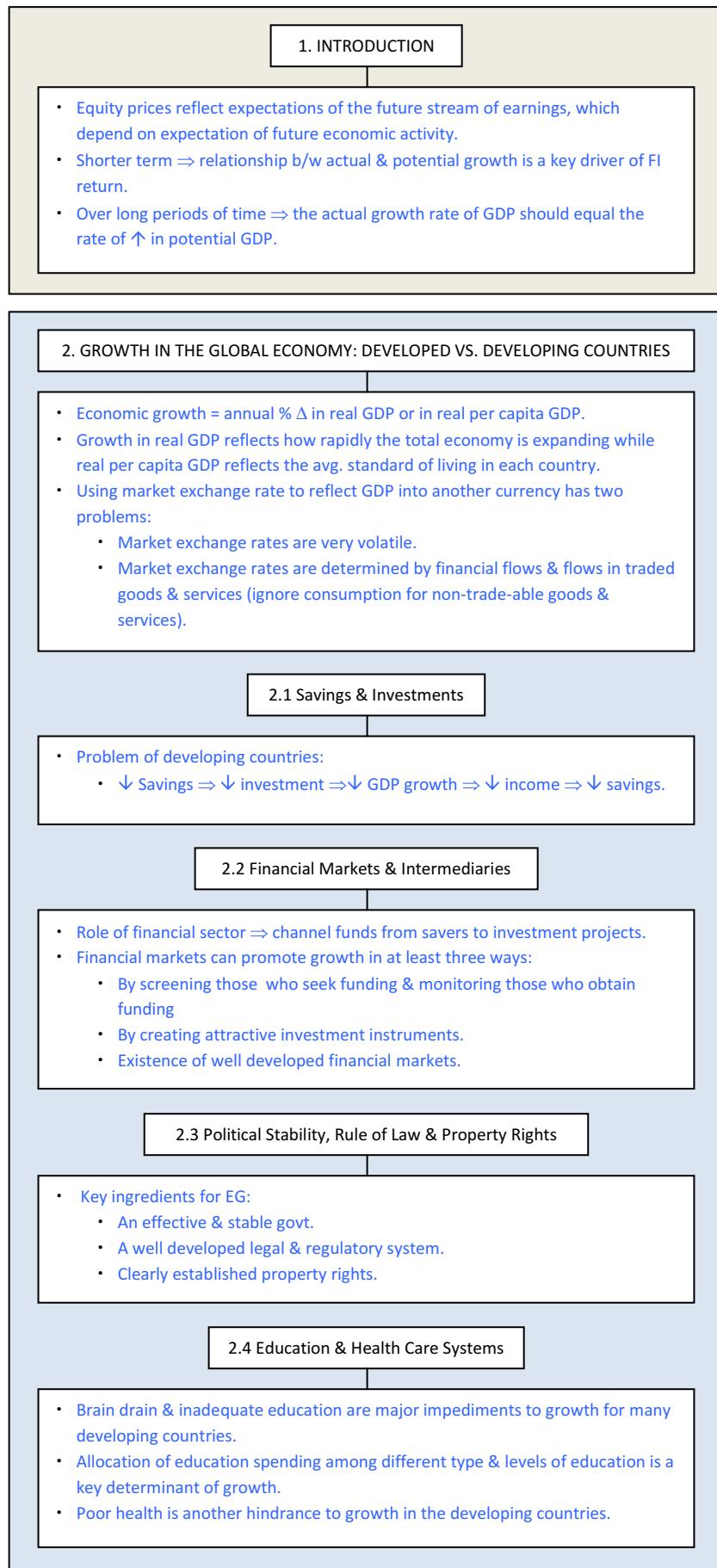
To anticipate crises some factors are highly interrelated and often one factor leads to another.

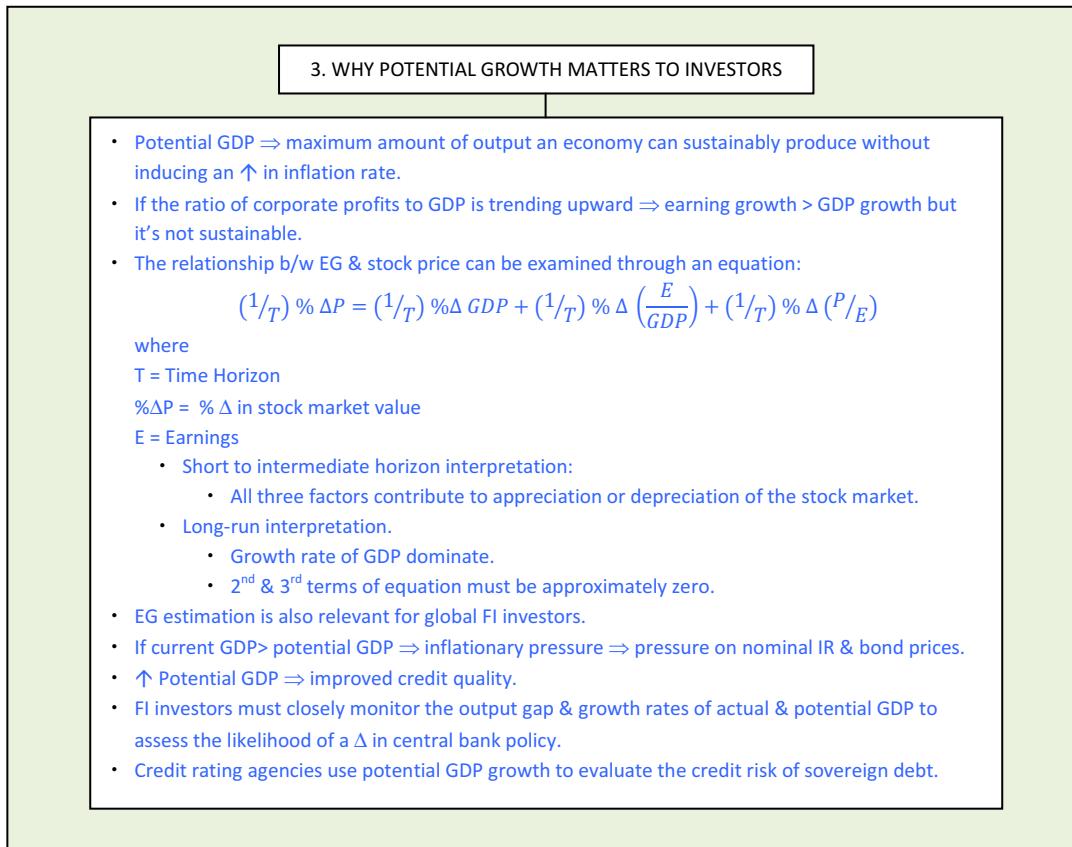
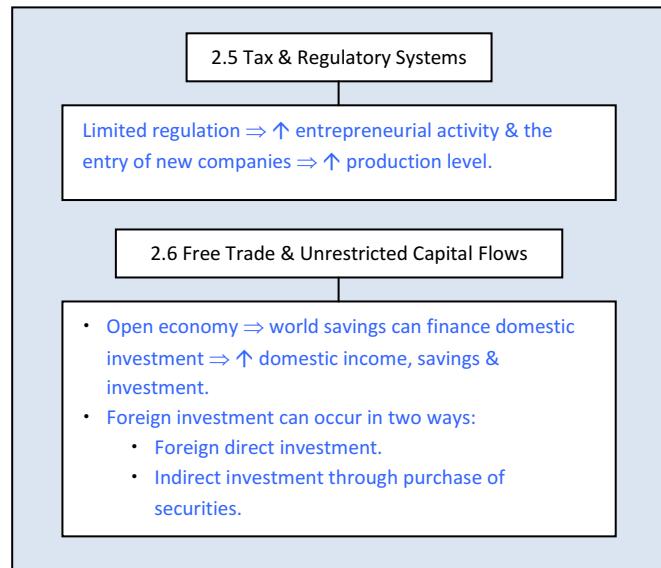


“ECONOMIC GROWTH AND THE INVESTMENT DECISION”

FI = Fixed Income
EG = Economic Growth

ICT = Information, Computers & Telecommunications





4. DETERMINANTS OF ECONOMIC GROWTH

4.1 Production Function

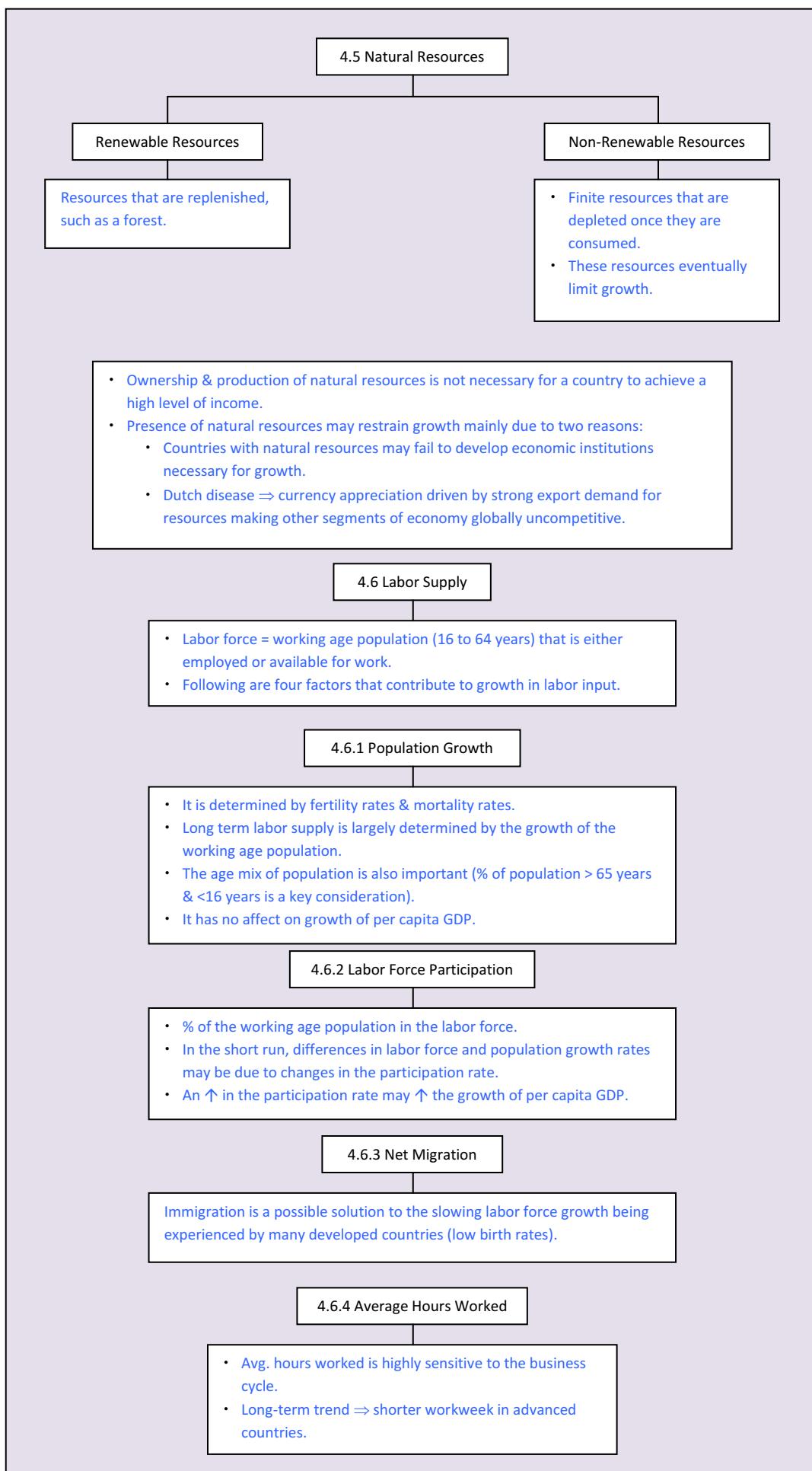
- Production function $\Rightarrow Y = AF(K, L)$
where
 Y = level of aggregate output
 L = labour quantity
 K = capital stock
 A = total factor productivity
 - Unless stated otherwise, the level of technology should be interpreted as referring to TFP.
- Cobb-Douglas production function:
$$F(K, L) = K^\alpha L^{1-\alpha}$$
where
 α = share of output paid by companies to capital & labor (value b/w 0 & 1).
 - Properties of Cobb-Douglas function:
 - Constant returns to scale.
 - Diminishing marginal productivity with respect to each individual input.
 - If value of α close to zero \Rightarrow diminishing marginal returns to capital are very significant.

4.2 Capital Deepening vs. Technological Progress

- Capital deepening \Rightarrow an \uparrow in the capital-to-labor ratio.
 - The ratio will \uparrow as long as growth rate of capital > growth rate of labor.
 - When marginal product of capital = marginal cost \Rightarrow profit maximizing producers will stop adding capital.
- Sustained growth in per capita output requires progress in TFP.

4.3 Growth Accounting

- The growth accounting equation:
$$\Delta Y/Y = \Delta A/A + \alpha \Delta K/K + (1 - \alpha) \Delta L/L$$
- It states that growth rate of output equals rate of technological Δ + α times the growth rate of capital plus $(1-\alpha)$ times the growth rate of labor.
- Data on output, labor, capital & elasticity are available in developed countries but data on technological Δ must be estimated.
- Growth accounting equation has a no. of uses:
 - It estimates the technological contribution progress to EG.
 - Used to empirically measure the sources of growth in an economy.
 - Used to measure potential output.
- Alternative method of measuring GDP:
 - Labor productivity growth accounting equation.
 - Growth rate in potential GDP = long term growth of labor force + long term growth of labor productivity.
 - Disadvantage \Rightarrow TFP & capital deepening are difficult to analyze & predict over long run.



4.7 Labor Quality: Human Capital

- Human capital \Rightarrow accumulated knowledge & skills that workers acquire from education, training or life experience.
- Better educated & more skilled worker \Rightarrow more productive & more adaptable to changes in technology.
- \uparrow Investment in education & on-the-job training, significant return on that investment.

4.8 Capital: ICT & Non-ICT

- If gross investment less Dep. of capital is > 0 , the physical capital stock \uparrow from year to year.
- The correlation b/w eco. growth & investment is high & +ve.
- Network externalities \Rightarrow computers allow people to interconnect through the internet & by e-mail, enabling them to work more productively.
 - \uparrow No of people in network \Rightarrow greater the potential productivity gains.
- High level of capital spending on non-ICT should eventually result in capital deepening & thus have less impact on potential GDP growth.

4.9 Technology

- Technology \Rightarrow the most important factor affecting growth of per capital GDP is technology.
- Technology results in upward shift in the production function.
- Technological change can be embodied in human capital &/or in new machinery, equipment & software.
- Innovation is possible through investment in ICT goods or through expenditure on R&D.
- TFP estimates are very sensitive to the measurement of the labor & capital inputs.
- Level of productivity depends on accumulated stock of human & physical capital.
- Permanent \uparrow in rate of labor productivity growth, \uparrow sustainable EG, \uparrow upper bound for earnings growth, \uparrow potential return to equity & vice versa.

4.10 Public Infrastructure

- Public capital \Rightarrow roads, bridges, municipal water dams & electric grids (in some countries).
- The full impact of govt. infrastructure investment may extend well beyond the direct benefits of the project.

5. THEORIES OF GROWTH

5.1 Classical Model

- Referred as Malthusian theory \Rightarrow focused on the impact of a growing population in a world with limited resources.
- Production function \Rightarrow labor input with land as a fixed factor.
- Key assumption \Rightarrow population growth accelerates when the level of per capita income rises above the subsistence income (minimum income needed to maintain life).
 - The labor input faces diminishing marginal returns so the additional output \downarrow to zero & per capita income returns back to subsistence level.
- Constant standard of living & no growth in per capital output in the long run.
- According to this model, the adoption of new technology results in a larger but not richer population in the long run.
- The prediction from model failed for two reasons:
 - As the growth of per capital income \uparrow , population growth slowed rather than accelerating as predicted by classical model.
 - Growth in per capita income has been possible (as rapid technological progress offset the impact of diminishing returns).

5.2 Neoclassical Model

- Objective of neoclassical growth model \Rightarrow determine the long-run growth of output per capita.
- Cobb-Douglas production function is the heart of this theory.

5.2.1 Balanced or Steady State Rate of Growth

- Steady state rate of growth \Rightarrow occurs when output-to-capital ratio is constant.
- The growth rate of output per worker:

$$\frac{\Delta y}{y} = \frac{\Delta A}{A} + \alpha \frac{\Delta k}{k}$$
- Equilibrium output-to-capital ratio, denoted by the constant Ψ

$$\frac{Y}{K} = \left(\frac{1}{s}\right) \left[\left(\frac{\theta}{1-\alpha}\right) + \delta + n \right] = \Delta$$

where

θ = growth rate of TFP

s = saving

$\frac{\theta}{1-\alpha}$ = growth rate of labor productivity

n = growth rate of labor

δ = depreciation rate
- In the steady state, capital-to-labor ratio (k) & output per worker (y) grow at the same rate, given by $\left[\left(\frac{\theta}{1-\alpha}\right)\right]$
- Marginal product of capital = real interest rate.
- Capital deepening has no effect on the growth rate of economy or on the marginal product of capital once the steady state has reached.
- Factors (saving rate, labor force growth rate & Dep. rate) Δ the level of output but do not permanently Δ the growth rate of output per worker.
- If the economy has not yet reached the steady state it can experience either faster or slower growth relative to steady state.
 - If the output-to-capital ratio $>$ its equilibrium level, the growth rates of output per capita & the capital-to-labor ratio are above the steady state (vice versa in case of output-to-capital ratio $<$ its equilibrium).

5.2.2 Implications of the Neoclassical Model

Four Major Groups of Conclusions

Capital Accumulation

- Capital accumulation affects the level of output but not the growth rate in the long run.
- Regardless of its initial capital-to-labor ratio or initial level of productivity, a growing economy will move to a point of steady state growth.
- In steady state, the growth rate of output equals the rate of labor force growth plus the rate of growth in TFP scaled by labor's share of income $[n + (\frac{\theta}{1-\alpha})]$. The growth rate of output does not depend on the accumulation of capital or the rate of business investment.

Capital Deepening vs. Technology

- Rapid growth that is above the steady state rate of growth occurs when countries first begin to accumulate capital; but growth will slow as the process of accumulation continues.
- Long-term sustainable growth cannot rely solely on capital deepening investment—that is, on increasing the stock of capital relative to labor. If the capital-to-labor ratio grows too rapidly (i.e., faster than labor productivity), capital becomes less productive, resulting in slower rather than faster growth.
- More generally, increasing the supply of some input(s) too rapidly relative to other inputs will lead to diminishing marginal returns and cannot be the basis for sustainable growth.
- In the absence of improvements in TFP, the growth of labor productivity and per capita output would eventually slow.
- Because of diminishing marginal returns to capital, the only way to sustain growth in potential GDP per capita is through technological change or growth in total factor productivity. This results in an upward shift in the any given mix of labor and capital inputs.

Convergence

- Given the relative scarcity and hence high marginal productivity of capital and potentially higher saving rates in developing countries, the growth rates of developing countries should exceed those of developed countries.
- As a result, there should be a convergence of per capita incomes between developed and developing countries over time.

Effects of Savings on Growth

- The initial impact of a higher saving rate is to temporarily raise the rate of growth in the economy. In response to the higher saving rates, growth exceeds the steady state growth rate during a transition period. However, the economy returns to the balance growth path after the transition period.
- During the transition period, the economy moves to a higher level of per capita output and productivity.
- Once an economy achieves steady state growth, the growth rate does not depend on the percentage of income saved or invested. Higher savings cannot permanently raise the growth rate of output.
- However, countries with higher saving rates will have a higher level of per capita output, a higher capital-to-labor ratio, and a higher level of labor productivity.

Reference: Volume 1, Reading 12.

5.2.3 Extension of the Neoclassical Model

- **Criticism on neoclassical growth theory:**
 - Lack of explanation for economic determinants of TFP.
 - Model predicts that the steady state rate of EG is unrelated to the rate of saving & investment.
- **Critiques of neoclassical model led to two lines of subsequent research on EG.**
 - **Augmented Solow approach** \Rightarrow adds human capital to the production function & enables us to measure the contribution of technological progress.
 - **Endogenous growth theory.**

5.3 Endogenous Growth Theory

- These models focus on explaining technological progress rather than treating it as exogenous.
- Self-sustaining growth concept with no necessary convergence to a steady state rate of growth.
- No diminishing marginal returns to capital for the economy as a whole.
- In this model human capital & R&D spending are factors of production & have to be paid for through savings.
- The production function in the endogenous model is a straight line.
- \uparrow the saving rate, \uparrow the EG rate.
- Market failure \Rightarrow due to +ve externalities, the private companies invest too low on R&D & knowledge capital.
- According to this model the incomes of developing & developed countries should not converge.

5.4 Convergence Debate

- **Convergence** \Rightarrow countries with low per capita incomes should grow at a faster rate than countries with higher per capita incomes.
- **Types of convergence under neoclassical growth theory:**
 - **Absolute convergence** \Rightarrow convergence of per capita growth rates among all countries but not the level of per capita income.
 - **Conditional convergence** \Rightarrow convergence to same level of per capita output as well as the same steady state growth rate is conditional on the countries having same saving rate, population growth rate & production function.
 - **Club convergence** \Rightarrow only rich & middle-income countries that are members of the club are converging to the income level of the richest countries.
 - **Non-convergence trap** \Rightarrow occurs if necessary institutional reforms will not be implemented.
- **Convergence b/w developed & developing countries** can occur in two ways.
 - Convergence takes place through capital accumulation & capital deepening.
 - By adopting technology that is widely used by advanced countries.
- **Endogenous model** makes no prediction that convergence should occur.

6. GROWTH IN AN OPEN ECONOMY

- Opening up an economy can significantly affect growth for following reasons:
 - Funding from global markets.
 - Countries can take benefit of law of comparative advantage.
 - Companies can exploit any economies of scales.
 - ↑ Technological progress.
 - ↑ Competition leads to better products.
- Opening up the economy should ↑ the rate at which countries' capital-to-labor ratios converge.
- Endogenous growth models ⇒ more open trade policy will permanently raise the rate of EG.
- Developing countries have pursued two strategies for economic development:
 - Inward-oriented policies ⇒ focus on developing domestic industries by restricting imports.
 - Outward-oriented policies ⇒ attempt to integrate domestic industries with those of the global economy (exports is a key driver of growth).

“ECONOMICS OF REGULATION”

1. INTRODUCTION

- Regulations have macro as well as micro (companies & individual level) effects.
- Regulation may develop either proactively (in anticipation of consequences of changes in environment) or reactively (in response to some occurrences).
- Significant challenge on the financial regulation ⇒ how to deal with systematic risk.

2. OVERVIEW OF REGULATION

Regulations may impose restrictions on how businesses interact with others & how businesses operate internally.

2.1 Classification of Regulations and Regulators

- Classification of regulations:
 - Statutes ⇒ laws enacted by legislative bodies.
 - Administrative law ⇒ rules issued by Govt. agencies or other regulators.
 - Judicial law ⇒ interpretations of courts.
- Advantage of independent regulators ⇒ immune from political influence & pressure (to some extent) but may be subject to pressure from their members.
- Regulations address a broad range of issues & can be classified by their objectives.
- Substantive law ⇒ focuses on the rights & responsibilities of entities & relationship among entities.
- Procedural law ⇒ focuses on the protection & enforcement of substantive laws.

2.2 Economic Rationale for Regulation

- Informational frictions result in a variety of issues:
 - Adverse selection ⇒ private information in the hands of some which affects the consumption of goods or services.
 - Moral hazard ⇒ incentive conflicts that arise from delegation of decision making.
 - Asymmetrical information.
- Externality issue (provision of public goods).
 - Because there are shared benefits for consuming the public good, market will not produce the optimal amount of these goods.

2.2.1 Regulatory Interdependencies

- Regulatory capture \Rightarrow regulation often arises to capture the interests of those regulated.
- Regulatory competition \Rightarrow regulators may compete to provide a regulatory environment designed to attract certain entities.
- Regulatory arbitrage \Rightarrow entities may identify & use some aspect of regulation and exploiting differences in regulatory interpretations or jurisdictions for their benefit.
- The reason behind the interdependencies across jurisdictions is to recognize the reality & implications of diverse trade-offs.
- Evidence exists that govt. recognize the necessity for global regulatory cooperation & coordination.
- Regulation by different regulators even with seemingly similar objectives can lead to very different regulatory outcomes.

2.3 Regulatory Tools

- Regulatory & Govt. policies should be predictable & effective in achieving objectives.
- Negative externalities:
 - Systematic risk \Rightarrow risk of failure of a major financial institution.
 - Financial contagion \Rightarrow situation in which financial shocks spread from their place of origin to other locales.
- The regulator should have comprehensive enforcement powers.
- Difficulties to prosecute settlements with individual violators include:
 - Violations are difficult to detect.
 - Strong incentives to fight in order to protect reputation & livelihood.

3. REGULATION OF COMMERCE

- IOSCO developed a framework of matters to be addressed in the domestic laws to facilitate effective securities legislation. Regulatory & Govt. policies should be predictable & effective in achieving objective.
- Negative externalities:
 - Systematic risk \Rightarrow risk of failure of a major financial institution.
 - Financial contagion \Rightarrow situation in which financial shocks spread from their place of origin to other locales.
- The regulator should have comprehensive enforcement powers.
- Difficulties to prosecute settlements with individual violators include:
 - Violations are difficult to detect.

4. REGULATION OF FINANCIAL MARKETS

- Securities regulation focuses on such goals as protecting investors, creating confidence in markets & enhancing capital formation.
- Key focus of regulators \Rightarrow maintaining the integrity of the markets & acting as a referee for its fairness.
- The disclosure framework is wide-ranging & has high potential importance.
- Monitoring & supervision are important aspects of the regulations.
- Benefits of regulations generally come up with associated costs.

5. COST-BENEFIT ANALYSIS OF REGULATION

- Regulatory burden \Rightarrow costs of regulation for the regulated entity.
- Net regulatory burden = private costs of regulation – private benefits of regulation.
- Regulators must distinguish b/w implementation costs (unanticipated) & indirect costs (unintended consequences).
- Regulatory benefits & costs are difficult to assess on a prospective basis compared with a retrospective basis.
- Sunset provisions \Rightarrow implemented regulation would be automatically removed after a no. of years.
- Regulatory judgments should reflect economic principal & full consideration of costs & benefits rather than the preferences of the current decision makers.

6. ANALYSIS OF REGULATION

- Effect of regulations \Rightarrow both micro & macro effects.
- Using a framework, an analyst identifies & focuses on areas that potentially have significant effects on the industry or entity being analyzed.
- The advocates of the principle of network neutrality argue that there should not be any restriction on access to networks.

6.1 Effects of Regulations

- Regulation may affect a no. of sectors to varying degrees or designed for a particular sector.
- Net regulatory burden to the entity of interest is an important consideration for an analyst.

“INTERCORPORATE INVESTMENTS”

HFT = Held-for-Trading
 HTM = Held-to-Maturity
 AFS = Available-for-Sale
 I.S = Income Statement
 C.A = Contingent Assets
 C.L = Contingent Liabilities
 N.I = Net Income
 B.C = Business Combinations
 B.V = Book Value
 JCE = Jointly Controlled Entities
 G/L = Gain & Loss
 FVPL = Fair Value through Profit & Loss
 FA = Financial Assets

B.S: Balance Sheet
 FV: Fair Value
 R.E = Retained Earnings
 R&D = Research & Development
 F.G = Financial Guarantee
 D&E = Debt & Equity
 JCO = Jointly Controlled Operations
 JCA = jointly Controlled Assets

CF = Cash Flow
 CV = Carrying Value
 G/W = Goodwill
 DFV = Designated at Fair Value
 P.P = Purchase Price
 P/L = Profit or Loss
 CFO = Cash Flow from Operations
 QSPE = Qualifying Special Purpose Entity

PV = Present Value
 HC = Historical Cost
 VIE = Variable Interest Entity
 T.C = Transaction Cost
 A&L = Asset & Liability
 R&E = Revenue & Expense
 SPE = Special Purpose Entity
 T.A = Total Assets
 T.L = Total Liabilities
 MV: Market Value
 OCI = Other Comprehensive Income
 FVOCI = Fair Value through Other Comprehensive Income

1. INTRODUCTION

2. BASIC CORPORATE INVESTMENT CATEGORIES

Financial assets
No significant control
(ownership < 20%)

Investment in associates
Significant influence over investee's operations
(ownership 20%-50%)

Business combinations
Control over investee's operations
(ownership > 50%)

Joint venture
Shared control

Ownership % is only a guideline; ultimate category is based on investor's ability to influence.

3. INVESTMENTS IN FINANCIAL ASSETS: STANDARD IAS 39 (AS OF DECEMBER 2012)

- IFRS \Rightarrow HTM, AFS, FV Through P/L, loans & receivables

3.1 Held-to-Maturity

Debt Securities
Long term
initially FV (IFRS)
Price paid (U.S.GAAP)

Balance Sheet
Amortized cost
(original cost \pm
Discount/premium).

Income Statement
Interest income.

3.5 Reclassification of Investments

IFRS

- Cannot be reclassified into & out of DFV & out of HFT.
- IFRS \Rightarrow not permitted to classify HTM if company sold significant HTM investment during current or two preceding years (certain exceptions).
- AFS debt to HTM, with FV at B.S & difference b/w fair & maturity value & G/L in other comprehensive income amortized over security life.
- HTM to AFS, with FV at B/S & difference b/w fair & CV in other comprehensive income.
- Debt instruments from HFT or AFS to loans & Receivables (foreseeable future holding)

U.S. GAAP

- From AFS \Leftrightarrow HFT = cumulative or unrealized G/L in I.S
- Debt security of AFS into HTM \Rightarrow cumulative G/L amortize over security life.
- HTM to AFS = unrealized G/L to comprehensive income.

3.2 Fair value through Profit or Loss

- IFRS \Rightarrow Include securities held for trading & designated at FV.
- U.S. GAAP \Rightarrow similar classification (except for some financial assets).

3.2.1 Held for Trading

- Short term debt & equity securities.
- Reported at FV.
- Unrealized G/L in I.S.
- Interest & dividend received in I.S

3.2.2 Designated at Fair Value

- Investment initially recognized at FV (under both IFRS & U.S.GAAP) that might otherwise be classified as AFS or HTM.
- Accounting treatment is similar to HFT.

3.3 Available-for-Sale

D&E Securities
Neither HTM nor FVPL
Initial & later recog at FV

Balance Sheet
Fair value,
unrealized
G/L in equity.

Income Statement
Realized G/L.
Foreign currency
unrealized G/L (Debt Sec IFRS).

3. INVESTMENTS IN FINANCIAL ASSETS: STANDARD IAS 39 (AS OF DECEMBER 2012)

- IFRS \Rightarrow HTM, AFS, FV Through P/L, loans & receivables

3.4 Loans & Receivables

- Non – derivative financial assets with fixed or determinable payments.
- IFRS \Rightarrow at amortized cost (unless designated as AFS or FVPL).
- U.S. GAAP \Rightarrow if meet the definition of debt security, then classified as HTM, AFS or HTM

3.6 Impairments

IFRS

U.S. GAAP

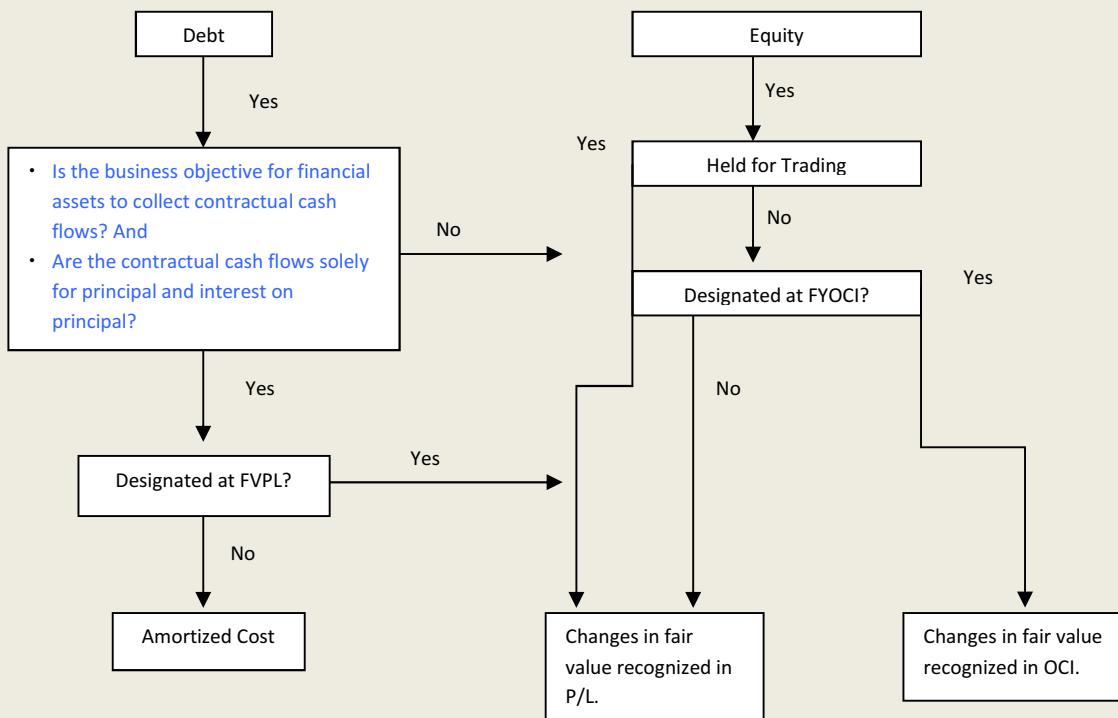
- | | |
|--|--|
| <ul style="list-style-type: none"> Evaluate HTM & AFS securities for impairment. Debt security is impaired if one loss event occurred, equity security is impaired if FV < CV. HTM & loans & receivables investment impaired, B/S value is PV of future C.F, loss in I.S & reversal is allowed. AFS security impaired, unrealized loss in I.S. equity cannot be reversed. | <ul style="list-style-type: none"> Evaluate HTM & AFS securities for impairment. Security is impaired if decline is not temporary. AFS \Rightarrow Subsequent increase is reported in OCI. |
|--|--|

4. INVESTMENTS IN FINANCIAL ASSETS: IFRS 9 (AS OF DECEMBER 2012)

- IASB has updated standard IFRS 9 (financial instruments).
- Effective date is Jan 1 '15 (early adoption permitted).
- Terms AFS & HTM no longer appear in IFRS 9.
- Financial assets must meet two criteria to be measured at amortized cost.
 - Business model test.
 - Cash flow characteristic test.

4.1 Classification and Measurement

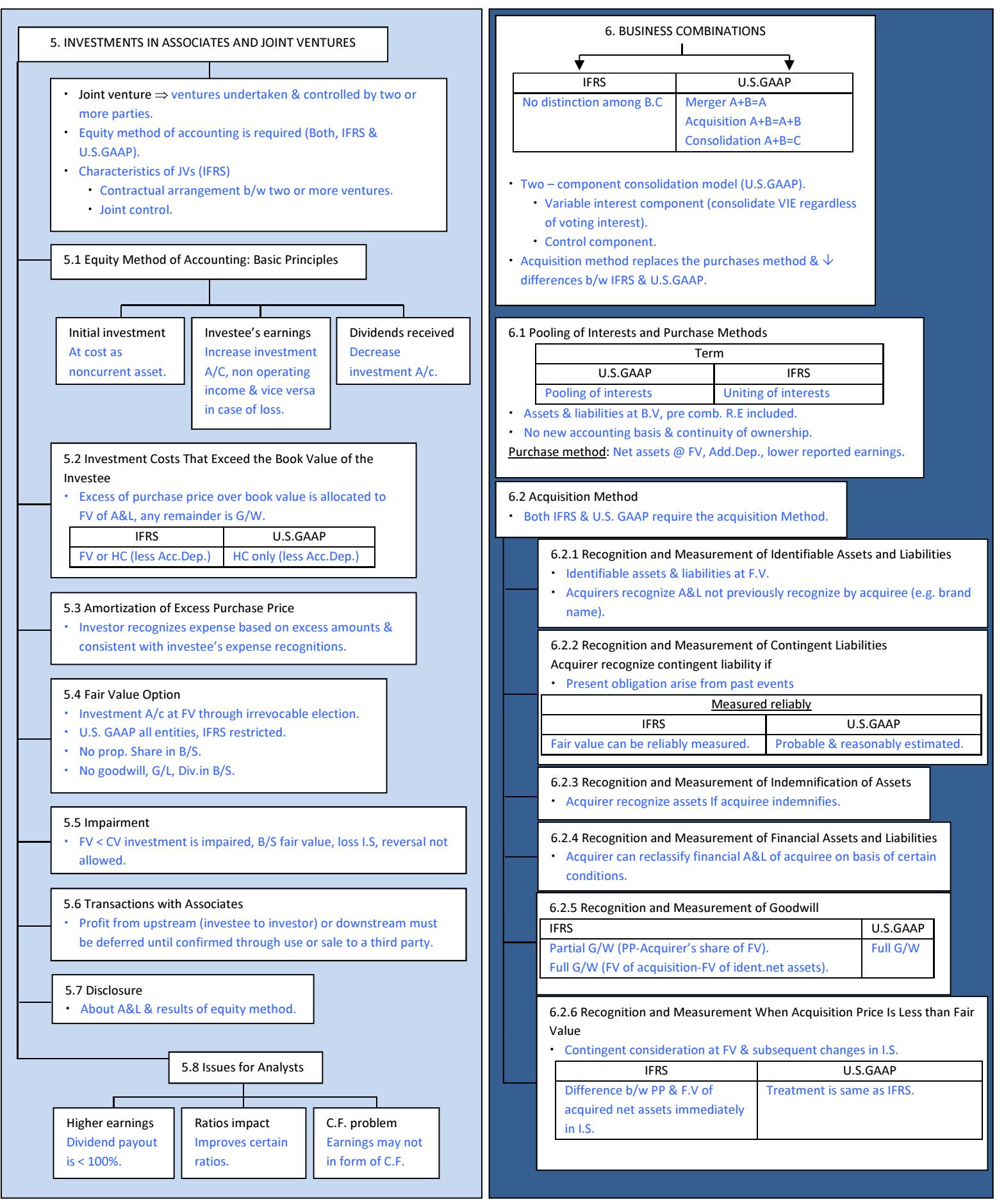
- All FA measured at FV when initially acquired.
- Subsequent treatment \Rightarrow FV or amortized cost.
- FA meeting above two tests of sec 4, are generally measured at amortized cost (management can choose FVPL).
- Equity investment HFT must be measured at FVPL.
- Other equity investments, FVPL or FVOCI (irrevocable choice).
- Derivatives are measured at FVPL (except hedging instruments).



Reference: Level II Curriculum, Volume 2, Reading 18.

4.2 Reclassification of Investments

- Reclassification of equity instruments is not permitted.
- Debt instrument reclassification \Rightarrow FVPL to amortized cost (vice versa) \Rightarrow only if objective for holding FA significantly affects operations.
- No restatement of prior periods.
- From amortized cost to FVPL \Rightarrow assets FV, G/L in P&L.
- From FVPL to amortized cost \Rightarrow FV become carrying value.



6.3 Impact of the Acquisition Method on Financial Statements, Post-Acquisition

- Financial statements continue to be affected.

6.4 The Consolidation Process

- Combine the results of operations
- Intercompany transactions are eliminated to avoid double counting
- Difference b/w IFRS & US GAAP must be considered to avoid inconsistency

6.4.1 Business Combination with Less than 100 Percent Acquisition

- Merger or consolidation \Rightarrow Acquire 100% equity.
- Acquisition < 100% (parent, subsidiary relationship).

6.4.2 Non-controlling (Minority) Interests: Balance Sheet

- Subsidiary's equity held by third parties.
- Separate component of equity (both IFRS & U.S.GAAP converged)

Measurement	
IFRS	U.S.GAAP
Full G.W method	Full G.W method
Partial G.W method	

6.4.3 Non-controlling (Minority) Interests: Income Statement

- A line item reflecting allocation of P&L.
- Intercompany transactions are eliminated in full.
- Impact on ratios would be diff. under full G/W & partial G/W.
- Value of noncontrolling interest on parent's B/S will change.

6.4.4 Goodwill Impairment

- Impairment test \Rightarrow annual or more frequent.
- Written down G/W. cannot be later restored.
- Impairment loss is separate line item in I.S (both IFRS & U.S.GAAP).

G/W assignment & impairment Test	
IFRS	U.S.GAAP
Assignment \Rightarrow Cash-generating unit	Assignment \Rightarrow Reporting unit
Impairment test (one step)	Impairment test (2step)
<ul style="list-style-type: none"> Rec. amount < C.V = loss Loss reduced G/W & other assets when G/W = 0. 	<ul style="list-style-type: none"> C.V > F.V = impairment occurred. [C.V - implied F.V] of Goodwill = amount of impairment Loss. Loss reduced G/W but not other assets.

6.5 Financial Statement Presentation Subsequent to the Business Combination

- Presentation is similar under IFRS & U.S.GAAP.

6.6. VARIABLE INTEREST AND SPECIAL PURPOSE ENTITIES

- To accommodate specific needs of the sponsor.
- Transfer A & L from sponsoring company's B.S. as sale.
- Improve certain ratios of sponsor by avoiding consolidation.

IFRS	U.S.GAAP
<ul style="list-style-type: none"> Revise the definition to encompass many SPEs IFRS 10 is applicable from Jan1'13 SPEs involved in structured financial transaction will require an evaluation of purpose, design and risks. 	<ul style="list-style-type: none"> More general term VIE as compare to SPE (IFRS). VIE includes other entities besides SPEs. Primary beneficiary must consolidate VIE if controls (certain indicators). Entity absorb losses must consolidate (if other entity will receive residual return). NCI in VIE also be shown in I.S & B.S.

6.6.1 Illustration of an SPE for a Leased Asset

- SPE borrow debt \Rightarrow buy asset \Rightarrow lease it to repay debt & return to equity holders.
- Sponsor bear default risk, asset ownership, so consolidate.

6.6.2 Securitization of Assets

- Example

6.7 Additional Issues in Business Combinations That Impair Comparability

6.7.1 Contingent Assets and Liabilities

IFRS	U.S.GAAP
<ul style="list-style-type: none"> Cost of acquisition allocated to F.V of A,L & contingent L. C.L at F.V (Initially) > of amount recognized & amount req. to settle (subsequent) Contingent assets not recognized. 	<ul style="list-style-type: none"> Contractual contingent A&L at FV at acquisition Non-contractual recognize only if meet the def. of A or L at acquisition. Subsequently C.L \Rightarrow of initial amount or estimate of loss. C.A \Rightarrow < F.V or future settlement amount.

6.7.2 Contingent Consideration

- May negotiated as part of acquisition price.
- Initially measured at F.V either A,L or Equity (both IFRS & U.S.GAAP)
- Can also classify as asset (U.S.GAAP). Subsequent changes in I.S.
- Not remeasured equity classified.(both IFRS & U.S.GAAP)

6.7.3 In-Process R&D

- A separate intangible asset at FV (both IFRS & GAAP).
- Subject to amortization or impairment.

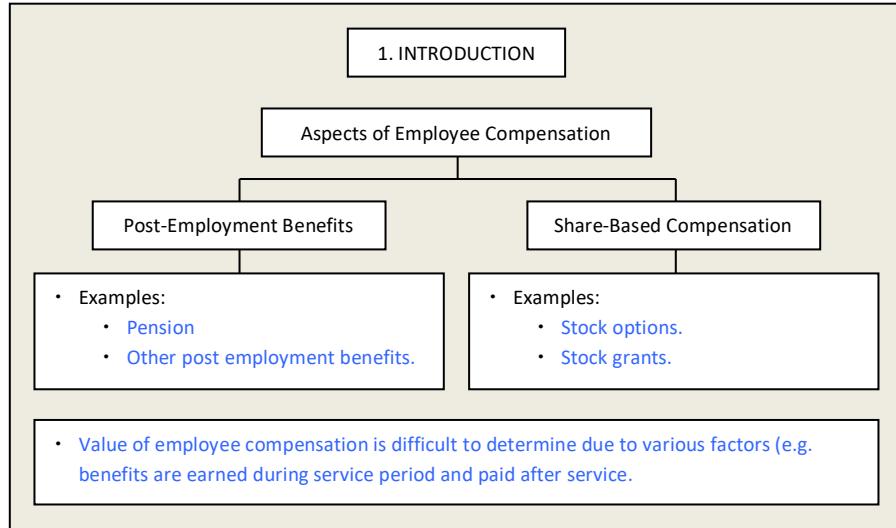
6.7.4 Restructuring Costs

- Expense in the period the costs are incurred.
- Not a part of cost of acquisition (both standards).

DR = Discount Rate
 PVDBO = Present Value of the
 Defined Benefit
 Obligation
 OPB = Other Post
 Employment Benefits
 VBO = Vested Benefit
 Obligation

DC = Defined Contribution
 DB = Defined Benefits
 BS = Balance Sheet
 FV = Fair Value
 ABO = Accumulated Benefit
 Obligation

“EMPLOYEE COMPENSATION: POST-EMPLOYMENT AND SHARE-BASED”



2. PENSION AND OTHER POST-EMPLOYMENT BENEFITS

2.1 Types of Post-Employment Benefits Plans

- Assumptions required estimating & recognizing future benefits can have a significant impact on the company's reported performance & financial position.
- Comparability across companies may be affected due to difference in assumptions.

Types of Post Employment Benefits Plans

DC Pension Plans

- Specific contributions by employer.
- Investment risk is borne by employee.
- The agreed upon amount is pension expense.
- Employees may also contribute to the plan.
- Plan impact on company's financial statements can be easily assessed.

DB Pension Plans

- Employer promises to pay a defined amount of pension in the future.
- Future pension payments represent a liability of the sponsoring company.
- Various actual assumptions & computations are required to measure pension obligation.
- Multi-employer plans (IFRS only) ⇒ plans to which many different employers contribute on behalf of their employees (e.g. industry association pension plan).
- Overfunded (underfunded) plan ⇒ pension assets > (<) pension liabilities.
- Sponsor bears the investment risk.

Other Post-Employment Benefits

- These include life insurance premiums & health care insurance.
- OPB are typically classified as DB plans but more complex reporting requirement.
- Future benefit depends on plan specifications & types of benefit.
- Companies typically do not prefund OPB.

2.2 Measuring a Defined Benefit Pension Plan's Obligations

Pension Obligation

IFRS

U.S.GAAP

- Obligation is called PVDBO.
 - PVDBO \Rightarrow PV of expected future payments required to settle the obligations arising from employee service in the current & prior periods (without deducting any plan assets).
 - Obligation is called PBO.
 - PBO \Rightarrow the actuarial PV as of a date of all benefit attributed by the pension benefits formula to employee service rendered prior to that date.
 - U.S. GAAP also identifies two other measures of pension liability including VBO & ABO.
- Pension obligation depends upon a number of actuarial assumptions (e.g. discount rate, future salary increase etc.).

2.3 Financial Statement Reporting of Pension Plans and Other Post-Employment Benefits

2.3.1 Defined Contribution Pension Plans

- Contribution into the plan is recorded as an expense on the income statement.
- Liability is recognized at the end of the reporting period only for any unpaid contributions.

2.3.2 Defined Benefit Pension Plans

2.3.2.1 Balance Sheet Presentation

2.3.2.2 Periodic Pension Cost

- Both IFRS & U.S.GAAP require a pension plan's funded status to be reported on the BS.
- Funded status = PV of the defined benefit obligation – FV of the plan assets.
- Underfunded (overfunded) plan \Rightarrow net pension liability (asset).

- Periodic pension cost \Rightarrow Δ in the net pension liability or asset adjusted for the employer's contribution.
- The periodic pension cost is recognized in profit or loss &/or in OCI.

Periodic Pension Cost

IFRS

U.S.GAAP

- Service cost \Rightarrow amount by which a company's pension obligation increases as a result of employees' service in the current period.
- Past service costs \Rightarrow amount by which a company's pension obligations relating to employees' service in prior periods changes as a result of plan amendment or a plan curtailment.
- Both current & past service costs are recognized as an expense in P&L.
- Net interest expense/ income \Rightarrow calculated by multiplying the net pension liability /assets by the DR used in determining the PV of the pension liability.
- Net interest expense/income is recognized in P&L.
- Remeasurement \Rightarrow it includes
 - Actuarial G&L.
 - Diff. b/w actual return on plan assets & the amount included in the net interest expense/income calculation.
 - Remeasurement amounts are recognized in OCI (no subsequent amortization to P&L).

- Current service cost is recognized in P&L.
- Past service costs are reported in OCI in the period in which cost occurs (amortized to P&L over the avg. service life of employees).
- Periodic pension cost for P&L includes interest expense & return on plan assets (similar to IFRS).
- Interest expense & return on plan assets are not netted & expected return on plan assets is used rather actual return on plan asset.
- Difference b/w expected & actual return is a source of actuarial G/L.
- All actuarial G/L can be reported either in P&L or in OCI.
- **Corridor approach:**
 - Net cumulative unrecognized actuarial G/L at the beginning of the reporting period are compared with DBO & the FV of plan assets at the beginning of period.
 - If unrecognized G/L > 10% of the greater of the DBO or the FV of plan assets, the excess is amortized (component of periodic pension expense in P&L) over the expected avg. remaining working lives of the participating employees.

2.3.2.2 Periodic Pension Cost

- Some amount of pension costs may qualify for capitalization as part of the costs of self constructed assets (e.g. inventories).
- These costs are recognized in P&L as part of COGS.
- IFRS \Rightarrow do not specify where companies presents the various components of periodic pension cost beyond the components presented in P&L & OCI.
- U.S.GAAP \Rightarrow all components of net periodic pension cost that are recognized in P&L to be aggregated & presented as a net amount within the same line item on I.S.

2.3.3 More on the Effect of Assumptions and Actuarial Gains and Losses on Pension and Other Post-Employment Benefits Costs

- Pension obligations are based on many estimates & assumptions (e.g. employee turnover, length of service, DR etc.).
- An \uparrow (\downarrow) in pension obligation resulting from Δ in actuarial assumptions is considered an actuarial loss (gain).
- Estimates related to plan assets also affect annual pension cost (mainly under U.S.GAAP because expected rather than actual return on plan asset is used).
- IFRS use projected unit credit method to measure the DB obligation.
 - PUCM gives rise to an additional unit of benefit during each period of service to which the employee is entitled at retirement.
 - Objective \Rightarrow to allocate the entire expected retirement costs over the employee's service periods.
- OPB also requires assumptions & estimates.

2.4 Disclosures of Pension and Other Post-Employment Benefits

- Comparative financial analysis using ratios can be affected due to several reasons e.g.
 - Difference in key pension assumptions.
 - Funded status is reported on BS rather than gross amounts. Gross amounts can Δ certain financial ratios.
 - IFRS & U.S.GAAP differ in their provisions about cost recognized in P&L v/s in OCI.
 - Periodic pension costs in P&L may not be comparable (pension cost is single line item under U.S.GAAP, various line items under IFRS).
 - CF information may not be comparable.

2.4.1 Assumptions

- In order to assess conservative or aggressive biases, assumptions must be compared over time & across companies.
- DR assumption is based on the market IR of high-quality corporate fixed income investments of similar maturity to timing of future pension payments.
- Assumptions must be internally consistent.
- Higher expected return assumptions (U.S.GAAP only) presumably reflect riskier investments.
- Under OPB following assumptions would result in \uparrow (\downarrow) benefit obligations & a \uparrow (\downarrow) periodic costs:
 - A \uparrow (\downarrow) near-term increase in health care costs.
 - A \uparrow (\downarrow) assumed ultimate health care trend rate.
 - A later (an earlier) year in which the ultimate health care trend rate is assumed to be reached.

2.4.2 Net Pension Liability (or Asset)

- Funded status is reported on the BS under both IFRS & U.S.GAAP.
- Footnotes can be used for gross amount of pension plan assets & liabilities which reflect underlying economic liabilities & assets of a company.
- If gross benefits obligations is $>$ company's total assets, a small change in pension liability can have a significant financial impact on the sponsoring company.

2.4.3 Total Periodic Pension Costs

- Net periodic pension cost = ending funded status – employer contributions – beginning funded status.
- Total periodic cost in a given period can also be calculated by summing the periodic components of cost.
- Payment of cash out of a DB plan to a retiree does not affect the net pension liability or assets (reduce plan assets & obligations by an equal amount).

2.4.4 Periodic Pension Costs Recognized in P&L vs. OCI

- IFRS & U.S.GAAP differ in their provisions about which periodic pension costs are recognized in P&L v/s in OCI.
- Analyst adjustment in U.S.GAAP company's P&L to make it similar to an IFRS company:
 - Include (exclude amortization of) past service costs arising during the period (previous periods).
 - Return on plan assets at a DR rather than the expected rate.
- Alternatively:
 - Analyst could use comprehensive income as the basis for comparison.

2.4.5 Classification of Periodic Pension Costs Recognized in P&L

- Periodic pension costs are generally treated as operating expense.
- To better reflect the operating performance an adjustment can be made as:
 - Add back the full amount of pension costs to operating income & then subtract only the service costs.
 - The interest expense component would be added to the company's interest expense.
- Return on plan assets would be treated IFRS & U.S.GAAP differ in their provisions about which periodic pension costs are recognized in P&L v/s in OCI.
- Analyst adjustment in U.S.GAAP company's P&L to make it similar to an IFRS company:
 - Include (exclude amortization of) past service costs arising during the period (previous periods).
 - Return on plan assets at a DR rather than the expected rate.
- Alternatively:
 - Analyst could use comprehensive income as the basis for comparison.

2.4.6 Cash Flow Information

- Cash flow impact of pension is the amount of contribution made to fund the plan or the amount of benefits paid (for unfunded plans).
- If periodic contributions > (<) total pension costs, the excess (shortage) can be viewed as a reduction of pension obligation (source of financing).
- If amounts of benefit obligations are material, the analyst may adjust the CFs in statement of CF.

3. SHARE-BASED COMPENSATION

- Form of deferred compensation (no initial cash outlay).
- Both IFRS & U.S.GAAP require disclosure of management compensation.
- Align managers' interest with shareholders.
- Recipient has no influence over MP.
- Ownership of existing owners is diluted (in case of stock grants & stock options).

Several important dates

Grant date	Day options are granted
Service period	Period b/w grant date & vesting date
Vesting date	Date employee can first exercise options
Exercise date	Actual options exercise date

3.1 Stock Grants

Outright transfer

- With restrictions or contingent on performance.

Restricted stock

- Cannot sell until vesting.

Performance stock

- Contingent on meeting performance.
- Accounting numbers manipulation e.g. earnings, ROA.

Compensation expense

- Fair value at grant date allocated over service life.

3.2 Stock Options

Fair value method

- Option pricing model (Binomial or Black – Scholes) is used to measure fair value of employees' stock options.
- Inputs are important, some are known, others are subjective (e.g. volatility).
- ↑Volatility ↑estimated life ↑RF ⇒ ↑FV while ↑ D.Y ↓ FV.
- Compensation expense is reported at fair value (both IFRS & U.S. GAAP).
- Option expense is recognized over the relevant vesting period (↓ retained earnings & the offsetting entry is an ↑ in paid-in capital, no net impact on total equity).

3.3 Other Types of Share-Based Compensation

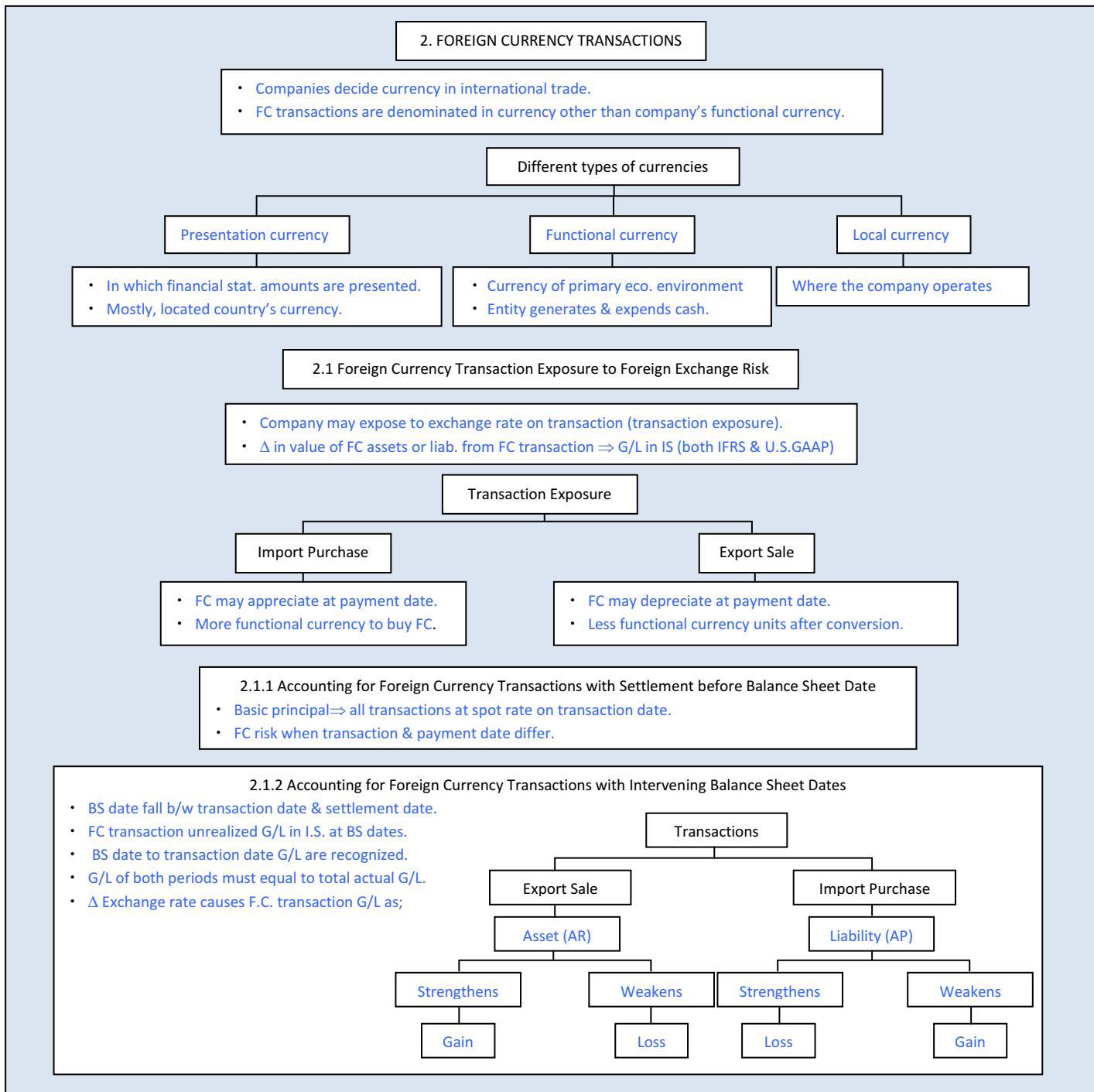
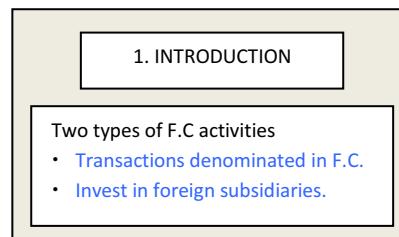
- Stock grants & stock options (equity settled) ⇒ allow the employee to obtain direct ownership in the company.
- SARs & phantom stock (cash settled) ⇒ compensate an employee based on Δ in value of shares (no need to hold shares).
- SARs are valued at fair value & compensation expense is allocated over the service period of the employee.
- Phantom share ⇒ compensation is based on performance of hypothetical stock rather than company's actual stock.
 - Used by private companies, private units or by highly illiquid companies.

“MULTINATIONAL OPERATIONS”

FC = Foreign Currency
 A&L = Assets & Liabilities
 PPL = Purchasing Power Loss
 G/L = Gain & Loss
 IS = Income Statement
 BS = Balance Sheet
 AR = Accounts Receivable
 AP = Accounts Payable
 I/E = Income or Expense
 F.S = Financial Statements

R/E = Retained Earnings
 COGS = Cost of Goods Sold
 HC = Historical Cost
 FV = Fair Value
 CV = Current Value

R&E = Revenue & Expense
 C.R = Current Rate
 H.R = Historical Rate
 P.P.G = Purchasing Power Gain
 FIFO = First-in-First-Out
 LIFO = Last-in-First-Out
 FASB = Financial Accounting Standard Board
 IASB = International Accounting Standard Board
 CTA = Cumulative Translation Adjustment



2.2 Analytical Issues

- Neither standard indicate where in IS, FC transaction G/L should be placed.
- Two most common treatments
 - Other operating I/E
 - Non-operating I/E, part of net financing cost (some cases).
- Operating profit margin affected by the placement (no guidance from standards).
- Comparison may distort b/w companies.
- Analyst also concern about unrealized F.C transaction G/L in I.S.

2.3 Disclosure Related to Foreign Currency Transaction Gains and Losses

- It is useful for companies to disclose.
 - Amount of FC transaction G/L (both standards require).
 - Presentation alternatives (no specific requirement).
- Companies often neglect to disclose location or amount of G/L (if immaterial).
- Several reasons for immaterial G/L (e.g. limited transaction, G/L offsetting, hedging activities).
- Δ in F.V of undesignated hedges in other income (amounts not disclosed).

3. TRANSLATION OF FOREIGN CURRENCY FINANCIAL STATEMENTS

- Companies have operations in foreign countries.
- Consolidated financial statements under both standards (require currency translation).
- Both IASB & FASB have very similar rules for translation.

3.1 Translation Conceptual Issues

- While translating two questions must be addressed.
 - Appropriate exchange rate for translation.
 - How is BS brought back into balance.

Two approaches for translation A&L

All A&L at current exchange rate

Monetary A&L at CR
Nonmonetary A&L at HR

3.1.1 All Assets and Liabilities Are Translated at the Current Exchange Rate

- FC balance Sheet accounts are revalued in term of functional currency at current exchange rate.
- Negative translation adjustment not results in cash outflow.
- Issue whether unrealized translation G/L in I.S. or equity.

3.1.2 Only Monetary Assets and Monetary Liabilities Are Translated at the Current Exchange Rate

- Only monetary assets & liabilities are at current rate.
- Same issue as in 3.1.1 (translation adjustment is unrealized, whether G/L to IS or equity).

3.1.3 Balance Sheet Exposure

- A&L translated at current rate ⇒ exposed to translation adjustment.
- Net asset BS exposure ⇒ A > L (translated at current rate).
- Net liabilities BS exposure ⇒ L > A (translated at current rate).
- Effects of currency fluctuations on BS exposure are same as in 2.1.2.
- After initial period CTA is required to keep B.S. balance.

3.2 Translation Methods**Two Approaches****Current rate method****All A & L at current rate****Monetary/Nonmonetary method****Variation****Temporal Method**

- Measurement basis preserved.
- A&L at FC BS at CR translated at CR
- A&L at FC BS at HR translated at HR

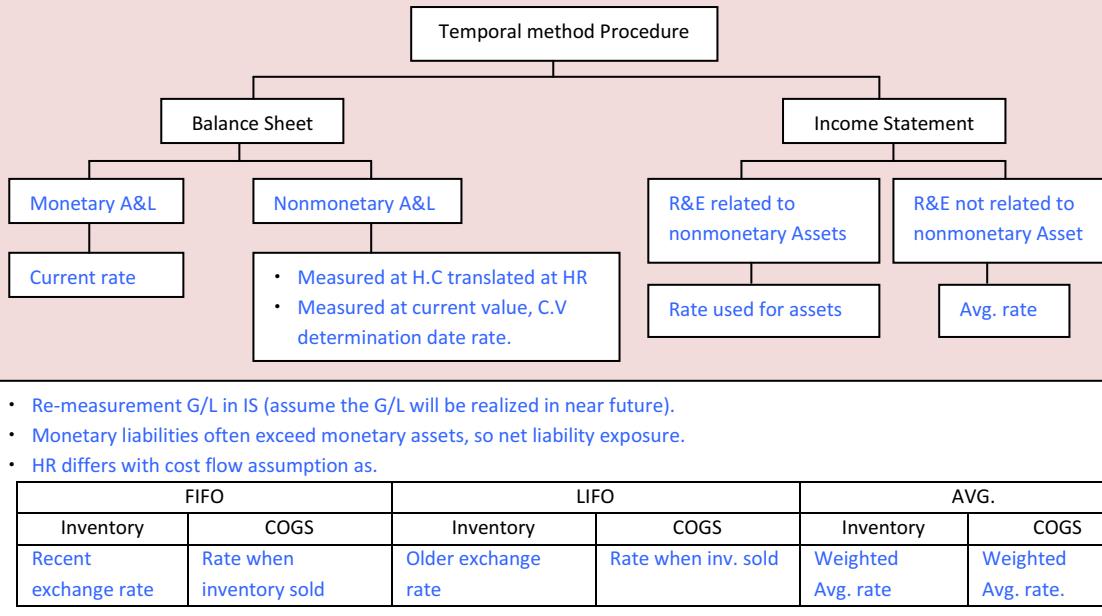
- Appropriate method depends on funct. currency.
- Certain indicators to determine funct. currency (similar under both standards).
- If indicators are mixed than management judgment.
- Three step translation approach (both standards).

Identify funct. currency ⇒ Translate F.C. balances to funct. currency ⇒ use current rate to translate into parents' presentation currency.

3.2.1 Foreign Currency Is the Functional Currency

- Funct. currency ⇒ different from parent presentation currency ⇒ C.R method.
- All A&L at CR ⇒ equity at HR ⇒ R&E at Avg rate.
- CTA keep BS balance under CR method.
- Entire investment exposed to translation G/L.
- CR method results in net assets exposure (except negative equity case).
- When FC ↑ in value ⇒ positive CTA & vice versa.

- 3.2.2 Parent's Presentation Currency Is the Functional Currency
- Temporal method.
 - Term "re-measurement" under U.S.GAAP (local currency to funct. currency).



3.2.3 Translation of Retained Earnings

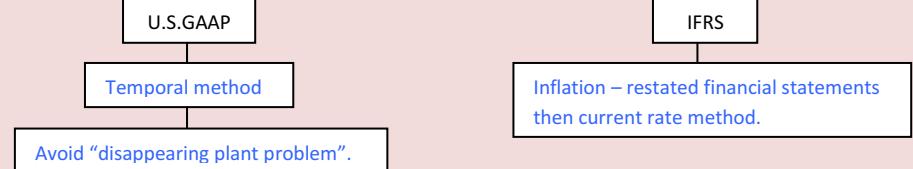
- Equity translated at H.R under both methods, create somewhat problem in translating retained earnings (different rates).
- R/E = accumulated previous years income – dividends.

3.2.4 Highly inflationary Economies

- Cumulative three-year inflation rate > 100% (U.S.GAAP, similar guidance IFRS).
- Cease to be highly inflationary then the funct. currency must be identified to determine the suitable method for translating the entity's F.S.

3.3 Illustration of Translation Methods (Excluding Hyperinflationary Economies)

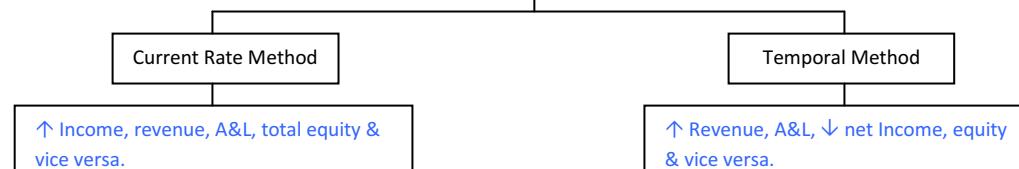
Approaches for Translation



3.4 Translation Analytical Issues

- Two translation methods result in very different amounts due to.
 - Different translation adjustment.
 - Different translation rates.
- Financial ratios differ significantly (except receivable turnover).
- Pure ratios (B/S or I/S) are similar before and after translation under C.R. method.
- Mixed ratios are distorted by translation under C.R. method.
- Translation using temporal method distorts all ratios.
- Not possible to generalize direction of distortion across ratios.

Foreign Currency Strengthens



3.5 Translation when a foreign Subsidiary operates in a Hyperinflationary Economy

- Temporal method (U.S.GAAP).
- First restatement of financial statement then C.R. method (IFRS).

Restatement Procedure

Balance Sheet

Income Statement

Monetary A&L

Non monetary A&L

Equity

No restatement

- HC adjusted for Δ in price index if items are at HC.
- Restated from date of revaluation if carried at revalued amount.

- Restated by applying Δ in price level from beg. of period or contribution date if later.

- Restated from item recording date to BS date.
- Net purchasing power G/L in IS

- Holding monetary assets during high inflation \Rightarrow PPL monetary liability \Rightarrow PPG.
- Results can be very similar under two different methods. (Similar exposure).
- Same result if $\% \Delta$ in exchange rate = Δ in general price index in high inflation.

3.6 Companies use Both Translation Methods at the Same Time

- A parent company uses temporal & C.R methods at same time (under both standards).
- Firms under same industry can use different translation methods (judgment in funct. currency).
- CTA to net income for comparability.

3.7 Disclosures Related to Translation Methods

- Both standards require two types of disclosures.
 - Amount of exchange difference in net income.
 - Amount of CTA along with reconciliation.
- Disclosure of CTA amount from equity to income at disposal of entity (U.S.GAAP).
- No separate transaction & translation disclosure (under both standards).
- Dirty-Surplus accounting \Rightarrow income items as part of equity rather G/L in I.S (e.g. CTA adjustment).
- Disclosures provide detail to move from dirty-surplus to clean-surplus.

4. MULTINATIONAL OPERATIONS AND A COMPANY'S EFFECTIVE TAX RATE

- Multinational companies incur income tax in the country of profit origin.
- Transfer prices \Rightarrow price change on intercompany transactions.
- Companies set transfer prices such that a higher portion of profit is allocated to lower tax rate regime.
- Analyst can obtain information about the effect of multinational operations from companies' disclosure on effective tax rate.
- Δ in effective tax rate could be caused by Δ in applicable tax rate &/or Δ in profit mix.

5. ADDITIONAL DISCLOSURES ON THE EFFECTS OF FOREIGN CURRENCY

5.1 Disclosures Related to Sales Growth

- Companies make disclosures about foreign currency effect on sales growth in MD&A section.
- Growth in sales from volume & price is more sustainable than sales growth that comes from Δ in exchange rate for a multinational company.

5.2 Disclosures Related to Major Sources of Foreign Exchange Risk

- Sensitivity analysis is often used in disclosures about the effects of currency fluctuations.
- Analyst can use sensitivity analysis disclosure with own forecast of exchange rate when developing forecast of profit & CFs.

“EVALUATING QUALITY OF FINANCIAL REPORTS”

2. Quality of Financial Reports

2.1 Conceptual Framework for Assessing the Quality of Financial Reports

Exhibit 1. Relationships between Financial Reporting Quality and Earnings Quality

		Financial Reporting Quality	
		Low	High
Earnings (Results) Quality	High	LOW financial reporting quality impedes assessment of earnings quality and impedes valuation.	HIGH financial reporting quality enables assessment. HIGH earnings quality increases company value.
	Low		HIGH financial reporting quality enables assessment. LOW earnings quality decreases company value.

- The presence of high-quality financial reporting is a necessary condition to evaluate results quality.
- High quality earnings provide an adequate level of return on investment & are sustainable.
- Company that provides GAAP-compliant, decision-useful information about low quality earnings would appear lower on quality spectrum.
- Problem with biased accounting choices \Rightarrow impedes an investor's ability to correctly assess a company's past performance.
- Aggressive (conservative) \Rightarrow \uparrow (\downarrow) companies reported performance in the current period & may \downarrow (\uparrow) reported performance in later period.

Reference: Level II, Volume 2, Reading 21.

2.2 Potential Problems that Affect the Quality of Financial Reports

2.2.1 Reported Amounts and Timing of Recognition

- Aggressive, premature & fictitious revenue recognition \Rightarrow overstated profit \Rightarrow overstated equity \Rightarrow usually accounts receivable are also overstated.
- Conservative revenue recognition \Rightarrow understated income; equity & understated assets.
- Omission & delayed recognition of expense \Rightarrow understated expense \Rightarrow overstated income, equity & assets \Rightarrow understated liabilities.
- Contingent liabilities understatement \Rightarrow overstated equity resulting from understated expenses & overstated income & overstated other comprehensive income.
- Overstatement (understatement) of financial assets (liabilities) reported at fair value are associated with overstated equity resulting from overstated unrealized gains or understated unrealized losses.
- CFO may \uparrow by deferring payables, inventory purchases & other operation related expenditures or by accelerating payments from customers.

2.2.2 Classification

Exhibit 4. Accounting Warning Signs

Potential Issues	Possible Actions/Choices	Warning Signs
<ul style="list-style-type: none"> Overstatement or non-sustainability of operating income and/or net income 	<ul style="list-style-type: none"> Contingent sales with right of return, "channel stuffing" (the practice of inducing customers to order products they would otherwise not order or order at a later date through generous terms), "bill and hold" sales (encouraging customers to order goods and retain them on seller's premises) 	<ul style="list-style-type: none"> Growth in revenue higher than that of industry or peers
<ul style="list-style-type: none"> Overstated or accelerated revenue recognition 		<ul style="list-style-type: none"> Increase in discounts to and returns from customers
<ul style="list-style-type: none"> Understated Expenses 		<ul style="list-style-type: none"> Higher growth rate in receivables than revenue
<ul style="list-style-type: none"> Misclassification of revenue, gains, expenses, or losses 	<ul style="list-style-type: none"> Lessor use of finance (capital) leases Fictitious (fraudulent) revenue Capitalizing expenditures as assets Lessee use of operating leases Classifying non-operating income or gains as part of operations Classifying ordinary expenses as non-recurring or non-operating 	<ul style="list-style-type: none"> Large proportion of revenue in final quarter of year for a non-seasonal business Cash flow from operations is much lower than operating income Inconsistency over time in the items included in operating revenues and operating expenses Increases in operating margin Aggressive accounting assumptions, such as long, depreciable lives Losses in non-operating income or other comprehensive income and gains in operating income or net income Compensation largely tied to financial results
<ul style="list-style-type: none"> Misstatement of balance sheet items (may affect income statement) 	<ul style="list-style-type: none"> Choice of models and model inputs to measure fair value 	<ul style="list-style-type: none"> Models and model inputs that bias fair value measures
<ul style="list-style-type: none"> Over- or understatement of assets 	<ul style="list-style-type: none"> Classification from current to non-current 	<ul style="list-style-type: none"> Inconsistency in model inputs when measuring fair value of assets compared with that of liabilities
<ul style="list-style-type: none"> Over- or understatement of liabilities 	<ul style="list-style-type: none"> Over- or understating reserves and allowances 	
<ul style="list-style-type: none"> Misclassification of assets and/or liabilities 	<ul style="list-style-type: none"> Understating identifiable assets and overstating goodwill 	<ul style="list-style-type: none"> Typical current assets, such as accounts receivable and inventory, included in

Exhibit 4. Accounting Warning Signs

Potential Issues	Possible Actions/Choices	Warning Signs
		<ul style="list-style-type: none"> • Allowances and reserves that fluctuate over time or are not comparable with peers
		<ul style="list-style-type: none"> • High goodwill value relative to total assets
		<ul style="list-style-type: none"> • Use of special purpose vehicles
		<ul style="list-style-type: none"> • Large changes in deferred tax assets and liabilities
		<ul style="list-style-type: none"> • Significant off-balance-sheet liabilities
<ul style="list-style-type: none"> • Overstatement of cash flow from operations 	<ul style="list-style-type: none"> • Managing activities to affect cash flow from operations • Misclassifying cash flows to positively affect cash flow from operations 	<ul style="list-style-type: none"> • Increase in accounts payable and decrease in accounts receivable and inventory
		<ul style="list-style-type: none"> • Capitalized expenditures in investing activities
		<ul style="list-style-type: none"> • Sales and leaseback
		<ul style="list-style-type: none"> • Increases in bank overdrafts

Reference: Level II, Volume 2, Reading 21.

2.2.3 Quality Issues and Mergers and Acquisitions

- Mergers & acquisitions provide opportunities & motivations to manage financial results.
- Acquisitions can provide a one-time boost to CFO that may or may not be sustainable.
- Investor cannot reliably assess whether or not the acquirer's CF problems are worsening as no required post-acquisition" with or without acquisition" disclosures.
- Acquisitions complicate a company's financial statements & this can conceal previous accounting misstatements.
- Acquisitions also provide opportunities that affect the initial consolidated balance sheet & income statement in future.
- The acquirer may underestimate the value of amortizable intangible when recording an acquisition.

2.2.4 Financial Reporting that Diverges from Economic Reality Despite Compliance with Accounting Rules

- Financial reporting must also reflect economic reality.
- An analyst should adjust the reported information to better reflect his/her view of economic reality.
- Analyst must evaluate whether restructuring/impairment charges occur regularly & would be the part of normalize earnings or not.
- Revisions to remaining economic lives of assets may lead an analyst to question whether an earlier change in estimate would have been more appropriate.
- Sudden ↑ in reverse & allowances could call into question whether the prior estimates resulted in overstatement of prior period's earnings.

3. Evaluating the Quality of Financial Reports

3.1 General Steps to Evaluate the Quality of Financial Reports

- Followings are same steps an analyst can choose to evaluate the quality of financial reports.
 - Develop an understanding of company & its industry.
 - Learn about management.
 - Identify significant accounting areas.
 - Make time series & cross sectional financial & ratio analysis.
 - Check the warning signs of possible issues.
 - Check exposure to geographic region or product segment in multinational firms.
 - Use quantitative tools to assess the likelihood of misreporting.

3.2 Quantitative Tools to Assess the Likelihood of Misreporting

3.2.1 Beneish Model

- Model to assess the probability of misreporting.
- $M - Score = -4.84 + 0.92(DSR) + 0.528(GMI) + 0.404(AQI) + 0.892(SGI) + 0.115(DEP1) - 0.172(SGAI) + 4.67(Accruals) - 0.327(LEVI)$
- $\Rightarrow DSR \Rightarrow$ Days Sales Receivable Δ in relationship b/w receivable & sales could indicate inappropriate revenue recognition.
- $\Rightarrow AQI \Rightarrow$ Asset Quality Index Δ in % of asset other than PPE & CA could indicate excessive expenditure capitalization.
- $\Rightarrow SGI \Rightarrow$ Sales Growth Index
- $\Rightarrow DEP1 \Rightarrow$ Depreciation Index \downarrow dep. rate could indicate understated depreciation as a means of manipulating earnings.
- $\Rightarrow SGAI \Rightarrow$ selling, general & admin Exp. Index an \uparrow in SGA expense suggests \downarrow admin & marketing efficiency.
- \Rightarrow Accruals \Rightarrow higher accruals can indicate earnings manipulation.
- $\Rightarrow LEVI \Rightarrow$ Leverage Index \Rightarrow Increasing leverage could predispose companies to manipulate earnings.

3.2.2 Other Quantitative Models

- Researchers have identified other variables for accounting manipulations.
- Some variables are auditor change, market to book value etc.

3.2.3 Limitations of Quantitative Models

- Financial models based on accounting numbers are only capable of establishing association's b/w variables.
- Manipulators are just as aware as analysts of the power of quantitative models.

4. Earnings Quality

4.1 Indicators of Earnings Quality

- High quality earnings \Rightarrow represent returns equal to or in excess of the company's cost of capital and are sustainable.

Indicators of Earnings Quality

4.1.1 Recurring Earnings

- Earnings that are expected to recur in the future.
- Discontinued & other non-recurring items are separated.
- Determination of whether an item is non-recurring involves judgment.

4.1.2 Earnings Persistence and Related Measures of Accruals

- Earnings persistence \Rightarrow sustainability of earnings excluding items that are obviously non-recurring & persistence of growth in those earnings.
- Components of earnings:
 - Cash components.
 - Accrual components.
- Cash component is more persistent than accrual component.
- If a firm reports positive net income but negative operating CFs \Rightarrow earnings quality is questionable.

4.1.3 Mean Reversion in Earnings

- Mean reversion in earnings \Rightarrow extreme earnings (high or low) tend to revert to normal levels over time.
- Mean reversion is a natural attribute of competitive markets.
- In constructing analyst forecast of future earnings, analysts need to develop a realistic CF model & realistic estimates of accruals.

Indicators of Earnings Quality

4.1.4 Beating Benchmarks

- A company that consistently reports earnings that exactly meet or nearly beat benchmarks can raise questions about earnings quality.

4.1.5 External Indicators of Poor-Quality Earnings

- These indicators include:
 - Enforcement actions by regulators.
 - Restatement of financials.
- These indicators are relatively less useful to an analyst.

4.2 Evaluating the Earnings Quality of a Company (Cases)

4.2.1 Revenue Recognition Case:
Sunbeam Corporation

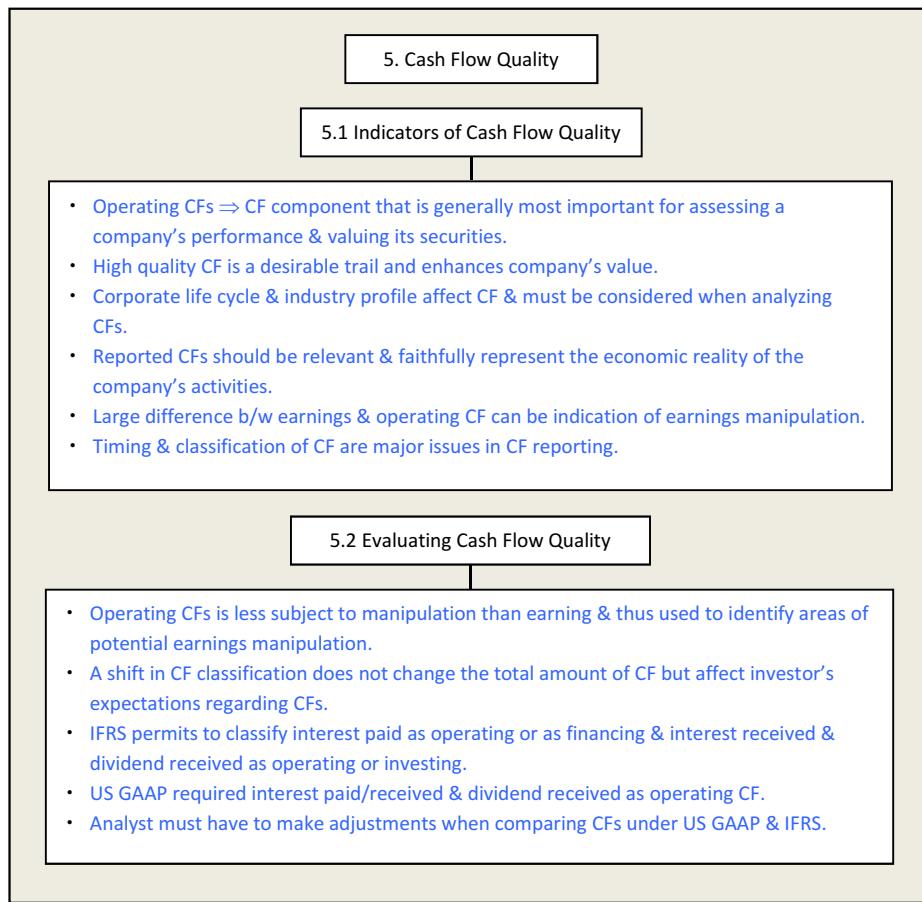
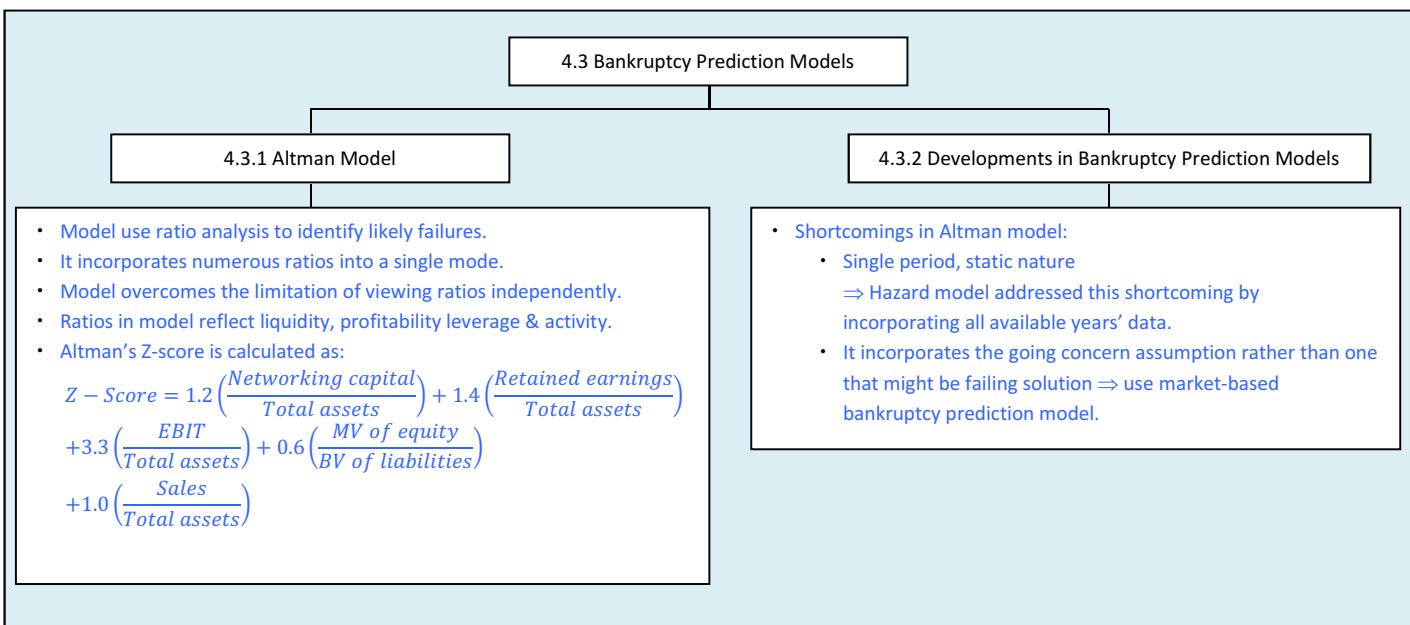
Example

4.2.2 Revenue Recognition Case:
MicroStrategy, Inc.

Example

4.2.3 Cost Capitalization Case:
WorldCom Corp.

Example



6. Balance Sheet Quality

- High financial reporting quality of balance sheet (BS) is indicated by completeness, unbiased measurement & clear presentation.
- High financial results quality ⇒ indicated by adequate liquidity, optimal amount of leverage & successful asset allocation.
- Completeness ⇒ significant amount of off-balance sheet obligations could be a concern for an analyst.
- Unbiased measurement ⇒ particularly important for asset & liabilities for which valuation is subjective.
- Clear presentation ⇒ it includes specification of many aspects of what appears on the BS.

7. Sources of Information about Risk

7.1 Limited Usefulness of Auditor's Opinion as a Source of Information about Risk

- An auditor's opinion is unlikely to be an analyst's first source of information about a company's risk.
- A change in auditor especially multiple changes in the auditor can signal possible reporting problem.

7.2 Risk-Related Disclosures in the Notes

- Notes to the financial statements typically contain information that is useful in understanding a company's risk.
- Disclosures also emphasize the uncertain timing & amount.
- Financial instruments disclosure provides information about credit, liquidity & market risk.

7.3 Management Commentary (Management Discussion and Analysis, or MD&A)

- Purpose of management commentary ⇒ to help users of financial statements in understanding company's risk exposures, approach to manage risks & risk management effectiveness.
- Five elements that should be contained in the commentary:
 - Nature of the business.
 - Objectives & strategies.
 - Resources, risks & relationships.
 - Results & prospects.
 - Performance measures & indicators.

7.4 Other Required Disclosures

- Other required disclosures that are specific to an event can provide important information relevant to assessing risk.
- Examples include capital raising, management changes, non-timely filing of financial reports etc.

7.5 Financial Press as a Source of Information about Risk

- Financial press can be a useful source of information about risk when reporter unveils an issue that has not previously been recognized.
- Source of any particular news article is important.
- Further investigation of initial idea from a news article is essential.

“INTEGRATION OF FINANCIAL STATEMENT ANALYSIS TECHNIQUES”

T.A = Total Assets
 B.S = Balance Sheet
 ROE = Return on Equity
 ROA = Return on Assets

M.V = Market Value
 I.S = Income Statement
 A&L = Assets & Liabilities
 C.F.O = Cash Flow from Operation
 QSPE = Qualifying Special Purpose Entity

1. INTRODUCTION

- The 6 step framework can be used in various objectives. (e.g. equity ownership, lending decision).

2. CASE STUDY 1: LONG-TERM EQUITY INVESTMENT

DuPont Analysis

- DuPont decomposition exposes effects of weaker operations that are masked by the effects of stronger operations.
- Component analysis of ROE \Rightarrow helps identify potential operational flaws.
- If equity income from associates is significant, remove equity income from DuPont analysis.
- Reduce total assets by the carrying value of investment.
- N.P margin & ROA will be recalculated after removing associate's effect.
- Financial leverage ratio adjustment = subtract investment in associate from T.A & equity (if financing is unknown).

Asset Based Composition

- Require an examination of changes in the composition of B.S assets over time.
- \uparrow in intangible assets \Rightarrow may be due to successful acquisitions.

Capital Structure Analysis

- Support management's strategic objectives and allow the firm to honor its future obligations.
- \downarrow current ratio, quick ratio, defensive interval, working capital is a concern.

Segment Analysis/Capital Allocation

- Based on segments (geographic areas of greatest importance).
- Segment is the portion of larger company that accounts for more than 10% of company's revenues or assets & distinguished risk and return.
- Segmentation is not purely geographical \Rightarrow analyst make judgments about allocation of capital.
- Capital exp. allocation should be based on profitability.

Accruals & Earnings Quality

- Analyst is concerned if consistency is result of earnings management.
- Check fluctuations & level of accruals B.S & C.F.

Cash Flow Relationships

- Most pressing concern \Rightarrow are operating earnings backed by C.F.?
- Add interest & tax to CFO for comparison with operating income.
- \uparrow C.F. interest coverage ratio, C.F to total debt ratio, positive signs.

Decomposition and Analysis of the Company's Valuation

- Implied value = parents' MV – parents' pro-rata share of associate's MV.
- More complicated to remove earnings of associate if accounting standards differ.
- Associate's stock on foreign stock exchange, convert MV of the associate to the parent's reporting currency.

3. CASE STUDY 2: OFF-BALANCE SHEET LEVERAGE FROM OPERATING LEASES

- Analyst will treat operating lease as finance lease.
- Significant hidden leverage (operating leases) is a concern for analyst.
- In early years, depreciation & interest expense will exceed the rental expense.
- Capitalizing the operating lease financial leverage is increased and interest coverage decreased.
- Analytical treatments for other off-balance-sheet financing (e.g. debt guarantees, take-or-pay agreements) are similar to operating lease.

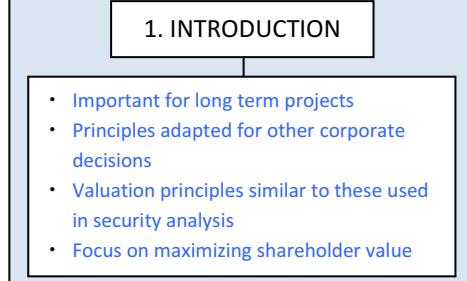
4. CASE STUDY 3: ANTICIPATING EFFECTS OF CHANGES IN ACCOUNTING STANDARDS

- Near term efforts at FASB to change accounting for securitizations.
- Currently company can remove assets from its B.S. and place it in an QSP (improve financial leverage).
- Analyst will treat the securitization as secured borrowings with Assets remaining on B.S. and including securitization liabilities as well.
- Although interest income, provision for loan losses & other income may change, net income is unaffected.
- Over the next few years, significant accounting changes are expected as U.S.GAAP & IFRS converge.

“CAPITAL BUDGETING”

r	= Required rate of return
NPV	= Net Present Value
IRR	= Internal Rate of Return
TVM	= Time Value of Money
Sal_T	= Cash proceeds from sale of fixed capital at Termination date
B_T	= Book value at Termination date
FCInv	= Fixed Capital Investment
NWCInv	= Net Working Capital Investment
S	= Sales
C	= Cash operating expenses
TNOCF	= Terminal year after tax non-op cash flow

T	= Tax rate.
CF	= after tax operating Cash Flow
EAA	= Equal Annual Annuity
CAPM	= Capital Asset Pricing Model
APT	= Arbitrage Pricing Theory
MRP	= Market Risk Premium
MV	= Market Value
PV	= Present Value
NOPAT	= Net Operating Profit After tax
MVA	= Market Value Added
D	= Depreciation



2. THE CAPITAL BUDGETING PROCESS

Steps

1. Generating Ideas

- Most important step

2. Analyzing Individual Proposals

- Gathering information
- Forecasting cash flows
- Evaluating profitability

3. Planning the Capital Budget

- Organize profitable proposals

4. Monitoring & Post-auditing

- Actual results compared with projections

Project Categories

1. Replacement projects

- Easier decisions
- Can be normal replacement of equipment or replacing with technology

2. Expansion Projects

- Increase size of business
- More uncertain
- Carefully considered

3. New product & services

- ↑ uncertainty
- Complex & involve more people in decision making process

4. Regulatory, safety, and environmental projects

- Frequently required by external party
- May generate no revenue
- Mandatory

5. Other Projects

- Can escape project analysis
- Pet projects (can be)
- Some R&D decisions (can be)

3. BASIC PRINCIPLES OF CAPITAL BUDGETING

Common Assumption & Principles

Some Important Concepts

1. Decision based on cash flows
2. Timing of cash flow crucial
3. Cash flows based on opportunity cost
4. After-tax cash flows analyzed
5. Financing costs are ignored → reflected in required rate of return

- Sunk cost: Already incurred, do not affect capital budgeting
- Opportunity cost: What resource is worth in next best use. Considered in capital budgeting
- Incremental cash flow: Cash flow with decision – cash flow without that decision
- Externality: Effect of investment on other things beside investment e.g. *cannibalization*
- Conventional Cash flow: Initial outflow followed by series of inflows
- Nonconventional cash flow: Cash flows can flip from +ve to -ve, or even multiple times

- Independent projects: Cash flows independent of each other
- Mutually exclusive projects: That compete directly with one and other
- Project sequencing: Done through time to create option to invest in future project
- Unlimited funds environment: Company capable of raising funds for all profitable projects
- Capital rationing: limited funds → allocated to achieve maximum shareholder value subject to funding constraints

4. INVESTMENT DECISION CRITERIA

4.1 Net Present Value (NPV)

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

- Invest if $NPV > 0$
- Do not Invest if $NPV < 0$

4.2 Internal Rate of Return

$$\sum_{t=1}^n \frac{CF_t}{(1 + IRR)^t} = outlay$$

- Invest if $IRR > r$
- Do not invest if $IRR < r$

4.3 Payback Period

- No. of years required to cover the original investment
- Cash flows are not discounted → major drawback
- Does not measure profitability
- Indicator of project liquidity
- No decision rule due to lack of economic viability

4.4 Discounted Payback Period

- No. of years taken by cumulative discounted cash flows to equal the original investment
- \uparrow than payback period
- Usually – NPV projects → No discounted payback period
- Ignores cash flows after payback period reached
- – NPV but + discounted cash flow can happen

4.5 Average Accounting Rate of Return (AAR)

$$AAR = \frac{\text{Avg.net income}}{\text{Avg. book value}}$$

- Easy to understand & calculate
- Based on accounting not on cash flow → practical limitation
- TVM not accounted for
- No conceptual criterion of distinguishing between profitable & non-profitable project investments

4.6 Profitability Index (PI)

$$PI = \frac{\text{PV of future cash flows}}{\text{Initial investment}} = 1 + \frac{NPV}{\text{Initial Investment}}$$

- Invest if $PI > 1.0$
- Do not invest if $PI < 1.0$
- PI → indicates value received against 1 unit invested
- Used as guide in capital rationing
- Also known as *benefit-cost ratio*

4.7 NPV Profile

- Shows NPV as function of discount rates
- y-axis \Rightarrow NPV, x-axis \Rightarrow Discount rates in %

4.8 Ranking Conflicts between NPV and IRR

- Conflicts arise in mutually exclusive projects
- Choose project based on \uparrow NPV
- Projects with different scale can also create conflicts

4.9 The Multiple IRR Problem and the No IRR Problem

- Unconventional cash flows can cause multiple IRR problem
- No IRR problem → No discount rate at which NPV is 0
- No IRR project → good investment

4.10 Popularity and Usage of the Capital Budgeting Methods

- Larger companies usually use NPV/IRR techniques
- European countries usually use payback period
- MBA's prefer using discounted cash flow techniques
- NPV criterion most directly related to stock prices
- Typically value of company = Existing investment + NPV of future investments
- Impact of investment on stock price is based on expectations
- Management's capital budgeting process can demonstrate quality of management and degree to which management \uparrow shareholders' wealth.

5. CASH FLOW PROJECTIONS

5.1 Table Format with Cash Flows Collected by year

- Cash flows from conventional expansion project grouped as
 - Investment outlay
 - After-tax operating cash flows over project's life
 - Terminal year after-tax non-operating cash flows
- See Volume III, Reading 22, Table 14.

5.2 Table Format with Cash Flows Collected by Type

- See Volume III, Reading 22, Table 15.
- Another way of organizing cash flows
- Cash flows accumulated by type

5.3 Equation Format for Organizing Cash Flows

- Initial outlay = $FC_{Inv} + NWCI_{Inv}$
- Annual after-tax op. cash flow = $(S - C - D)(1 - T) + D$
- $TNOCF = \Delta Sal_T + NWCI_{Inv} - T(\Delta Sal_T - \Delta B_T)$

6. MORE ON CASH FLOW PROJECTIONS

6.1 Straight Line and Accelerated Depreciation Methods

- Accelerated depreciation generally improves NPV compared to straight-line depreciation
- Modified Accelerated Cost Recovery System (MACRS) is generally used for tax reporting
- Assets under MACRS are classified into 3,5,7 or 10 year classes
- Each year's depreciation calculated through given percentage.
- Under MACRS depreciation period is assumed to start at middle of year

See Volume III, Reading 22, Table 17.

6.2 Cash Flows for a Replacement Project

- Incremental cash flows are used
- Outlay = $FC_{Inv} + NWCI_{Inv} - Sal_0 + T(\Delta Sal_0 - \Delta B_0)$
- $CF = (\Delta S - \Delta C - \Delta D)(1 - T) + \Delta D$
- $TNOCF = \Delta Sal_T + NWCI_{Inv} - T(\Delta Sal_T - \Delta B_T)$

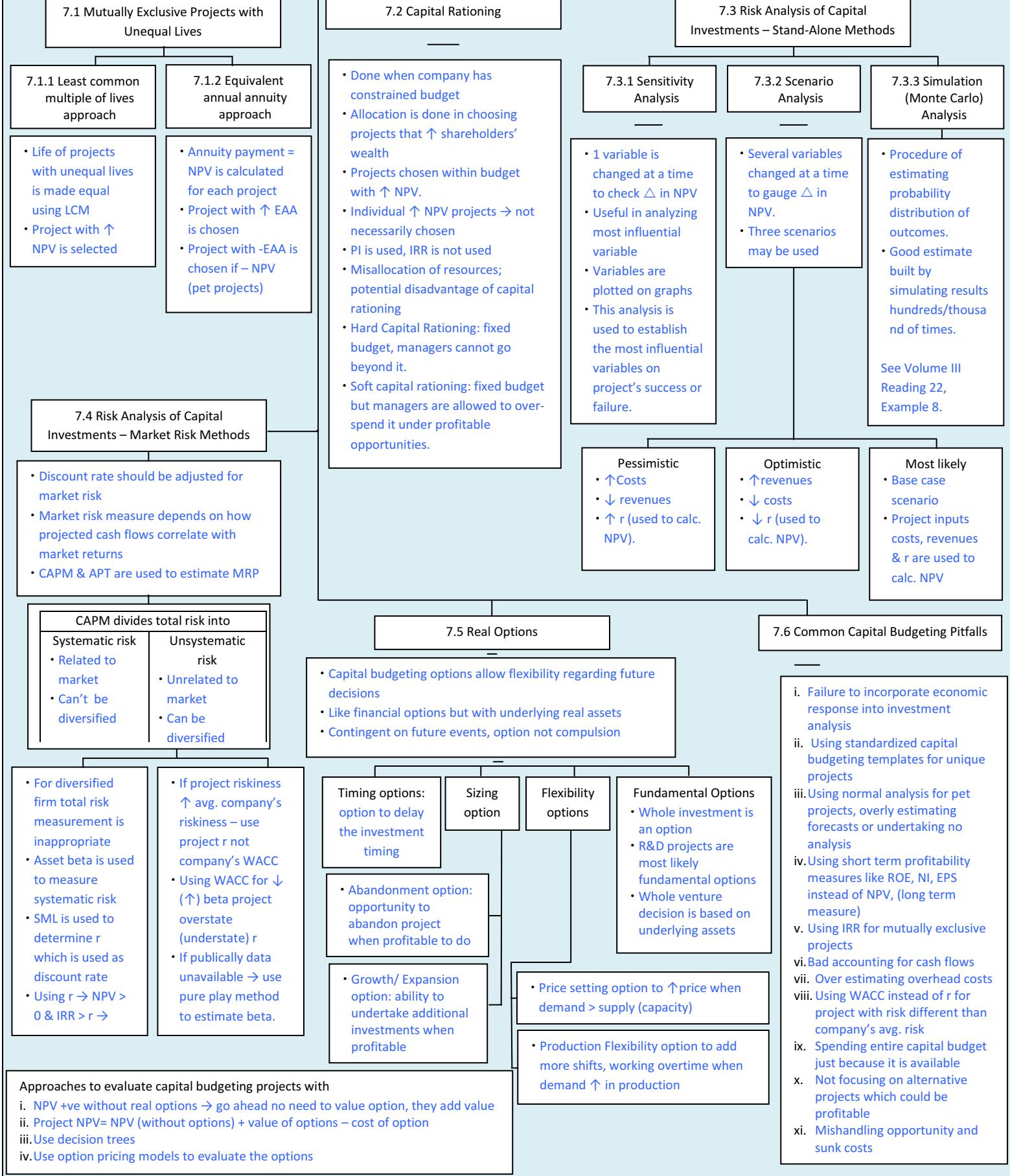
6.3 Spreadsheet Modeling

- Capital budgeting usually done on computers using spreadsheets
- See Volume III, Reading 22, Example 7.

6.4 Effects of Inflation on Capital Budgeting Analysis

- Nominal CF \Rightarrow includes effects of inflation
- Real CF \Rightarrow adjusted \downarrow to remove effects of inflation
- Nominal CFs discounted at nominal discount rate
- Real CFs discounted at real discount rate
- $1 + \text{Nominal rate} = (1 + \text{Real rate})(1 + \text{Inflation rate})$
- With inflation WACC \uparrow , NPV \downarrow , IRR \downarrow
- If inflation $>$ expected \rightarrow profitability \downarrow than expected
- \uparrow inflation \downarrow depreciation tax saving \uparrow wealth transfer from tax payers to government
- Higher than expected inflation, \uparrow wealth transfer from bondholders to issuers
- Unequal effect of inflation on revenues & costs
 - After-tax cash flows will be better or worse depending on how sales outputs and cost inputs are affected.

7. PROJECT ANALYSIS & EVALUATION



8. OTHER INCOME MEASURES & VALUATION MODELS

8.1 The Basic Capital Budgeting Model

See Volume III, Reading 22, Table 28.

8.2 Economic & Accounting Income

- Economic Income = Cash flow + Δ in MV
 Δ in MV = Ending MV – Beg. MV
 Δ in MV is also termed as economic depreciation
- MV at any point in time = PV of future CF
 - Interest is ignored
 - Economic rate of return is used to calculate MV

- Accounting Income
- Measured as Revenue - Expense
 - Depreciation based on original cost not MV
 - Interest is adjusted while calculating it

8.3 Economic Profit, Residual Income & Claims Valuation

8.3.1 Economic Profit

- EP = NOPAT - $\$$ WACC
 - NOPAT = EBIT (1 - TAX)
 - $\$$ WACC = Capital x WACC
- $$NPV = \sum_{t=1}^{\infty} \frac{EP_t}{(1 + r_{WACC})^t}$$
- $$NPV = MVA$$

8.3.2 Residual Income

- $RI_t = NI_t - EC_{t-1}$
 - $EC_t = r \times B_{t-1}$
- $$NPV = \sum_{t=1}^{\infty} \frac{RI_t}{(1 + r_{WACC})^t}$$
- Value of company = Original BV of debt & equity + PV of RI

8.3.3 Claim Valuation

- Estimates value of liabilities / equity claims against assets.
- Value of company = Liabilities value + equity value
- Value of liabilities = PV of interest & principal proceeds at r_d
- Value of equity = PV of cash flows at r_e
- In principal EP, RI and claim valuation results in same valuation
- Only measure value of company

Real world complications

- Pension liability adjustments
- Financial instruments MV
- Gains/losses (exchange rate)
- Adjustments → deferred tax, goodwill, inventories, lease

“CAPITAL STRUCTURE”

WACC	=Weighted Avg. Cost of Capital
r_e	=Marginal Cost of Equity
r_0	=WACC
I	=Interest Cost
B_a	=Asset Beta
B_e	=Equity Beta
B_d	=Debt Beta

1. INTRODUCTION

- Importance of the capital structure decision depends on the assumptions about capital markets & agents operating in them.
- Possible to have an optimal level of debt in capital structure \Rightarrow level of debt where company value is maximized.

D	=Debt Value
E	=Equity Value
V	=Company Value
r_d	=Marginal Cost of Debt
T	=Marginal Tax Rate

2. THE CAPITAL STRUCTURE DECISION

- Capital structure \Rightarrow debt & equity mix company uses to finance its business.
- Goal of capital structure \Rightarrow mix that \uparrow value & \downarrow WACC.
- $$WACC = \left(\frac{D}{V}\right) r_d (1 - t) + \left(\frac{E}{V}\right) r_e$$
- $V = D+E$
- Marginal cost capital \Rightarrow cost of raising additional capital.

2.1 Proposition I without Taxes: Capital Structure Irrelevance

- MM ranged under certain assumption choice of capital structure does not affect company's value.
- Assumption:
 - Investors have homogenous expectation for cash flows
 - No transaction, taxes, bankruptcy costs \Rightarrow perfect capital markets
 - Investors can borrow/lend at risk free rate
 - No agency costs \Rightarrow mergers always act to \uparrow shareholders wealth
 - Financing & investing decisions \Rightarrow independent of each other
- Value of company levered (V_L) = value of company unlevered (V_u).
- WACC unaffected by capital structure
- Value of company \Rightarrow solely determined through cash flows.
- $$V_u = V_L = \frac{EBIT}{WACC}$$

2.2 Proposition II without Taxes: Higher Financial Leverage Raises the Cost of Equity

- The cost of equity is a linear function of the company's debt/equity ratio.
- Company \uparrow debt $\Rightarrow r_e \uparrow$ linearly, r_d & WACC remains constant.
- Assumptions:
 - No financial distress costs
 - Cost of debt $<$ cost of equity
- Business risk \Rightarrow determines cost of capital.
- Financial risk \Rightarrow determined by capital structure.
- $$WACC (\text{ignoring taxes}) = \left(\frac{D}{V} \times r_d\right) + \left(\frac{E}{V} \times r_e\right)$$
- $$r_e = r_0 + (r_0 - r_d) \times \frac{D}{E}$$
 - Cost of equity \Rightarrow linear function of D/E ratio.
- Company's asset beta = weighted avg of debt & equity beta
- $$B_a = \left(\frac{D}{V}\right) B_d + \left(\frac{E}{V}\right) B_e$$
- \uparrow debt ratio $\Rightarrow \uparrow B_e$

2.3 Taxes, the Cost of Capital, and the Value of the Company

- After tax $r_d = r_d \times (1 - T)$
- Factors affecting value of levered company
 - Tax issues.
 - Cost of financial distress.
 - Agency costs.
 - Asymmetric information.
- Debt adds value to company depending on:
 - Corporate tax rate.
 - Personal tax rate on interest income.
 - Personal tax rate on dividend income.
- Personal tax rate in interest income > personal tax rate on dividends $\Rightarrow \uparrow r_d, \downarrow$ company's value.

MM Proposition I: with taxes

MM Proposition II: with taxes

- Company's value maximum at 100% debt.

$$V_L = V_u + (t \times D)$$

$$V_u = \frac{EBIT(1-t)}{WACC}$$

debt-tax shield = $t \times D$

$$V = D + E$$

$$V_L = E + D \rightarrow V_L$$

$$= [(EBIT - I)(1 - t) / r_e] + (I / r_D)$$

- Assumption:

- No financial distress cost.
- No bankruptcy cost.

- WACC \downarrow at 100% debt $r_e = r_0 + (r_0 - r_d)(1 - t) \frac{D}{E}$

- WACC of levered company < WACC of unlevered.

- WACC (with taxes) $\frac{D}{V} r_a(1 - t) + \frac{E}{V} r_e$

- $r_e \uparrow$ as $D \uparrow$ but not as fast as with no-tax case.

2.4 Costs of Financial Distress

- Cost associated with company's financial distress \uparrow uncertainty of meeting debt obligations.

- Financial distress cost.
 - Actual bankruptcy & financial distress cost.
 - Probability of occurrence of financial distress & bankruptcy.

- Direct cost of financial distress \Rightarrow legal & admin fee, actual cash expense.

- Indirect cost of financial distress \Rightarrow impaired ability to conduct business, customers loss etc.

- Companies with assets having a ready secondary market $\Rightarrow \downarrow$ financial distress cost.

- Companies with intangible assets $\Rightarrow \uparrow$ financial distress cost.

- \uparrow probability of bankruptcy:
 - \uparrow Financial leverage.
 - \uparrow Business risk.
 - \downarrow Management quality.

- \uparrow Financial distress (expected) \downarrow preferred debt level in capital structure.

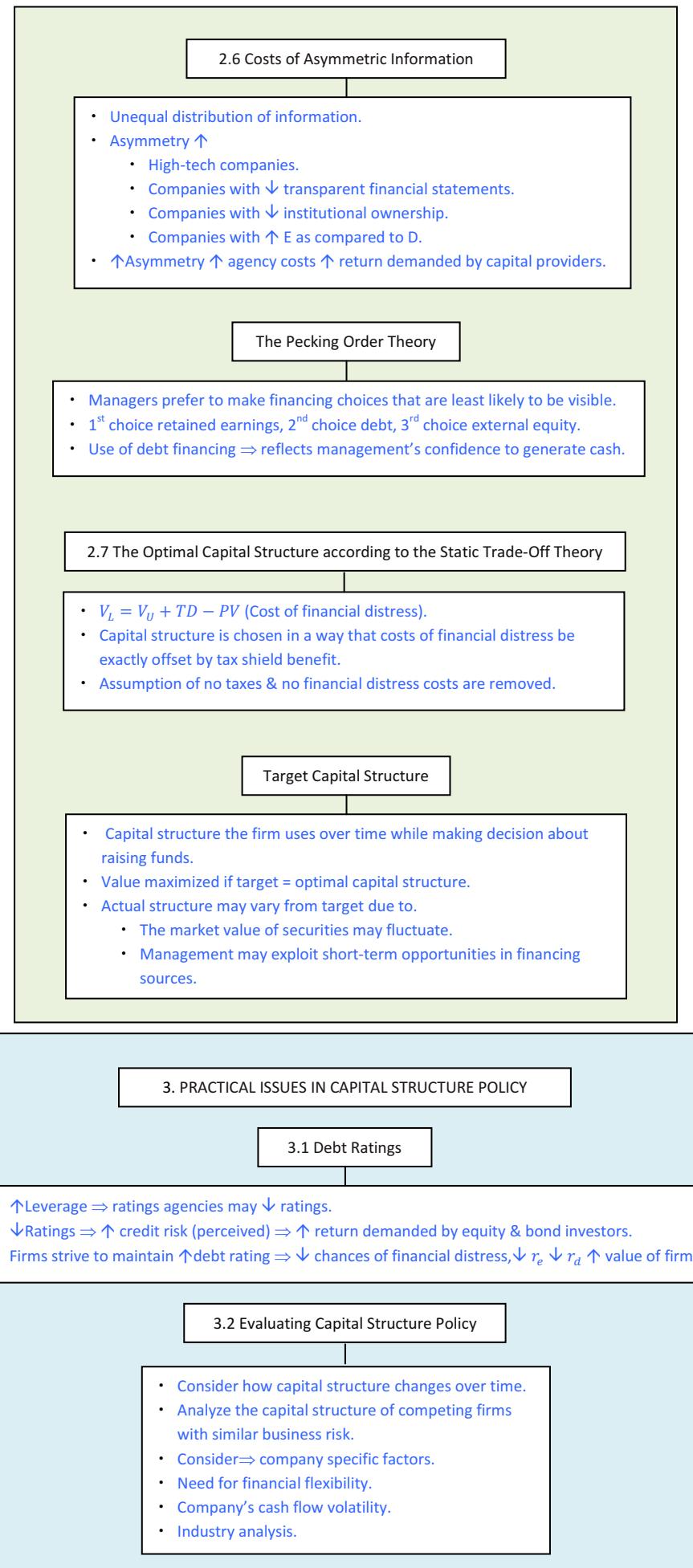
2.5 Agency Costs

- Conflict of interest b/w management & providers of capital.

- Comprise of:
 - Monitoring cost: borne by owners to monitor managers.
 - Bonding cost: cost to align their interest with organization.
 - Residual loss: costs incurred despite sufficient bonding & monitoring.

- \uparrow Corporate governance \downarrow agency costs.

- \uparrow Debt in capital structure \downarrow agency cost.



3.3 Leverage in an International Setting

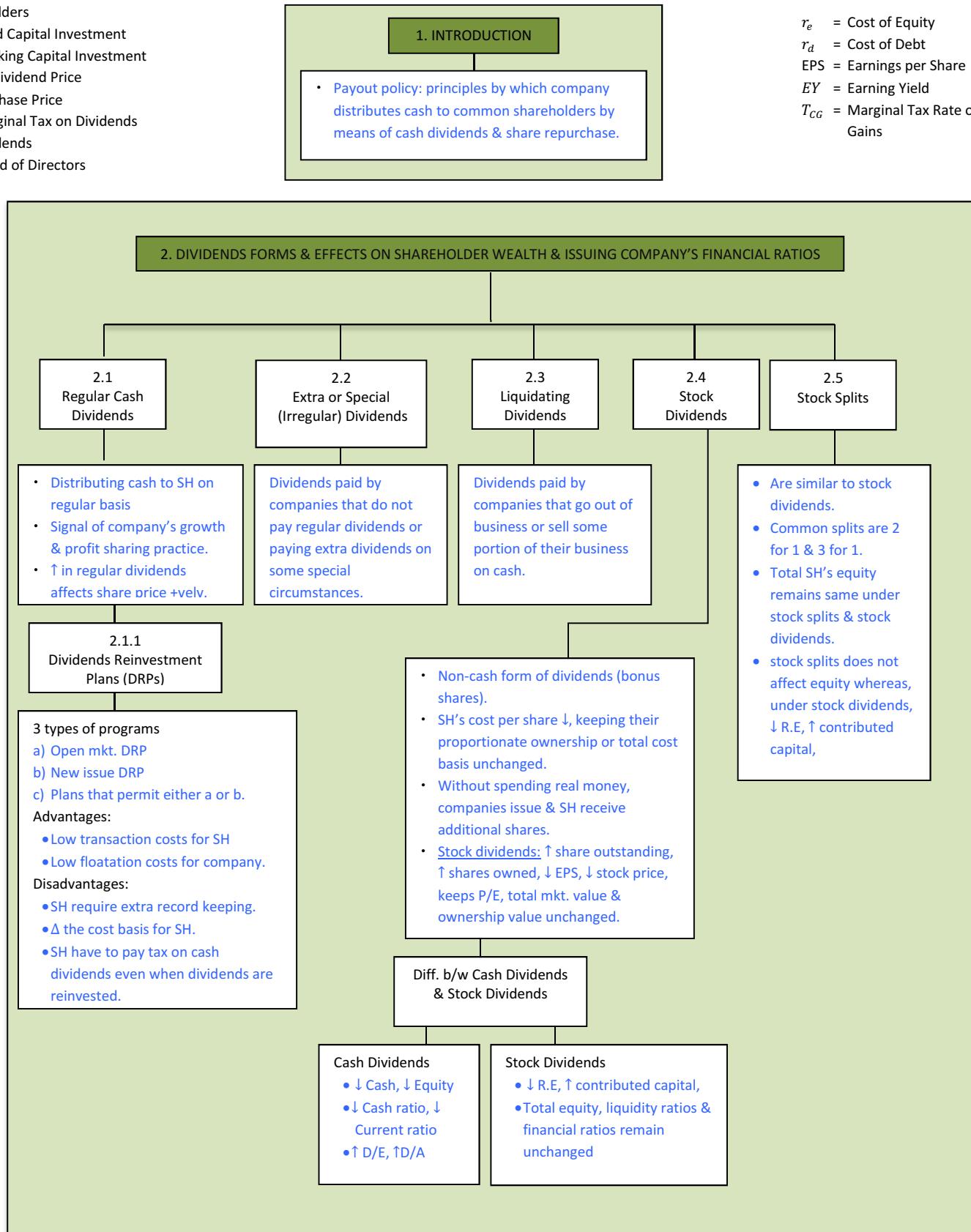
- Capital structure of a company depends upon \Rightarrow quality of assets profitability, chance of bankruptcy, growth opportunities & company's industry affiliations.
- Financial leverage across countries differ by \Rightarrow traditions, regulations, tax policies.
- While doing cross country comparison consider macroeconomic factors, environmental issues, financing & banking sector, institutional & legal environment.

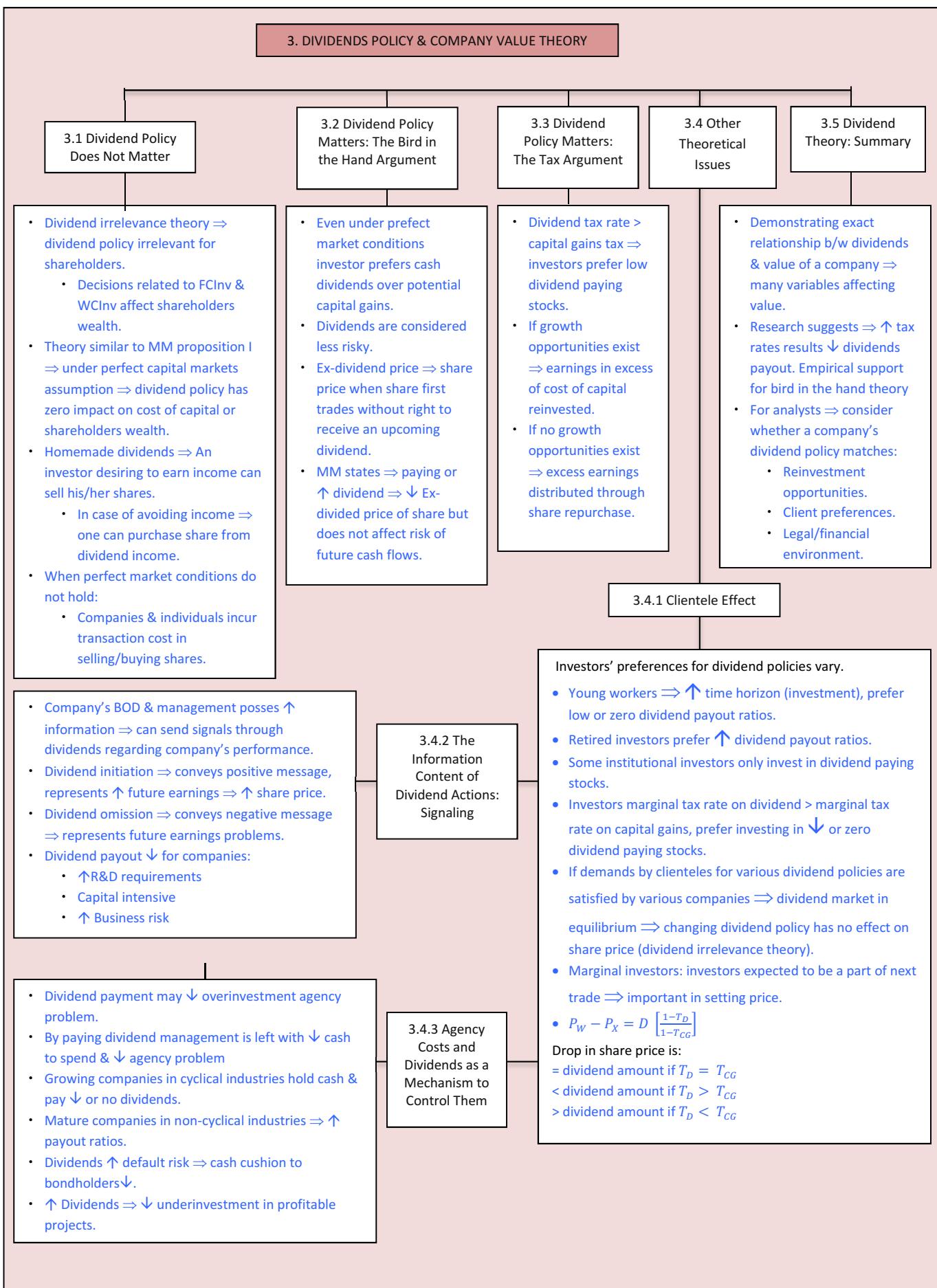
- Institutional framework
 \downarrow D/E ratio & larger debt if \Rightarrow \uparrow efficient law & legal system, \uparrow auditors & analysts, taxes favoring equity.
- Banking systems. Financial markets.
Longer debt maturity if active bond & stock market
Large institutional investors \downarrow D/E ratio
 \uparrow D/E if bank-based financial system.
- Macroeconomic environment.
 \uparrow Inflation \Rightarrow \downarrow D/E, shorter maturity debt.
 \uparrow GDP growth \Rightarrow \downarrow D/E, longer maturity debt.

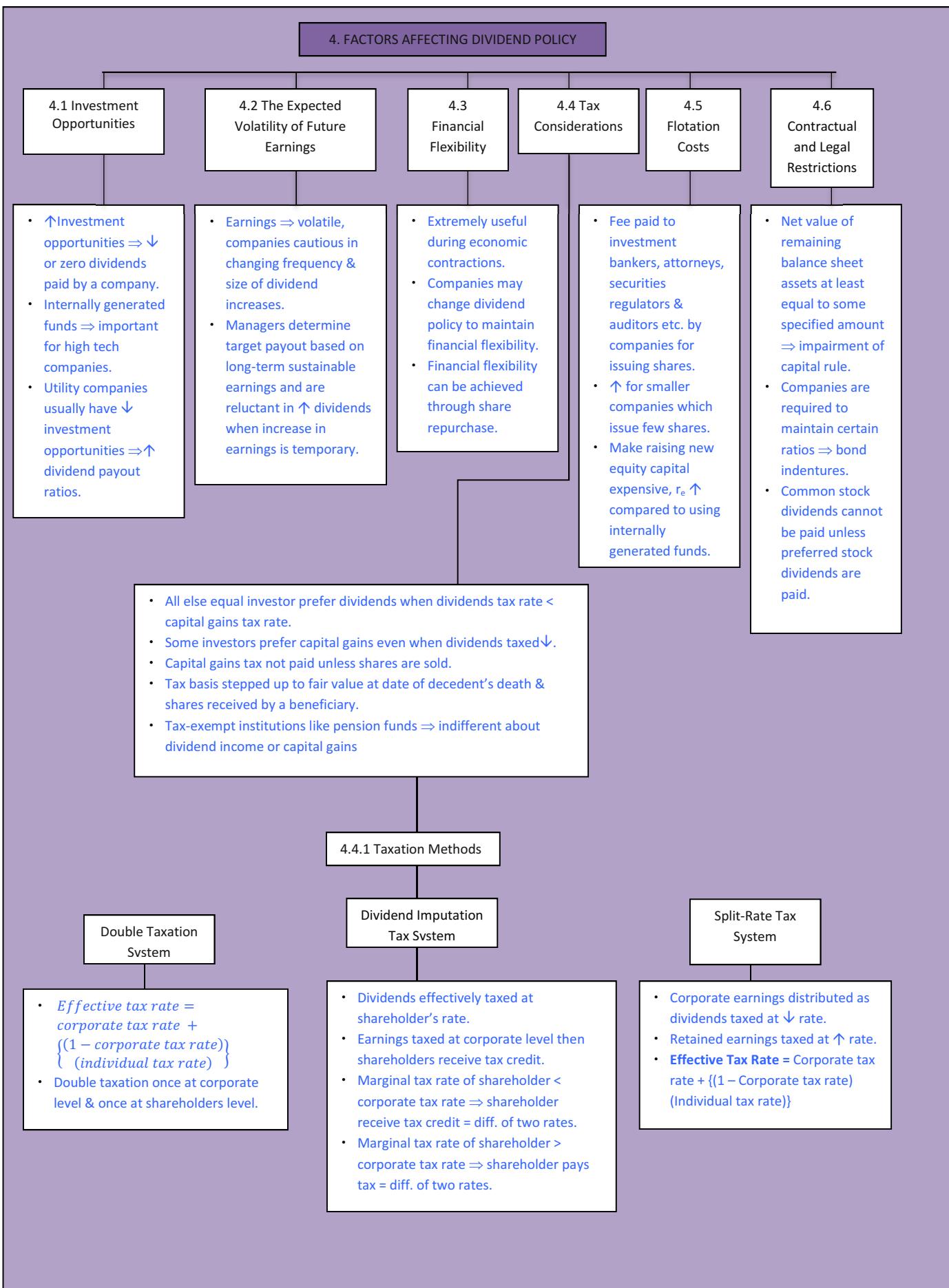
“DIVIDENDS AND SHARE REPURCHASES: ANALYSIS”

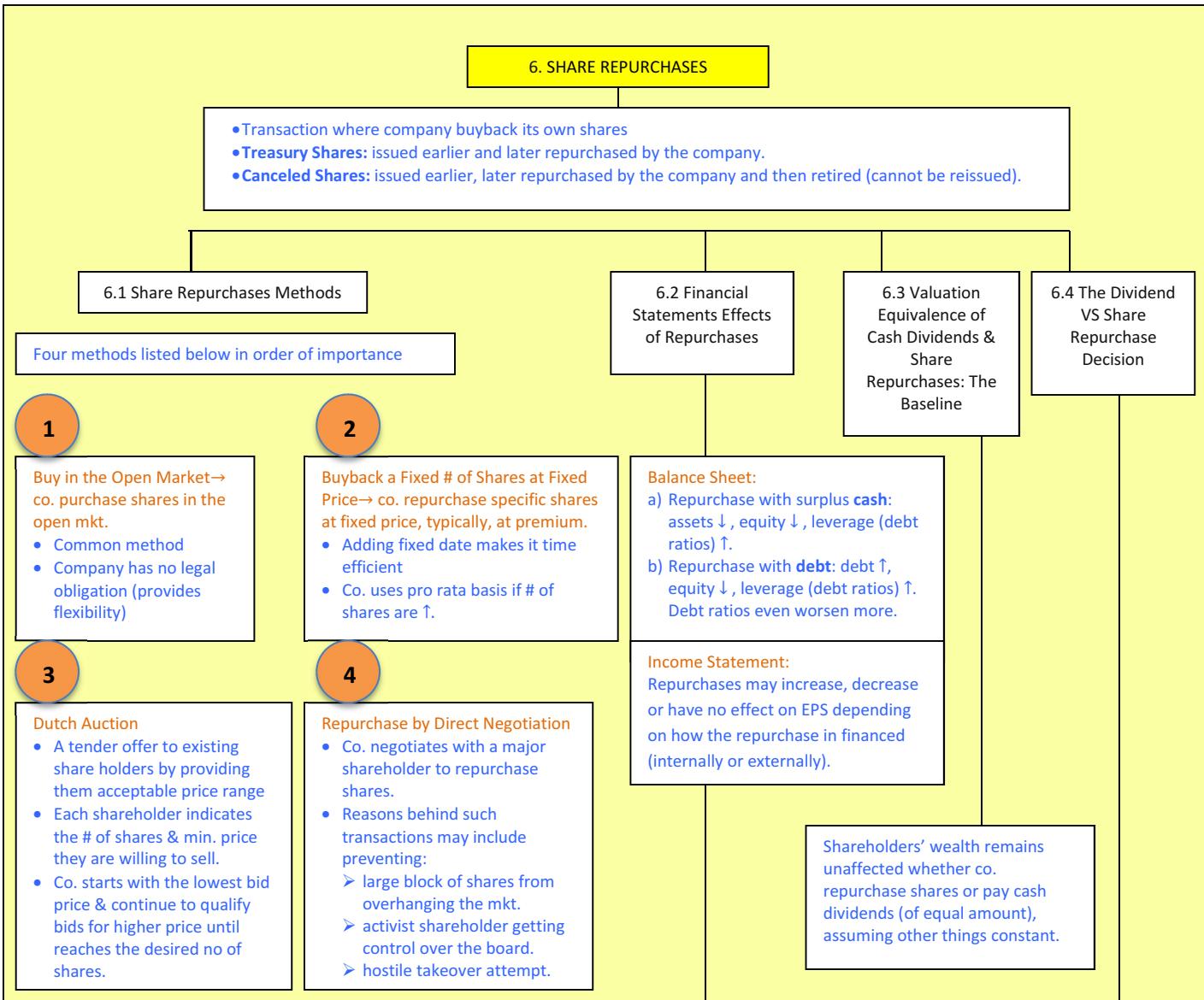
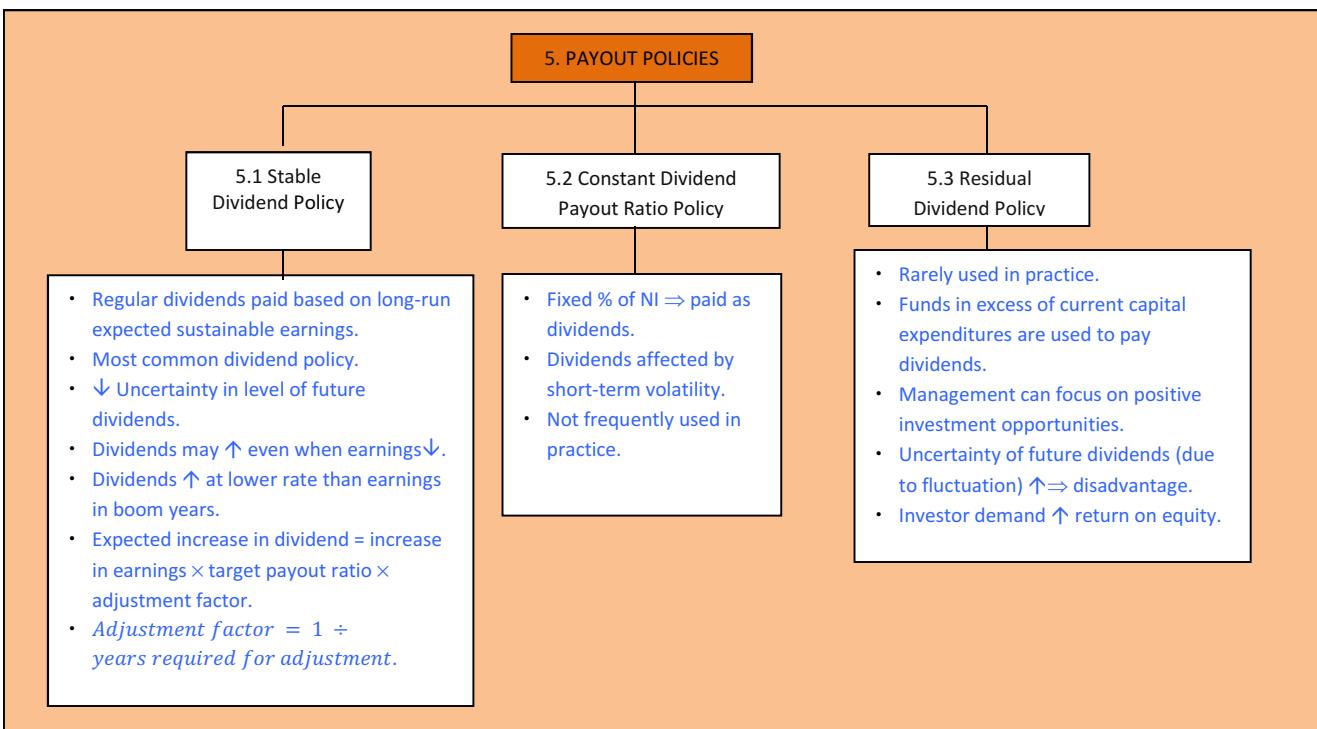
SH = Shareholders
 FCInv = Fixed Capital Investment
 WCInv = Working Capital Investment
 P_X = EX-Dividend Price
 P_b = Purchase Price
 T_D = Marginal Tax on Dividends
 D = Dividends
 BOD = Board of Directors

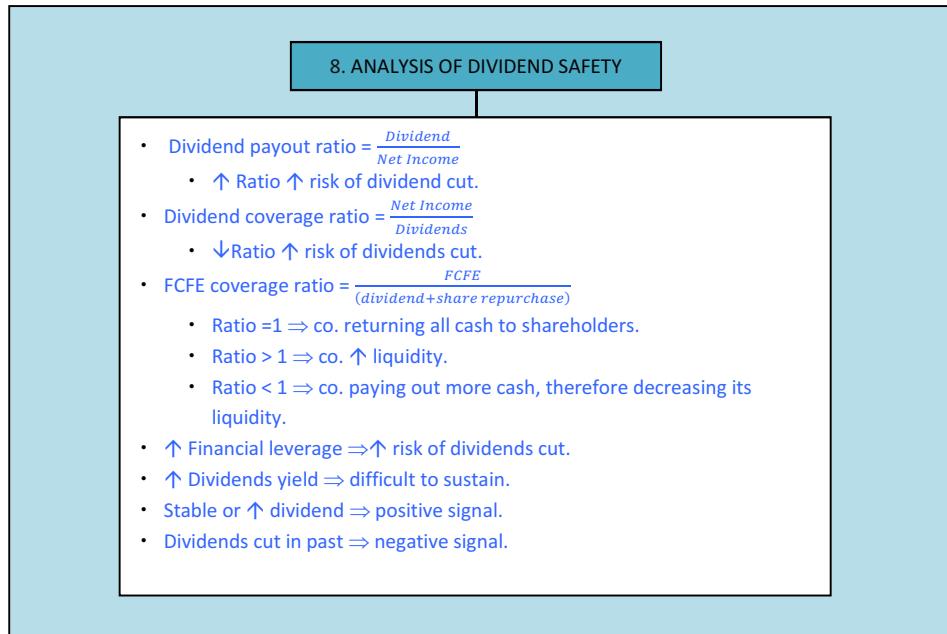
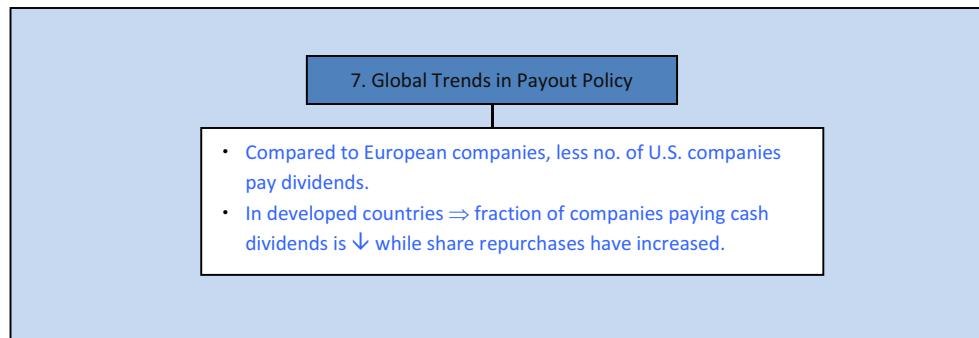
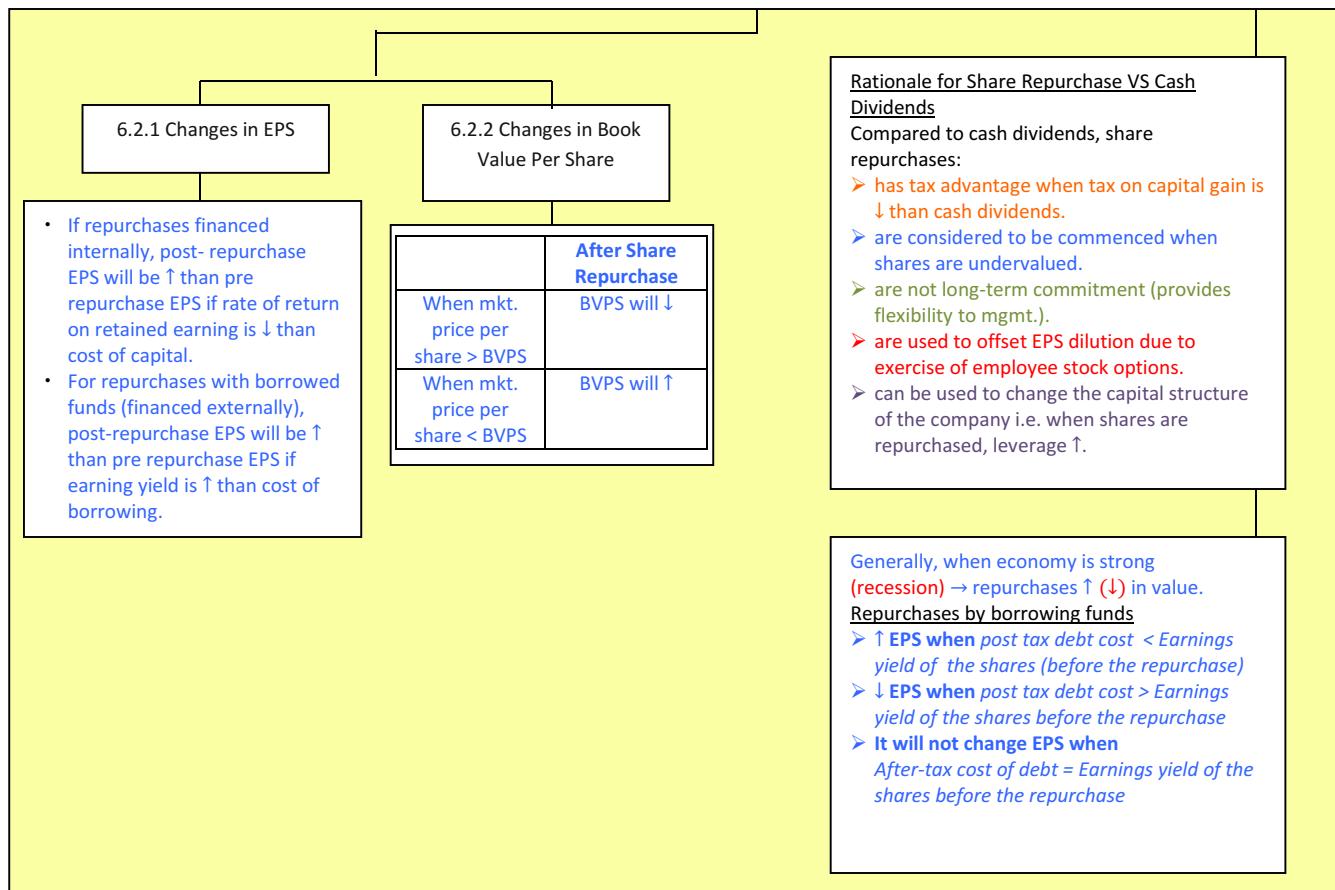
r_e = Cost of Equity
 r_d = Cost of Debt
 EPS = Earnings per Share
 EY = Earning Yield
 T_{CG} = Marginal Tax Rate on Capital Gains











“DIVIDENDS AND SHARE REPURCHASES: ANALYSIS”

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1. INTRODUCTION

- Payout policy: principles by which company distributes cash to common shareholders by means of cash dividends & share repurchase.

2. DIVIDENDS FORMS & EFFECTS ON SHAREHOLDER WEALTH & ISSUING COMPANY'S FINANCIAL RATIOS

2.1 Regular Cash Dividends

- Distributing cash to SH on regular basis
- Signal of company's growth & profit sharing practice.
- ↑ in regular dividends affects share price +vely.

2.1.1 Dividends Reinvestment Plans (DRPs)

3 types of programs

- Open mkt. DRP
- New issue DRP
- Plans that permit either a or b.

Advantages:

- Low transaction costs for SH
- Low floatation costs for company.

Disadvantages:

- SH require extra record keeping.
- Δ the cost basis for SH.
- SH have to pay tax on cash dividends even when dividends are reinvested.

2.2 Extra or Special (Irregular) Dividends

- Dividends paid by companies that do not pay regular dividends or paying extra dividends on some special circumstances.

2.3 Liquidating Dividends

- Dividends paid by companies that go out of business or sell some portion of their business on cash.

2.4 Stock Dividends

- Are similar to stock dividends.
- Common splits are 2 for 1 & 3 for 1.
- Total SH's equity remains same under stock splits & stock dividends.
- stock splits does not affect equity whereas, under stock dividends, ↓ R.E, ↑ contributed capital,

2.5 Stock Splits

- Non-cash form of dividends (bonus shares).
- SH's cost per share ↓, keeping their proportionate ownership or total cost basis unchanged.
- Without spending real money, companies issue & SH receive additional shares.
- Stock dividends: ↑ share outstanding, ↑ shares owned, ↓ EPS, ↓ stock price, keeps P/E, total mkt. value & ownership value unchanged.

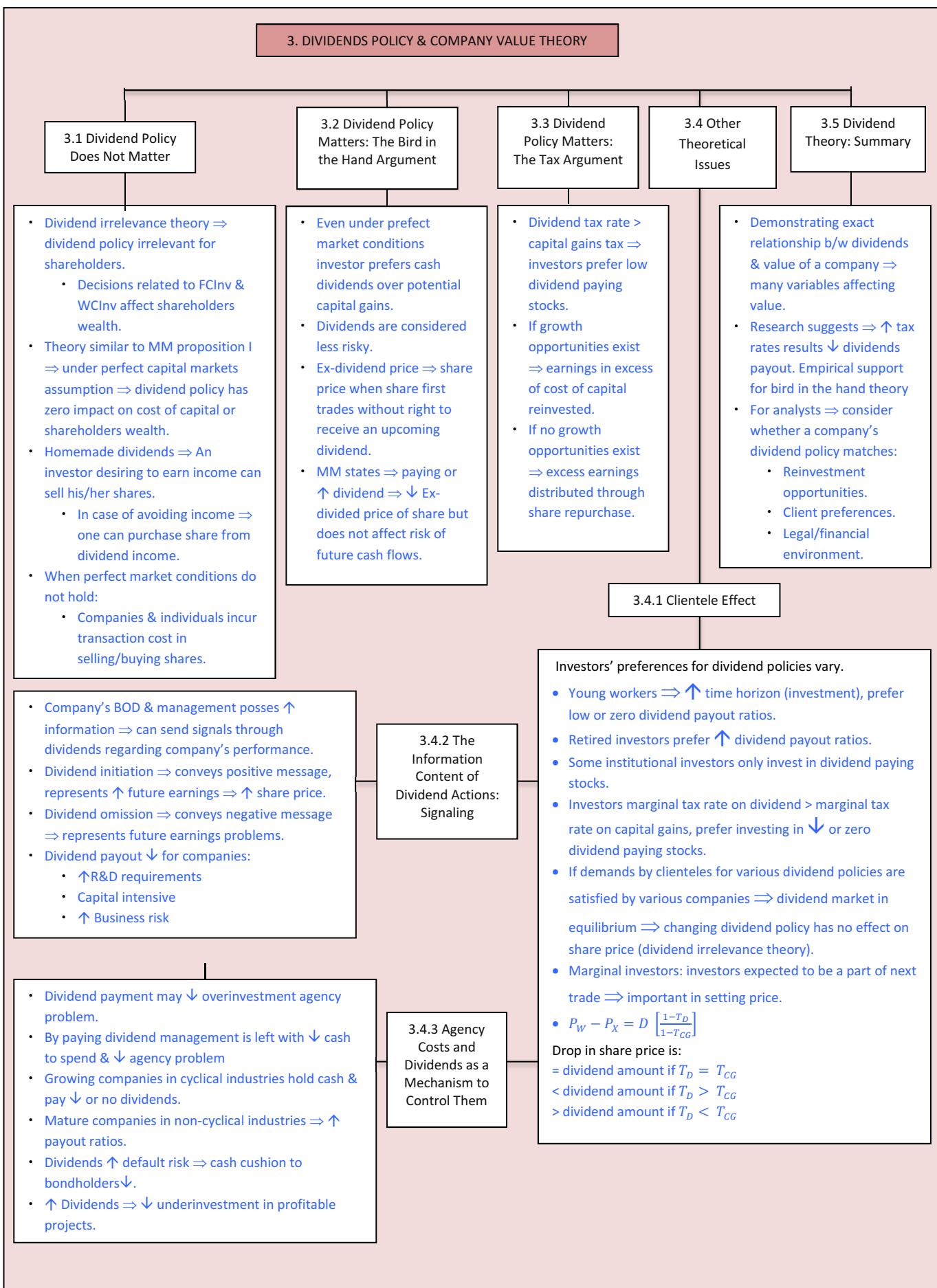
Diff. b/w Cash Dividends & Stock Dividends

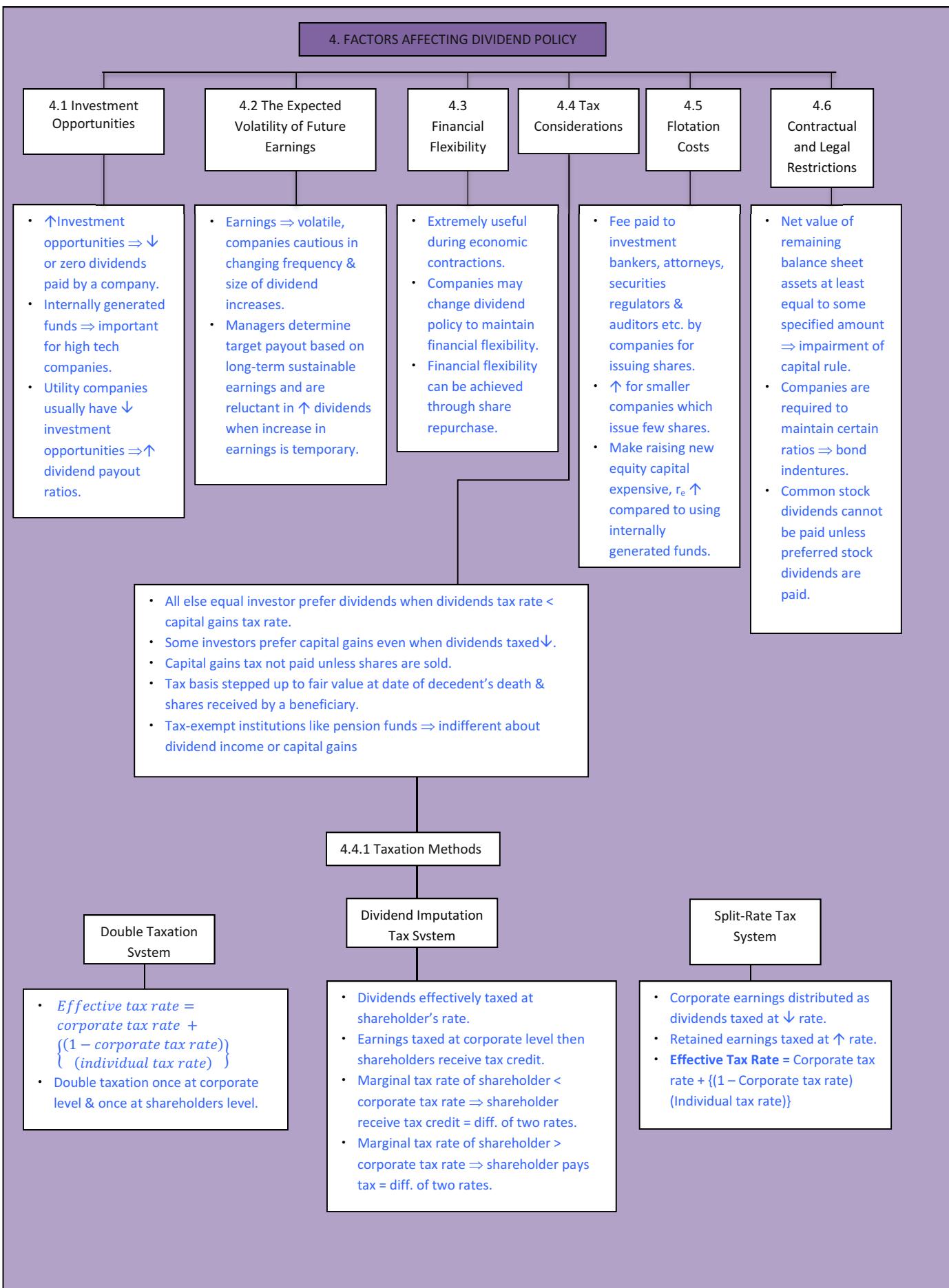
Cash Dividends

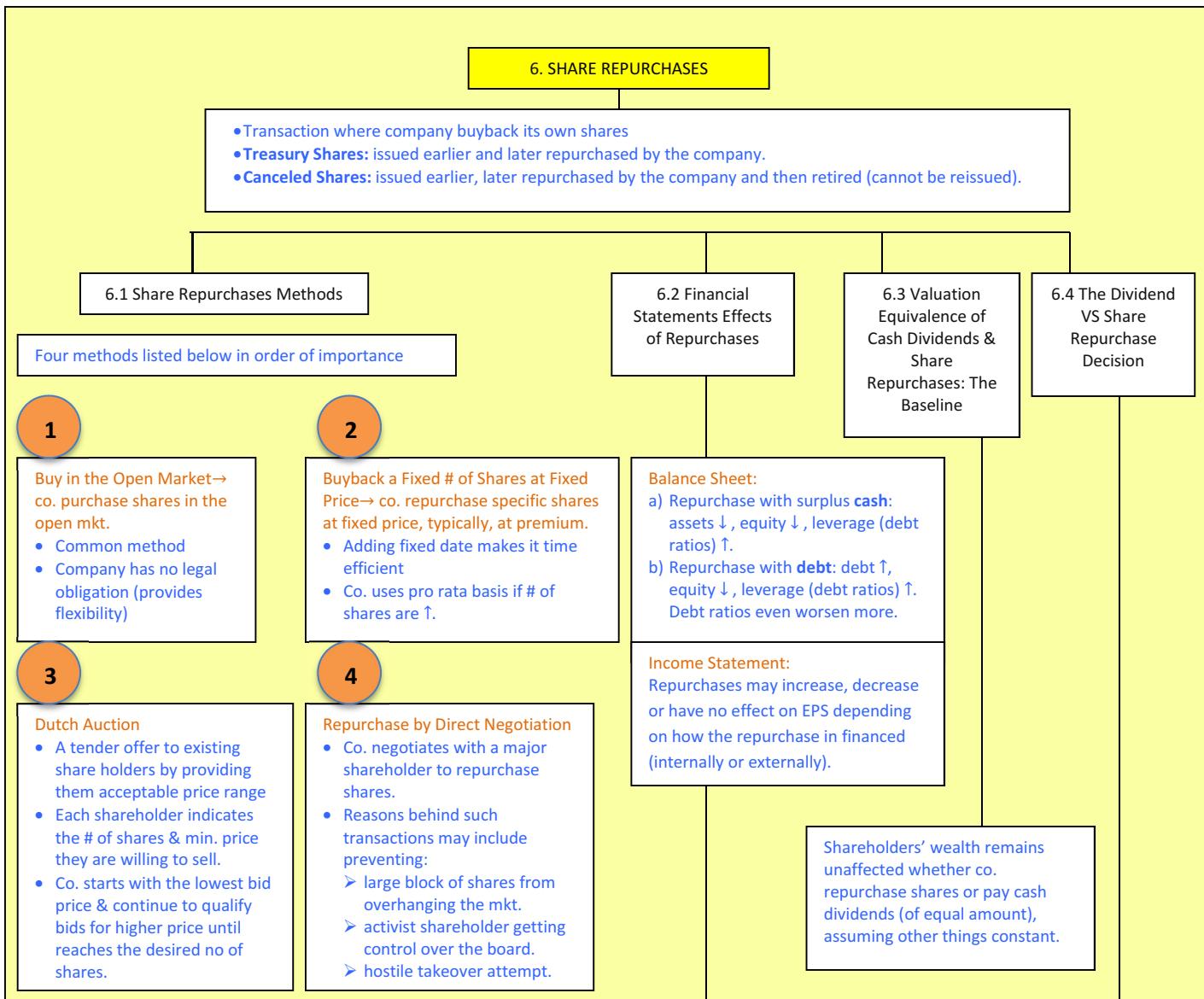
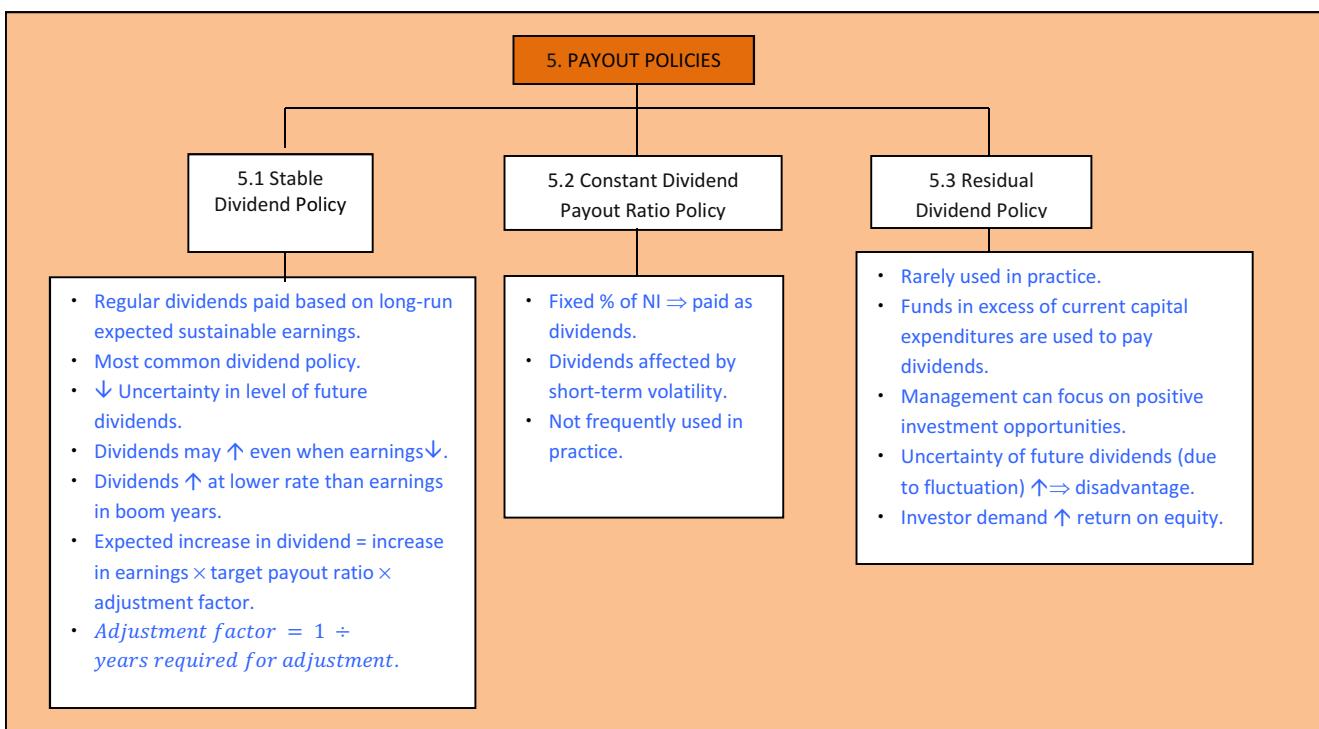
- ↓ Cash, ↓ Equity
- ↓ Cash ratio, ↓ Current ratio
- ↑ D/E, ↑ D/A

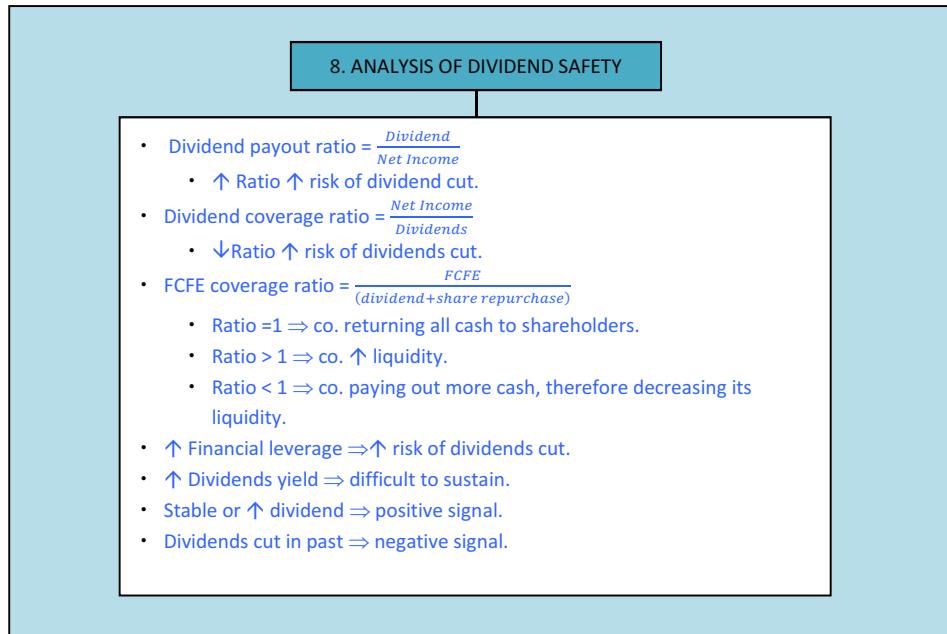
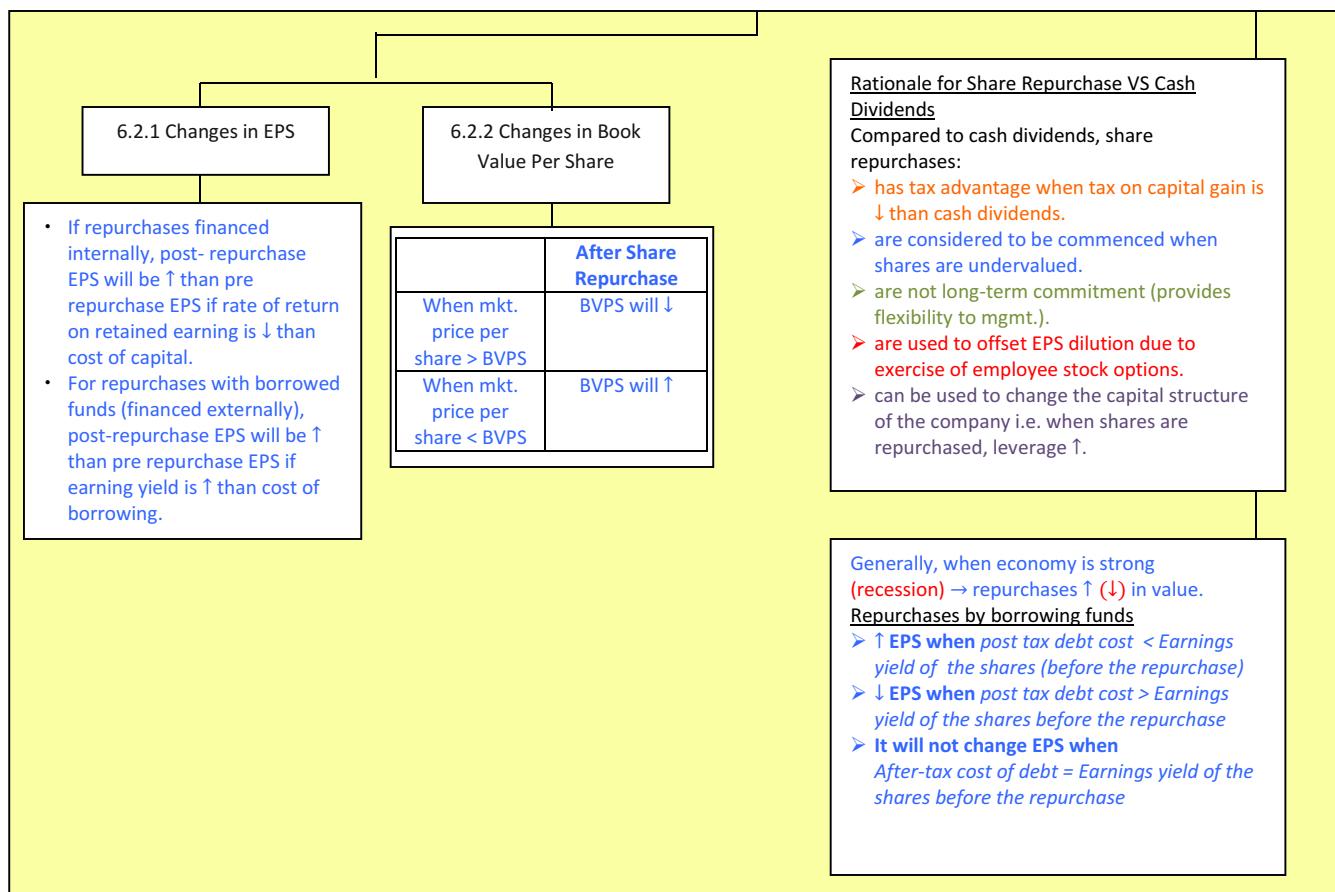
Stock Dividends

- ↓ R.E, ↑ contributed capital,
- Total equity, liquidity ratios & financial ratios remain unchanged









“CORPORATE PERFORMANCE, GOVERNANCE, AND BUSINESS ETHICS”

Stakeholders and Corporate Performance

- Stakeholders ⇒ **individual or groups with an interest, claim or stake in the company.**
- Internal stakeholders' ⇒ **stockholders & employees.**
- External stakeholders ⇒ **all other individuals & groups that have some claim on the company.**
- Exchange relationship exists b/w the company & all stakeholders.
- Stakeholders may withdraw their support if a company fails to account for their claims when formulating strategies.

Stakeholder Impact Analysis

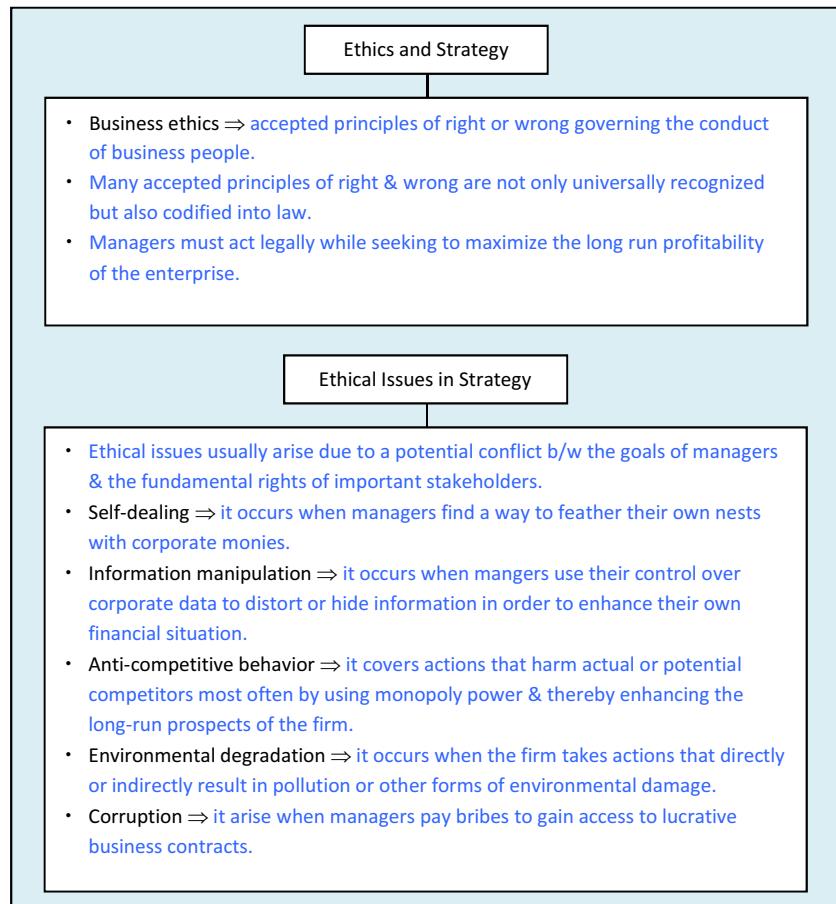
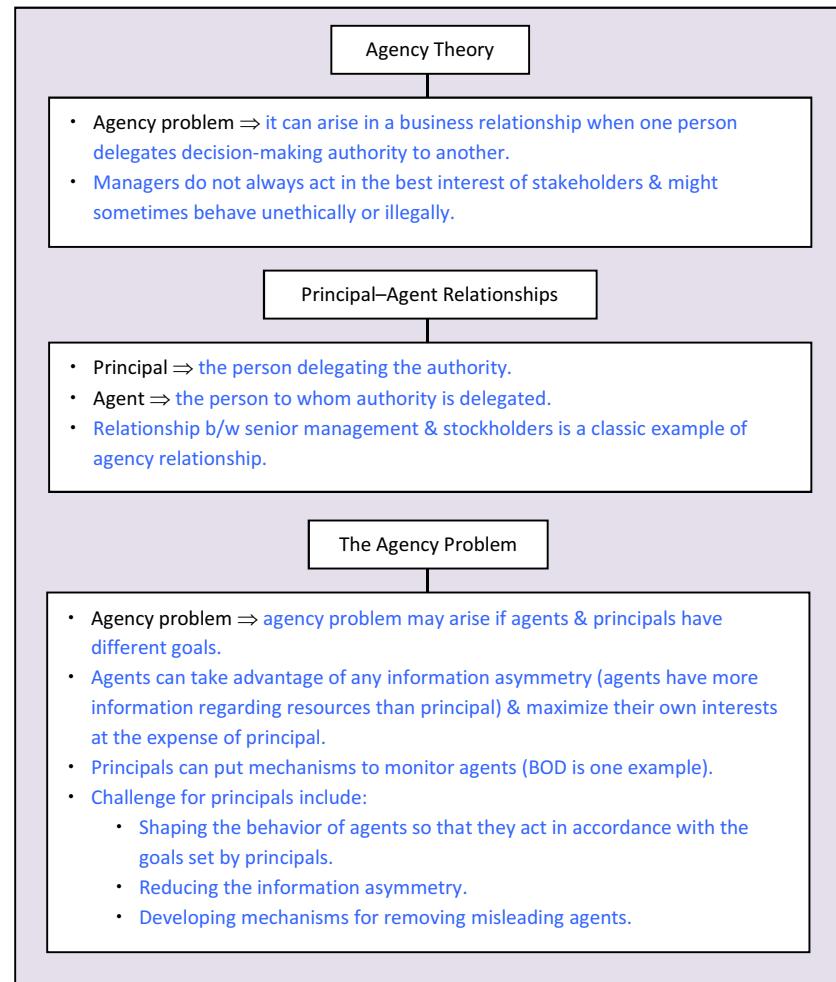
- Company may face conflict of interest issue when satisfying the claims of all stakeholders.
- Stakeholders impact analysis follows these steps:
 - Identify stakeholders.
 - Identify stakeholders' interest & concerns.
 - Resultantly, identify the claims of stakeholders on the organization.
 - Identify most important stakeholders from organization's perspective.
 - Identify the resulting strategic challenges.

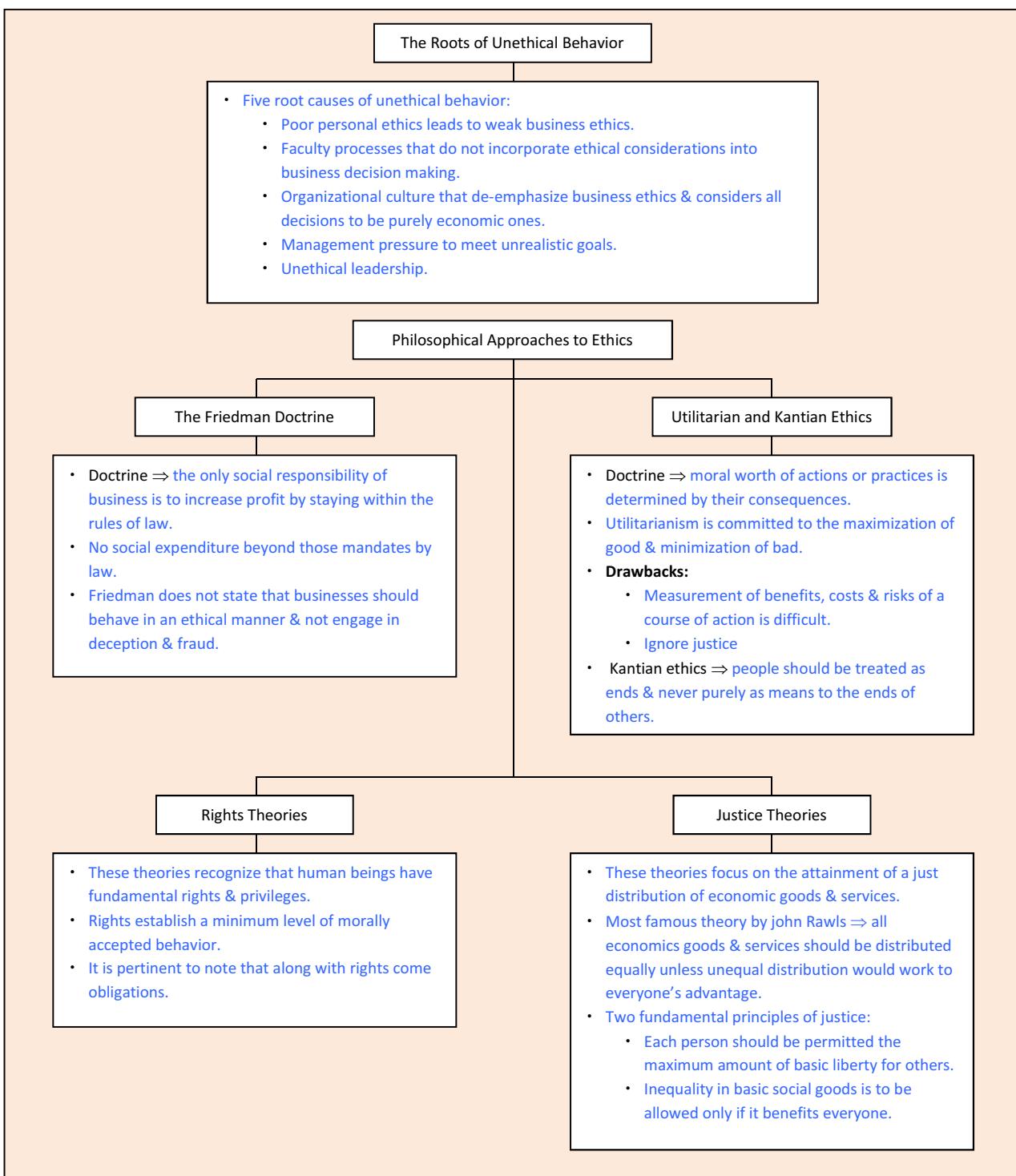
The Unique Role of Stockholders

- Stockholders are legal owners & the providers of risk capital. That's why they are usually put in a different class from other stakeholder groups.
- Management is obligated to pursue strategies that maximize the return in order to reward stockholders for providing the company with risk capital.

Profitability, Profit Growth, and Stakeholder Claims

- **Forms of stockholders return:**
 - Dividend
 - Capital appreciation
- **Return on invested capital (ROIC)** ⇒ It tells managers the resources of company
- **Too much emphasis on current profitability at the expense of future profitability** can make an enterprise less attractive to shareholders.
- **Claims of other stakeholders** must also be taken into account when maximizing return to stockholders.
- **Abiding of law & societal expectations** must also be taken care of when maximizing long-run profitability.





“CORPORATE GOVERNANCE”

BOD = Board of Directors
 ESG = Environmental, Social, Governance

MV = Market Value
 CGS = Corporate Governance Systems

1. INTRODUCTION

- Corporate governance is the system of, principles, policies, procedures & clearly defined responsibilities.
- Used by stakeholders to overcome conflicts of interest inherent in the corporate form.

2. CORPORATE GOVERNANCE: OBJECTIVES AND GUIDING PRINCIPLES

Corporate Governance Objectives

- Eliminate or ↓ conflict of interest b/w shareholders & management.
- Ensure a company's asset used in best interest of stakeholders & investors.

Effective Corporate Governance System: Core Attributes

- Delineation of rights of shareholders & other stakeholders.
- Clearly defined responsibilities of manager & directors to stakeholders.
- Accountability for performance of responsibilities clearly identifiable & measureable.
- Fairness & equitable treatment in dealings between managers, directors & shareholders.
- Complete transparency & accuracy in disclosures regarding risk, financial position, operations & performance.

3. FORMS OF BUSINESS AND CONFLICTS OF INTEREST

TABLE 1 Comparison of Characteristics of Business Forms

Characteristic	Sole Proprietorship	Partnership	Corporation
Ownership	Sole owner	Multiple owners	Unlimited ownership
Legal requirements and regulation	Few; entity easily formed	Few; entity easily formed	Numerous legal requirements
Legal distinction between owner and business	None	None	Legal separation between owners and business
Liability	Unlimited	Unlimited but shared among partners	Limited
Ability to raise capital	Very limited	Limited	Nearly unlimited
Transferability of ownership	Non-transferable (except by sale of entire business)	Non-transferable	Easily transferable
Owner expertise in business	Essential	Essential	Unnecessary

Source: Level II, Volume III, Reading 27, Table 1.

4. SPECIFIC SOURCES OF CONFLICT: AGENCY RELATIONSHIPS

4.1 Manager-Shareholder Conflicts

- Managers can:
 - Invest in projects which benefit them & not the shareholders.
 - May become extremely-risk averse or risk takers at instances to protect their interests.
 - May utilize funds to increase company's size contrary to shareholders' interest.
 - May grant themselves excessive compensation & perquisites that are treated as ordinary business expenses.

4.2 Director-Shareholder Conflicts

- BOD responsible for:
 - Acting as intermediary b/w shareholders & management.
 - Monitoring activities of managers & approve strategies & policies which are in the best interest of shareholders.
 - Approving mergers & acquisitions.
 - Approving audit contracts.
 - Reviewing audit & financial statements.
 - Setting managers' compensation.
 - Disciplining or replacing poorly performing managers.
- When board acts in favor of management \Rightarrow conflict occurs.
- Board not considered independent when
 - Board members have consulting agreement with company.
 - Board members are major lenders to the firm.
 - Board members in family circle of management.
 - Overly excessive compensation paid to directors.
 - One/more senior managers serve as a director in the company of their own board members.

5. CORPORATE GOVERNANCE EVALUATION

5.1 The Board of Directors

Responsibilities

- Ensure management work in the best interest of shareholders \Rightarrow primary objective.
- Establish values to ensure business is conducted in an ethical, fair, competent & professional manner.
- Ensure firm complies with legal & regulatory requirements on a timely manner.
- Establish long-term strategic objectives with goal that shareholders' best interests come first.
- Defining responsibilities of managers, establish system of accountability & performance measurement.
- Hire CEO, determine appropriate compensation packages & periodic evaluation of performance.
- Ensure board receives sufficient info to make timely & informed decisions.
- Meet regularly & arrange extraordinary sessions if necessary. Have adequate training to be able to perform their duties.

Characteristics

1. Independence: at least the majority (75%) should be independent.
2. Experience: appropriate & relevant expertise to the business.

Objectives

- To ensure company's assets used in best-long-term interests of shareholders.
- To ensure management's policies, plans & practices designed to achieve objective.

5.1.1 Board Composition and Independence

- At least 75% of board members should be independent.
- Factors indicating lack of independence.
 - Former employment with the company.
 - Any business relation.
 - Business interests of board members.
 - Personal relationships
 - Interlocking directorships.
 - Ongoing banking or other credit relationships.

5.1.2 Independent Chairman of the Board

- CEO & Board chairman, if same person, can adversely affect corporate governance practices & impair independence of the board.
- Unitary board system: single board of directors.
- Tiered hierarchy of boards: comprise of management & supervisory board.
 - Management board ⇒ oversees management strategy etc.
 - Supervisory board ⇒ monitoring & reviewing management's decisions, & making decisions where conflict of interest in management board impairs independence.

5.1.3 Qualifications of Directors

- BOD must possess adequate skills to perform their duties.
- At least they should be.
 - Independent.
 - Possess relevant expertise in the industry.
 - Know about principal technologies.
 - Be aware of financial operations.
 - Understand legal matters.
 - Accounting & auditing.
 - Indicate ethical soundness.
 - Possess experience in strategic planning & risk management.
 - Board experience with companies with sound governance practices.
 - Not serve on more than a few boards simultaneously.
 - Excellent attendance record.
 - Limit other business commitments that require ↑ time.
 - Committed to investors' needs.

5.1.4 Annual Election of Directors

- Annual elections compared to staggered elections ⇒ global corporate governance best practice.
- Annual basis ⇒ each member is elected every year.
- Staggered basis ⇒ only a portion of BOD is elected every year.
- Information regarding directors' terms and election frequency found in regulatory filings.

5.1.5 Annual Board Self-Assessment

- At least once on annual basis assessment of board must be done.
- Board carries out its own assessment.
- Review should include ⇒ an assessment of board's effectiveness.
 - Individual members' evaluation performance.
 - Assessment on boards' committees.
 - Assessment of board's effectiveness in overseeing their functions.
 - Evaluation of board's current qualities vs. required future qualities.
 - A report on board self assessment.
- Self assessment helps ↑ board & company performance.
- Enables directors to ↑ their understanding of role.
- ↑ Communication b/w board members.
- ↑ Board Cohesiveness.

5.1.6 Separate Sessions of Independent Directors

- Independent members (board) must meet separately at least annually & preferably quarterly, without management's presence.
- If separate meetings done infrequently → it may signal board is not working in the best interest of the shareholders.

5.1.7 Audit Committee and Audit Oversight

Functions

- Independent oversight of company's financial reporting.
- Evaluation of internal controls & compliance systems of the company.
- Provide independent oversight of the company's non-financial disclosures.

Characteristics of Audit Committee

- Consist of only independent directors.
- At least two members shall have relevant accounting & auditing experience.
- Committee must have sufficient expertise in financial, accounting, auditing & legal matters.
- Oversee internal audit function.
- Internal audit staff to report directly to committee.
- Have sufficient resources.
- Authority of investigations.
- Authorized to hire external auditor.
- Meet auditors independently at least annually.
- Full authority to review audited financial statements.

5.1.8 Nominating Committee

- Comprise of only independent directors.
- Establish criteria for nominations.
- Identify candidates for board & committee.
- Establish criteria for nominees for senior management positions in the company.
- Review qualification of nominees of board & of individual committees.
- Identify candidates for management positions.
- Review nominee's qualifications.
- Documentation of the reasons for the selection of candidates.

5.1.9 Compensation Committee

- Compensation should include incentives to meet long term goals.
- Compensation should act as a tool to attract, retain & motivate highest quality & most experienced managers for the company.
- Compensation should not be excessive.
- Salary should constitute ↓ portion of the total compensation.
- Bonuses should be based on exceeding expected performance.
- Grants of stock options subject to shareholders' approval.
- $$\text{share overhang} = \frac{\text{share represented by options}}{\text{total stock outstanding}}$$
- Re-pricing of stock options ⇒ not considered in best interest of shareholders.

5.1.10 Board's Independent Legal and Expert Counsel

- BOD ⇒ possess ability & resources to hire independent counsel ⇒ best practice.

5.1.11 Statement of Governance Policies

- Companies with strong commitment to GG supply statement of corporate governance policies in regulatory filing or on websites.
- Statement comprise of:
 - Code of ethics.
 - Statement of oversight, monitoring & review responsibilities of directors.
 - Management performance assessments.
 - Prior to board meetings statement of management's responsibilities must be provided.
 - Management's performance assessments.
 - Training provided prior to joining the board & periodically thereafter.

5.1.12 Disclosure and Transparency

- Hiding or misrepresenting financial information can lead to mispricing of securities → ↓ efficiency & effectiveness of capital markets.
- Financial statements should have quality, clarity, completeness & information should have provided in timely manner.
- Related party transaction should require prior approval of BOD.
- Non-financial disclosers include.
 - Governance policies & procedures.
 - Organizational structure.
 - Competitive threats.
 - Compensation policies.
 - Changes to governance structure.

5.1.13 Insider or Related-Party Transactions

- Analyst should assess company's policies regarding related-party transactions.
- Prior approval required by BOD for any such transaction.
- Financial disclosure ⇒ source for analysts.

5.1.14 Responsiveness of Board of Directors to Shareholder Proxy Votes

- Managements' responsiveness to proxy matters \Rightarrow representative of management's willingness to act in shareholders' best interests.
- If voting results ignored by management \Rightarrow indicates both BOD & management not working in shareholders' interest.

6. ENVIRONMENTAL, SOCIAL, AND GOVERNANCE FACTORS

- Investors should consider potential effects of ESG on companies.

Legislative & Regulatory Risk

- The risk that changes in government laws & regulations may change and have a significant adverse impact on profitability & long-term sustainability.

Legal Risk

- Risk associated with failure of company management to effectively manage ESG factors.

Operating Risk

- Companies operations may be affected by ESG factors negatively.

Reputational Risk

- Risk of \downarrow MV & reputation \Rightarrow due to ineffectively managing ESG.

Financial Risk

- ESG risk factors can result in significant losses to company & its shareholders.

7. VALUATION IMPLICATIONS OF CORPORATE GOVERNANCE

- Strong CGS \uparrow profitability & \uparrow shareholders wealth \uparrow company's wealth & vice versa.
- Ineffective CGS leads to:
 - Accounting risk \Rightarrow financial disclosures are incomplete, misleading, or materially misstated.
 - Assets risk \Rightarrow risk that firm's assets not used in the best interest of shareholders as director and/or management misappropriate them.
 - Liability risk \Rightarrow managers may enter into excessive obligations committed on behalf of shareholders.
 - Strategic policy risk: managers may take up projects or transactions not favorable long-term best interest of shareholders.

"MERGERS AND ACQUISITIONS"

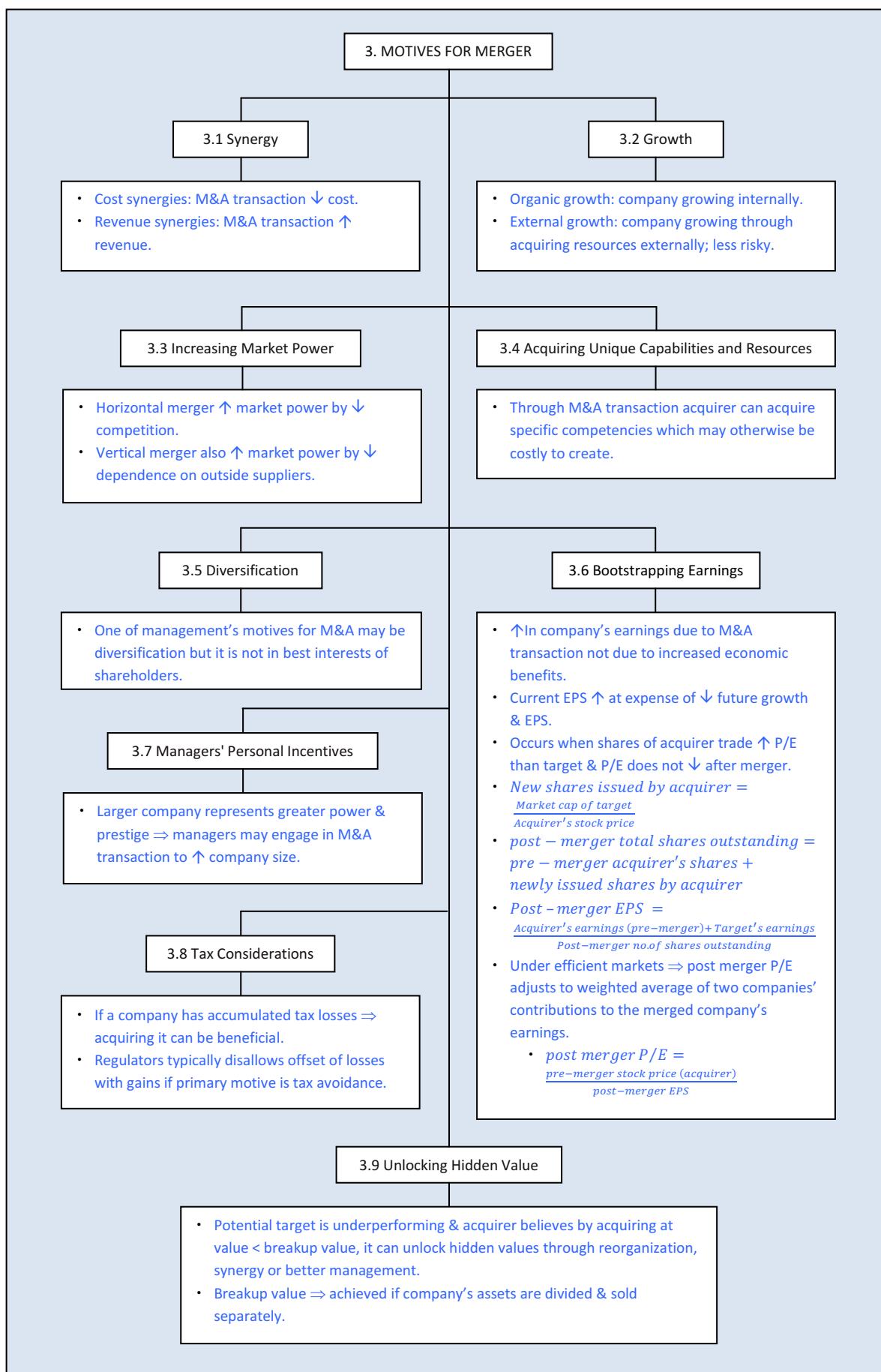
M&A	= Merger & Acquisition	N	= No. of Shares Target Received	EV	= Enterprise Value
DP	= Deal Price/Share	PAT	= Price after Manager Announcement	CF	= Cash Flow/Share
SP	= Stock Price/Share	C	= Cash Paid to Target	P	= Price/Share
FCF	= Free Cash Flow	P_T	= Price Paid for Target	BV	= Book Value/ Share
NI	= Net Income	V_T	= Pre Merger Targets Value	E	= Earnings per Share.
WACC	= Weighted Avg. Cost of Capital	V_A	= Pre Merger Value of Acquirer's Stock	S	= Sale per Share
NCC	= Non-Cash Charges. Investment	S	= Value of Synergies	EBITDA	= Earnings Before Interest, Tax Depreciation
CapEX	= Capital Expenditure	V_{A*}	= Post Merger Value of Combined Company	Amortization	WCI _{Inv} = Working Capital Investment
		MP	= Market Price		

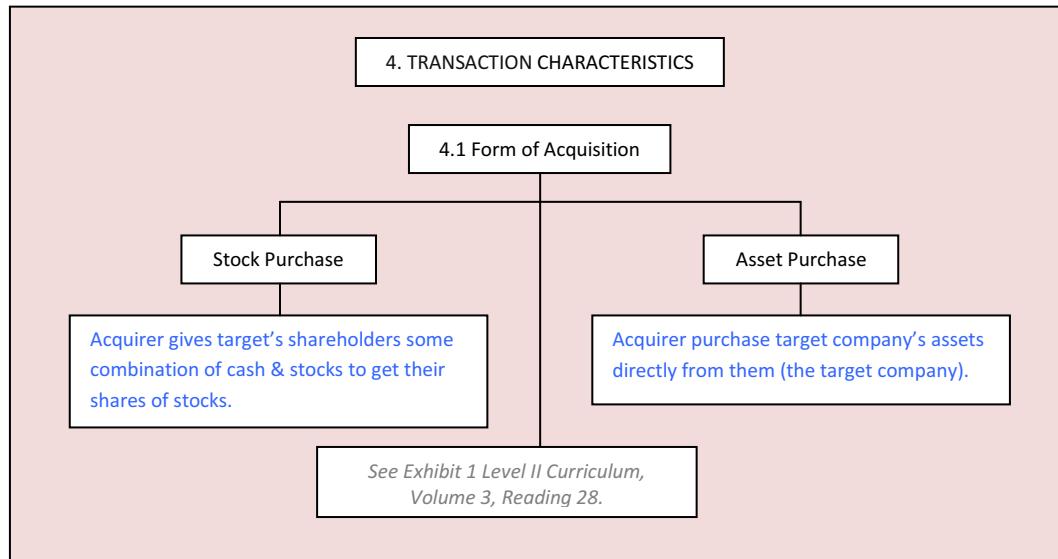
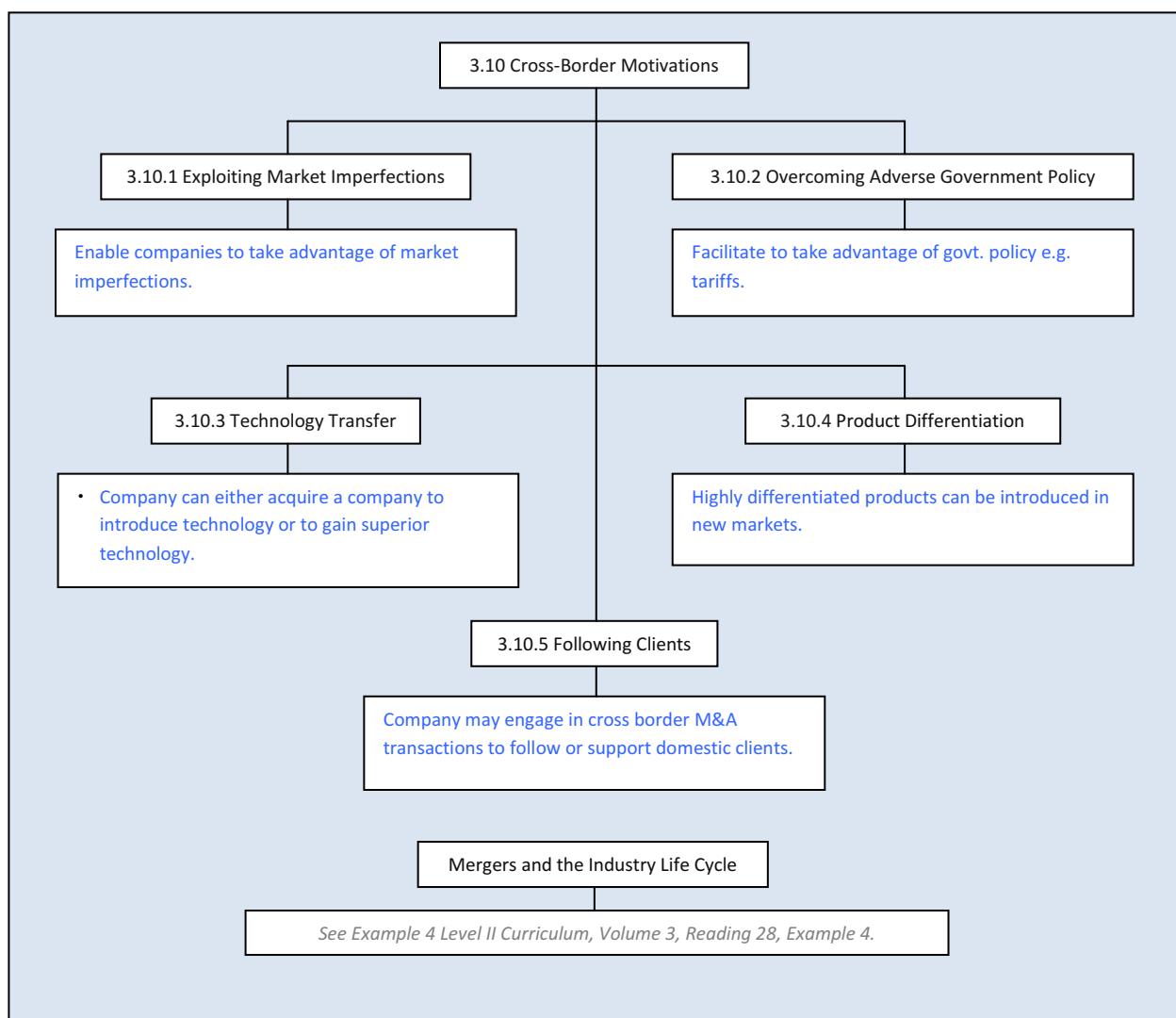
1. INTRODUCTION

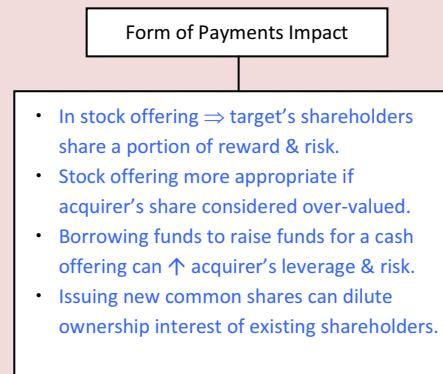
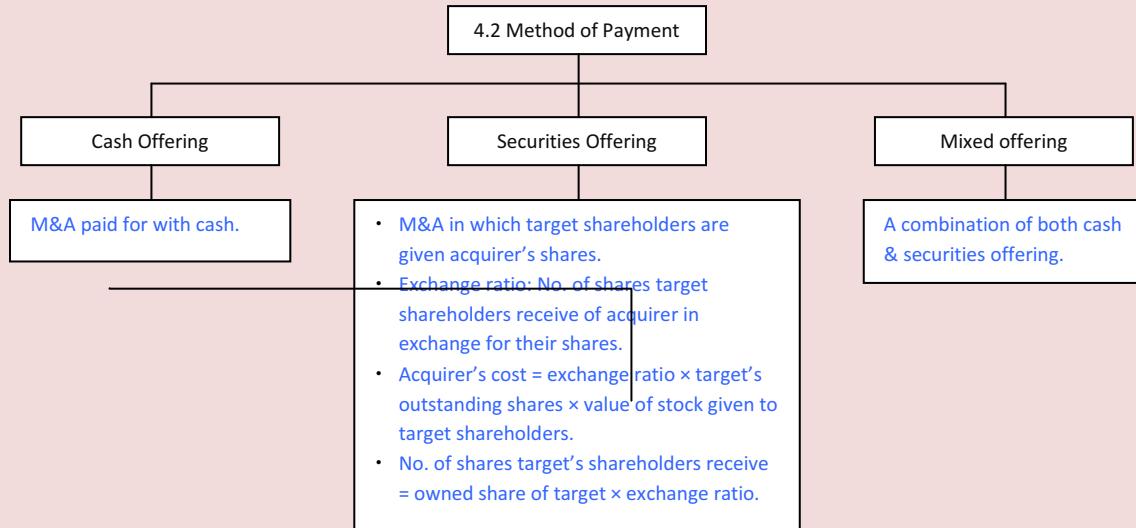
- Companies may enter into M&A activities for variety of reasons.
- Important for corporate executives & analysts to understand both motives, operational & financial consequences of mergers.

2. MERGERS AND ACQUISITIONS: DEFINITIONS AND CLASSIFICATIONS

- Acquisitions: purchase of some portion of one company by another.
- Merger: absorption of one company by other.
- Statuary merger: acquirer acquires all target's assets & liabilities.
- Subsidiary merger: target becomes subsidiary after purchase.
- Consolidation: both cease to exist to become a new company.
- Target Company: one being acquired.
- Acquiring company: company acquiring target.
- Hostile transaction: potential business combinations without management & board's consent.
- Friendly transaction: business combinations approved by management of both companies.
- Horizontal merger: merging companies in same kind of business.
- Vertical merger: companies at different position in same value chain.
- Backward integration: acquirer purchases target ahead of it in value chain.
- Forward integration: acquirer purchases target further down the value chain.
- Conglomerate merger: Acquirer purchases target unrelated to its core business.







4.3 Mind-Set of Target Management

4.3.1 Friendly Mergers

- Potential business combination approved by managers of both companies.
- Due diligence required & done by both parties.
- DMA ⇒ contract that clarifies transaction details covering terms, warranties, termination details etc.
- Proxy statement: contains all material facts concerning voting.
- Payment made after deal is closed with approval of shareholders & regulators.

4.3.2 Hostile Mergers

- Potential business combinations against the wish of target's managers.
- Bear hug: proposal directly submitted to target's BOD by acquirer's management.
- Tender offer: public offer by acquirer to target's shareholders to tender their shares at price proposed in tender offer. Tender offer can be made with cash, shares of acquirer's stock, other securities, combination of both.
- Proxy fight: individual or company seeks to take control of organization through shareholder vote.

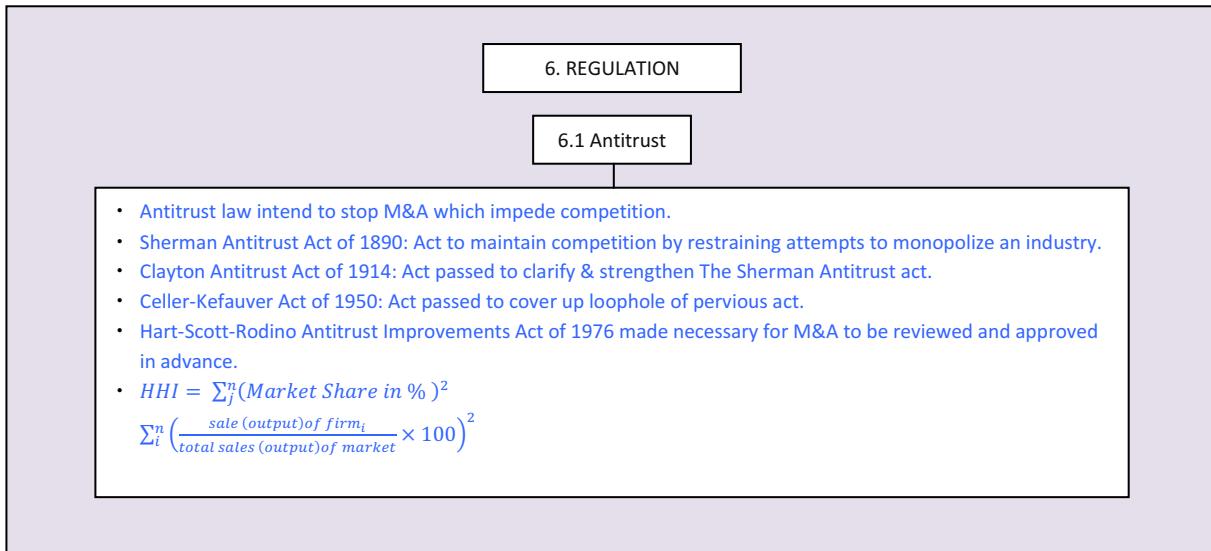
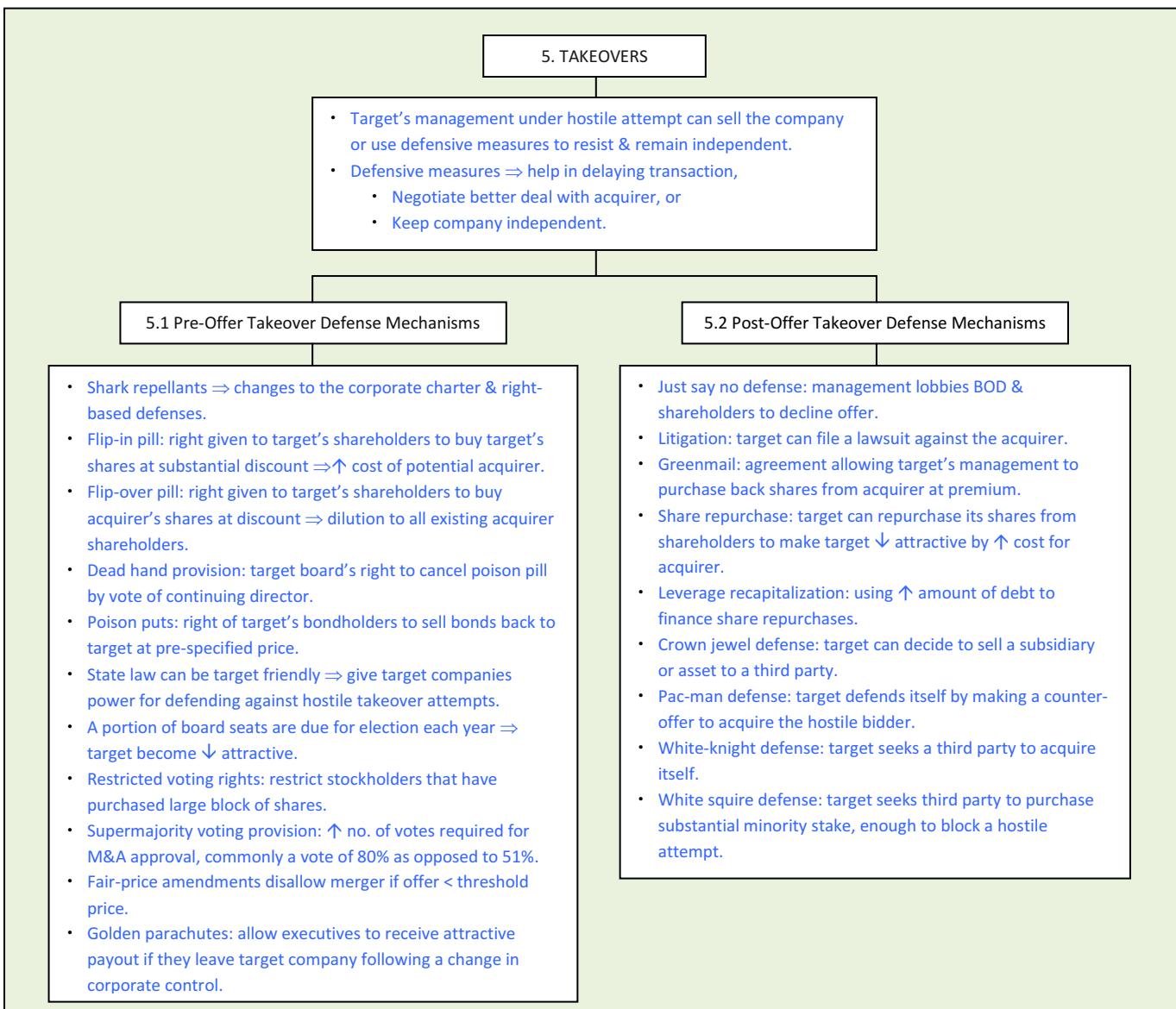


EXHIBIT 2

HHI Concentration Level and Possible Government Action

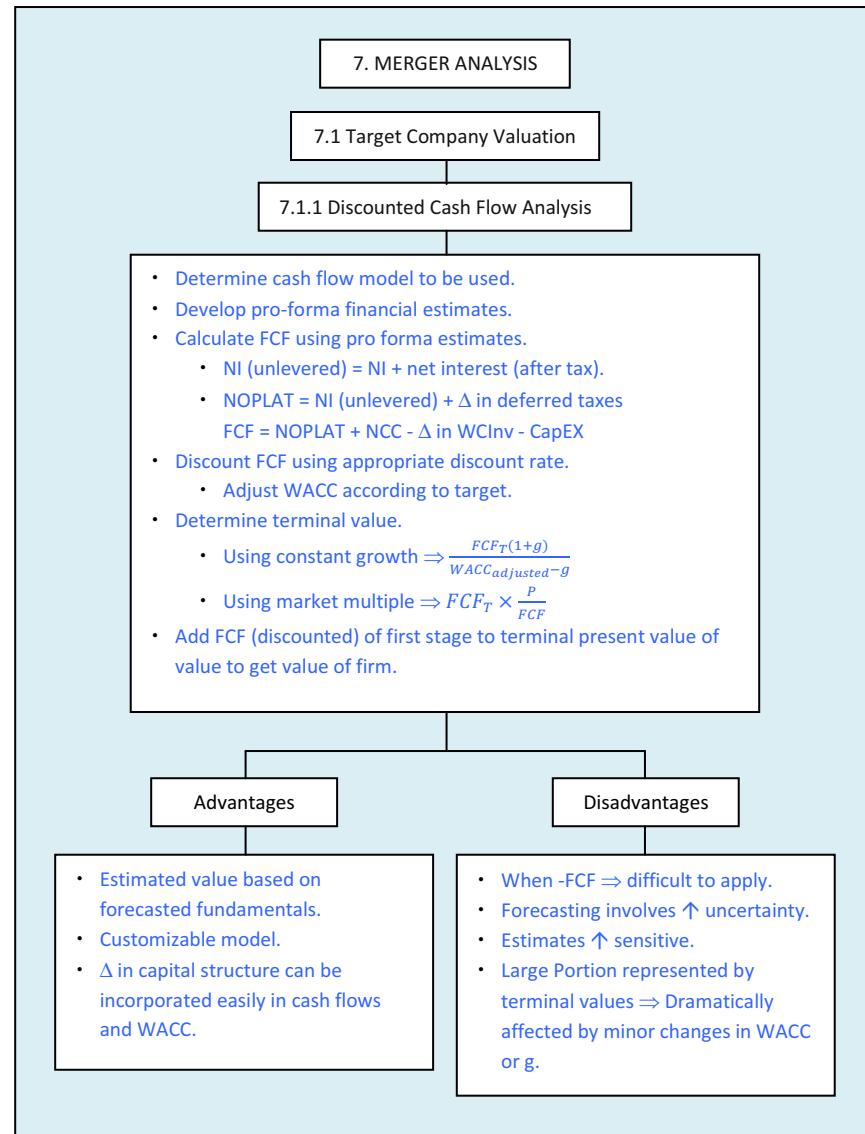
HHI Concentration Level

Post-Merger HHI	Concentration	Change in HHI	Government Action
Less than 1,000	Not concentrated	Any amount	No action
Between 1,000 and 1,800	Moderately concentrated	100 or more	Possible challenge
More than 1,800	Highly concentrated	50 or more	Challenge

Reference: Level II Curriculum, Volume 3, Reading 28, Exhibit 2.

6.2 Securities Laws

- Williams Act \Rightarrow cornerstone of securities legislation for M&A activities.
- Ensures fairness of tender offer through disclosure requirements & formal tender offer procedures.
- Disclosure: section 13(d) requires public disclosure whenever a company acquires 5% or more of target's outstanding common stock.
- Section 14 creates tender offer process by establishing various rules & restrictions.



7.1.2 Comparable Company Analysis

- Identify comparable firms.
 - Calculate relative value measure for these firms.
- $$\left. \begin{array}{l} \frac{EV}{EBITDA} \\ \frac{EV}{EBIT} \\ \frac{EV}{EBIT} \\ \frac{EV}{SALES} \\ \frac{P/CF}{P/CF} \\ \frac{P/S}{P/S} \\ \frac{P/E}{P/E} \\ \frac{P/BV}{P/BV} \end{array} \right\} \text{Estimating Enterprise value}$$
- $$\left. \begin{array}{l} P/CF \\ P/S \\ P/E \\ P/BV \end{array} \right\} \text{Estimating Equity}$$
- Calculate descriptive statistics of relative value metric & apply to target firm.
 - Value = EPS \times (P/E)
 - Mean, median & range can be calculated for relative value measures.
 - Estimate takeover premium.
 - Takeover premium = deal price/share of target - current stock price of target.
 - Takeover premium in % = $\frac{DP-SP}{SP} \times 100$
 - Estimate takeover price of target
 - Estimated stock price + estimated takeover premium.

Advantages

- Based on economic principle of law of one price.
- Estimation based on actual market data.
- Data required for estimation is easily available.

Disadvantages

- Method sensitive to market mispricing.
- Fair takeover premium \Rightarrow estimated separately.
- Difficult to incorporate specific plans for the target.
- Past data may not be timely.
- Difficult to apply on financially distressed company.

7.1.3 Comparable Transaction Analysis

- Identify set of recent transactions.
 - Sample of recent transactions must include M&A activities of companies in same industry as target.
- Calculate relative measures.
 - P/CF, P/E etc.
- Calculate descriptive statistics for relative value measure.
 - Value = EPS \times (P/E)

Advantages

- No need to separately estimate takeover premium.
- Value based on actual market data.
- Face \downarrow litigations risk.

Disadvantages

- If previous takeovers mispriced \Rightarrow technique may be inadequate.
- If few comparable transaction have occurred \Rightarrow difficult to apply.
- Difficult to incorporate specific plans for the target.
- Difficult to apply to a firm experiencing financial distress.

7.2 Bid Evaluation

- Merger if creates economic value \Rightarrow combined firm value $>$ sum of two separate firms.
- Target shareholders' gain $= P_T - V_T$
- Acquirer's gain $= S - (P_T - V_T)$
- $V_A^* = V_A + V_T + S - C$
- $V_T \Rightarrow$ Minimum bid target's shareholders should accept.
- $V_T + S \Rightarrow$ Maximum bid acquirer wants to pay.
- If acquires pays $> V_T + S \Rightarrow V_A^* < V_A$
- More managers are confident about expected synergies:
 - Acquirer managers \Rightarrow prefer to pay cash
 - Target managers \Rightarrow prefer to receive stocks
- \uparrow Stocks of acquirer paid $\Rightarrow \uparrow$ risk and benefits shared by target.
- Cash offer \Rightarrow target's profit = takeover premium.
- Stock offer \Rightarrow premium determined by value of combined firm.
- $P_T = N \times P_{AT}$

8. WHO BENEFITS FROM MERGERS

Target

- Empirically \Rightarrow short run benefits gained.
- On avg. 30% premium realized over pre-announcement MP

Acquirer

- Acquirer's SP \downarrow 1-3%.
- In long run acquirer have empirically underperformed.
- Avg. returns -4.3% .
- 61% acquirers lagging behind industry peers.
- Managerial hubris \Rightarrow managers over-estimating synergies \Rightarrow transfer \uparrow wealth to target's shareholders.

- Strong buyers, \downarrow premiums, \downarrow no. of bidders & favorable initial market reaction \Rightarrow create value in M&A.

9. CORPORATE RESTRUCTURING

- Divestiture: decision of company to sell, liquidate, spin-off a division or a subsidiary.

Reasons for Divestiture

- Change in strategic focus.
- Poor fit.
- Reverse synergy.
- Financial / cash flow needs.

Ways to divest Assets

- Equity carve-out.
- Spin-off
- Split-off.
- Liquidation.

“EQUITY VALUATION: APPLICATION AND PROCESSES”

MP = Market Price

IV = Intrinsic Value

C.F = Cash Flows

FSA = Financial Statement Analysis

DDM = Dividend Discount Model

FCFE =Free Cash Flows to the Equity

FCFF = Free Cash Flows to the Firm

PV= Present Value

DCF =Discounted Cash Flow

1. INTRODUCTION

- Valuation is the estimation of asset's value based on
 - Variables affecting future returns.
 - Comparisons with similar assets.
 - Estimates of immediate liquidation proceeds.

2. VALUE DEFINITIONS AND VALUATION APPLICATIONS

- Context of valuation \Rightarrow determines def. of value & affects selection of valuation approach.

2.1 What is Value?

- Several perspectives on value \Rightarrow foundation for valuation models.

2.1.1 Intrinsic Value

- Intrinsic value \Rightarrow value of asset given complete understanding of investment characteristics.
- If MP = I.V, market is efficient.
- Rational efficient markets formulation = returns generated by information processing are higher than cost of gathering information.
- Active managers attempt to produce excess risk adjusted returns (Alpha).
- Two possible sources of mispricing.

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

$(V - P)$ = intrinsic value – market price = true mispricing

$(V_E - V)$ = estimated value – intrinsic value = estimation error

- Mispricing may remain even after correct forecasts and valuation models (e.g. due to market conditions).

2.1.2 Going Concern Value and Liquidation Value

- Going concern value = value of a company assuming operations continue for the foreseeable future.
- Liquidation value = value of a company in financial distress.
- Going concern value is normally greater than liquidation value.

2.1.3 Fair Market Value and Investment Value

- Fair market value = price at which willing & informed buyer & seller ready to exchange asset or liability.
- Investment value = value to a buyer after considering synergies & investor's expectation.

2.1.4 Definitions of Value: Summary

- Intrinsic value under going concern assumption is important for equity valuation.

2.2 Applications of Equity Valuation

- Valuation concepts & models are used for
 - Stock selection & extracting market expectations.
 - Evaluating corporate events & business strategies.
 - Fairness opinions & communication with analysts & shareholders.
 - Appraising private businesses & share-based payment.

3. THE VALUATION PROCESS

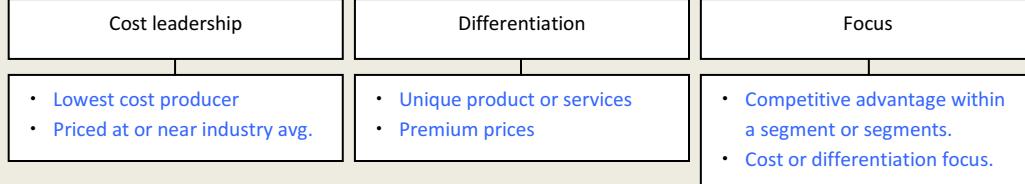
3.1 Understanding the Business

- Evaluate company's performance in economy & industry context.

3.1.1 Industry & Competitive Analysis

- Industry analysis is important because similar economic and technological factors affect all companies in industry.
- Various frameworks for industry & competitive analysis to organize thoughts about an industry.
- Sensitivity analysis to recognize aspects of company in which opportunity exist.
- Industry structure \Rightarrow industry's economic & technical characteristics (porter's analysis).
- Consider qualitative factors & avoid extrapolating past results in strategic execution.

Porter's three generic strategies



3.1.2 Analysis of Financial Reports

- The relevant aspects of financial report vary across companies & industries.
- Established Companies \Rightarrow ratio analysis.
- Newer companies or products \Rightarrow nonfinancial measures.

3.1.3 Sources of Information

- Analyst can compare information provided by company to their own research.
- Company provided information \Rightarrow regulatory filings, press releases & investor relation material.
- Analyst can use third party sources of information.

3.1.4 Considerations in Using Accounting Information

- Analysts rely on accounting information to forecast future performance.
- Quality of earnings analysis \Rightarrow evaluate economic reality.
- Nonrecurring events \Rightarrow low quality earnings.
- Compare company's net income with operating C.F.
- Growth of assets > growth of sales = aggressive accounting.
- Analysts must be careful about future negative surprises.

3.2 Forecasting company Performance

Two perspectives

Economic environment

Forecasting Approaches

Company's own operating & financial characteristics

Top-down forecasting approach

- Economy to industry to company.
- Macro to micro.

Bottom-up forecasting approach

- Company to industry to economy.
- Micro to macro.

- Analysts combine industry & competitive analysis with FSA to forecast certain items.

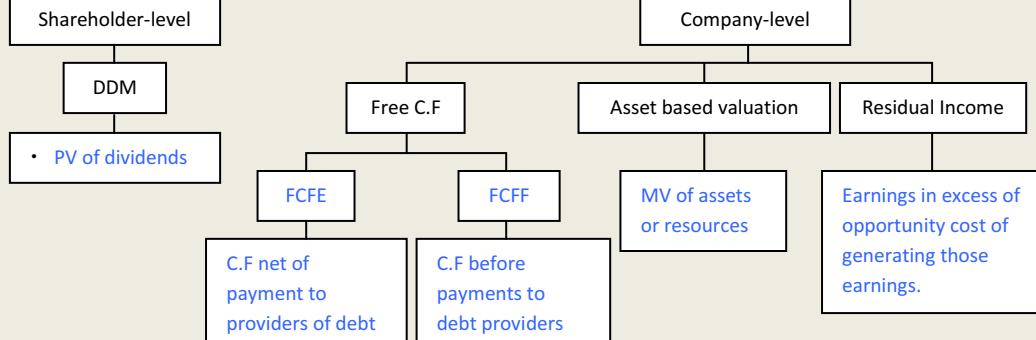
3.3 Selecting the Appropriate Valuation Model

- Absolute & relative valuation models \Rightarrow going concern assumption.

3.3.1 Absolute Valuation Models

- Specifies an asset's intrinsic value (PV models).

PV or DCF Model



- PV approach can also be applied for valuing bonds & has less uncertainty than common stocks.

3.3.2 Relative valuation Models

- Asset's value relative to another asset.
- Use price or enterprise multiples (method of comparables).
- Similar assets should sell at similar prices.
- Pairs trading \Rightarrow utilize pairs of closely related stocks (buy undervalued, sell overvalued).

3.3.3 Valuation of the Total Entity and Its Components

- Sum-of-the-parts valuation (breakup value or private market value) \Rightarrow estimated values of each of the company's businesses (each business is independent).
- Conglomerate discount \Rightarrow market applies a discount to the stock of company operating in multiple, unrelated businesses.

3.3.4 Issues in Model Selection and Interpretation

- Consistent with the characteristics of the company being valued.
- Appropriate given the availability and quality of data.
- Consistent with the purpose of valuation, including the analyst's perspective.

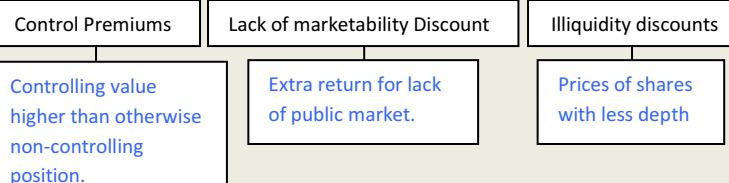
3.4 Converting Forecasts to a Valuation

Aspects of converting forecasts to valuation

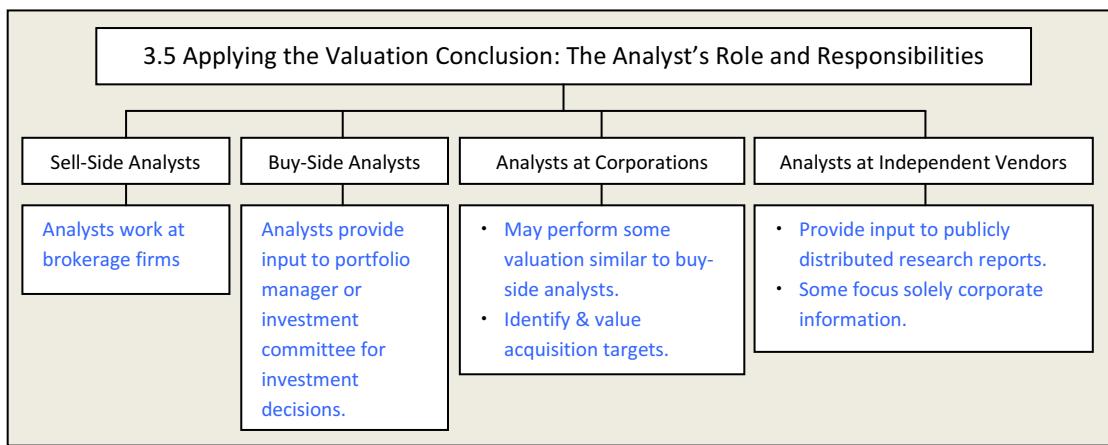
Sensitivity analysis

- Sensitivity of output to an input.
- Some sensitivity analysis is common to most valuation.

Situational adjustments



- Blockage factor \Rightarrow price for a stock block trade is less than the MP for a smaller amount of stock.



“RETURN CONCEPTS”

ERP = Equity Risk Premium
 RR = Required Return
 RF = Risk Free
 AM = Arithmetic Mean
 GM = Geometric Mean
 FFM = Fama-French Model

WACC = Weighted Avg. Cost of Capital
 MVD = Market Value of Debt
 Rd = Return on Debt
 MVCE = Market Value of Common Equity

1. INTRODUCTION

- Investors compare expected return with fair return.
- Analysts specify the discount rate.

2. RETURN CONCEPTS

2.1 Holding Period Return

- Return earned over a specified time period.
- Consider dividend reinvestment if received b/w holding period.

Return Components

Investment Income Price Appreciation

- $r = \frac{D_H}{P_0} + \frac{P_H - P_0}{P_0}$ or $\frac{D_H + P_H}{P_0}$
- $\frac{D_H}{P_0}$ = Dividend yield or investment income.
- $\frac{P_H - P_0}{P_0}$ = capital gains or price appreciation.

2.2 Realized & Expected (Holding Period) Return

Returns

Realized Return

Expected Return

- | | |
|---------------------------------------|--|
| • Holding period in the past. | • Expected dividend & selling price. |
| • Selling price & dividend are known. | • Price valuation models. |
| | • Different investors have different expected returns. |

2.3 Required Return

- Minimum level of expected return an investor requires given the asset's riskiness.
- It is opportunity cost for investing in the asset.
- If expected return > required return = security undervalued (positive ex- ante alpha) & vice-versa.
- Realized or ex- post alpha = actual holding period return-required return.
- Estimates of required return are essential for present value models.

2.4 Expected Return Estimates from Intrinsic Value Estimates

- When an asset is mispriced, price convergence takes place.
- When investor's value estimate is more accurate than market \Rightarrow return has two components \Rightarrow required return & return from convergence.
- $E(R_T) \approx r_t + \frac{V_0 - P_0}{P_0}$ where $\frac{V_0 - P_0}{P_0}$ is convergence return.
- Convergence component of $E(R)$ is quite risky (e.g. time horizon problem or inaccurate estimates).

2.5 Discount Rate (D.R)

- Rate used to find PV of future C.F.
- D.R depends on characteristics of investment.
- Different D.R. for distinct expected future C.F.

2.6 Internal Rate of Return

- IRR is the DR that equates PV of expected future CF to the asset's price.
- When markets are efficient \Rightarrow IRR is required return on equity.
- Required return = $\frac{\text{year-ahead dividend}}{\text{Market price}} + \text{Expected dividend growth.}$

3. THE EQUITY RISK PREMIUM

- Incremental return for holding equities rather than risk-free assets.
- ERP depends on expectations.
- RR on equity = current expected RF +ERP
- RR on share i = current expected RF + β_i (ERP).

Or

Current expected RF + ERP \pm other risk premia/discounts.

3.1 Historical Estimates

- Mean value of difference b/w equity index returns & govt. debt return.
- No systematic errors in expectations \Rightarrow Avg. returns are unbiased estimates.
- In developing historical ERP estimate include the selection of :
 - Equity index for equity market return.
 - Time period for computing estimate.
 - Type of mean calculated & proxy for RF return.
 - Extending the length of data \Rightarrow increase precision but decrease assumption of stationarity.
 - High ERP during bad times but low during good times.
 - Two choices for historical mean return calculations are AM & GM.
 - RF rates can be long-term govt. bond or short-term govt. debt return.

3.1.1 Arithmetic Mean or Geometric Mean

- GM is always less than AM given any variability in returns.
- AM returns best represent mean return in a single period.
- If AM is known \Rightarrow expected terminal value can be found by compounding at AM.
- GM is a compounded growth rate logical in multiperiod context.
- ERP estimates based on GM tend to be closer to supply & demand-side estimates from economic theory.
- Thus, GM is preferred to AM.

3.1.2 Long-Term Government Bond or Short-Term Government Bills

- A normal yield curve offsets the effect of the RF rate choice on RR estimate.
- Inverted yield curve \Rightarrow ERP higher under bill-based estimate.

3.1.3 Adjusted Historical Estimates

- Historical ERP may be adjusted through offsetting effect of Biases or independent considering estimate of ERP.
- Survivorship bias \Rightarrow inflate ERP \Rightarrow should be adjusted downward.
- Unexpected positive & negative events & surprises may require ERP adjustment (upward or downward).

3.2 Forward-Looking Estimates

- Based on expectations for economic & financial variables (ex ante estimates).
- Less subject to nonstationarity or data biases.
- Subject to potential behavioral biases & model errors.

3.2.1 Gordon Growth Model Estimates

- Model assumptions are met in mature developed equity markets.
- GGM Equity RP = expected dividend yield on index + long term growth rate - current long-term govt. bond yield.
- Multiple earnings growth stages \Rightarrow calculate IRR which is required return on equity r and then subtract govt. bond yield to arrive at ERP as follows:

$$\text{Equity index price} = PV_{\text{fast growth}}(r) + PV_{\text{transition}}(r) + PV_{\text{mature}}(r).$$
- GGM assumes P/E ratio is constant, analyst make adjustment to reflect P/E expansion or contraction.

3.2.2 Macroeconomic Model Estimates

- More reliable when public equities represent large share of economy.
- Focus on supply-side variables.
- $\text{ERP} = \{[(1+EINFL)(1+EGREPS)(1+EGPE) - 1.0] + EINC\} - \text{expected risk free return}.$
- $EINFL = \text{Expected inflation} \approx \frac{1+YTM \text{ of 20-year T.bonds}}{1+YTM \text{ of 20-year TIPS}} - 1$
- EGREPS = expected growth in real earnings per share \Rightarrow sum of labour productivity growth & labour supply growth.
- EGPE = expected growth in P/E ratio \Rightarrow baseline value is zero; current P/E level show overvaluation or undervaluation.
- EINC = expected income component \Rightarrow expected dividend yield.

3.2.3 Survey Estimates

- Ask people (experts) what they expect about capital market, then premium can be inferred.

4. THE REQUIRED RETURN ON EQUITY

The choices include

- The CAPM.
- Multifactor models.
- Build-up method.

4.1 The Capital Asset Pricing Model

- Provide equilibrium required return.
- Required return on share $i = RF + \beta_i (\text{ERP})$.
- β_i is sensitivity of asset returns to the return on the "market portfolio" of risky assets.
- If markets are segmented, two assets with same risk can have different required returns if traded in different markets.
- If markets are integrated \Rightarrow international CAPM is used.

4.1.1 Beta Estimation for a Public Company

- Unadjusted or raw beta \Rightarrow regression of return on stock on the return on the market.
- Choice of index & data period length & frequency of observations are important considerations.
- Beta in future period \Rightarrow closer to mean value of 1.0, so we adjust raw beta as

$$\text{adjusted beta} = (2/3) \text{ (unadjusted beta)} + (1/3) (1.0).$$
- Infrequently traded securities \Rightarrow beta will be too small & required return will be underestimated.

4.1.2 Beta Estimation for Thinly Traded Stocks and Nonpublic Companies

- Analysts estimate beta of nonpublic company on basis of public peer's beta.
 - Consider differences in financial leverage.
 - Unlever the benchmark (public company) beta for beta of asset (debt is high quality)
- $$\beta_U \approx \left[\frac{1}{1 + (D/E)} \right] \beta_E$$
- If subject company has debt & equity levels D' & E', then subject company's equity beta is
- $$\beta_E = \left[1 + \left(\frac{D'}{E'} \right) \right] \beta_U$$
- Sometimes median or avg. industry beta is used as benchmark beta.
 - CAPM is simple, widely accepted, theory-based method.
 - For individual securities \Rightarrow idiosyncratic risk overwhelm market risk \Rightarrow beta may be poor indicator of future average return.

4.2 Multifactor Models

- CAPM beta describes risk incompletely; evidence suggests multiple factors drive returns.
 - Multifactor models are complex & expensive which does not ensure greater explanatory power.
 - APT models express required return as
- $$r = R_f + (\text{Risk premium})_1 + (\text{Risk premium})_2 + \dots + (\text{Risk premium})_k$$
- where
- Risk premium = (factor sensitivity or beta)_i \times (factor risk premium)_i
 factor risk premium is expected return in excess of R_f.

4.2.1 The Fama-French Model

- $r_i = R_f + \beta_i^{\text{mkt}} \text{RMRF} + \beta_i^{\text{size}} \text{SMB} + \beta_i^{\text{value}} \text{HML}$
- RMRF = $R_m - R_f$, return of value weighted index in excess of one month T-bill.
- SMB (small minus big) = Avg return of three small-cap portfolios – avg. return of three large size portfolios.
- HML (high minus low) = avg return on two high book-to-market portfolios minus Avg return on two low book-to-market portfolios.
- Each of the factors can be viewed as mean return to zero-net investment, long-short portfolio.
- FFM market β could be above or below CAPM β .
- FFM includes equity market factor (systematic risk) & company factors (e.g. size & value).
- FFM views size & value premiums as compensation for systematic risk; practitioners believe return premiums arise from market inefficiency.

4.2.2 Extensions to the Fama-French Model

- Investors demand a return premium for illiquid assets.
- Pastor-Stambaugh model adds to the FFM a fourth factor (liquidity).
- $r_i = R_f + \beta_i^{\text{mkt}} \text{RMRF} + \beta_i^{\text{size}} \text{SMB} + \beta_i^{\text{value}} \text{HML} + \beta_i^{\text{liq}} \text{LIQ}$
- Avg. liquidity equity, liquidity β of 0. Below-Avg. liquidity, positive β & vice versa.
- Liquidity is a function of the size of the interest, depth & breadth of market & ability to conduct block trading with minimal price impact.
- Marketability \Rightarrow relates to right to sell an asset.

4.2.3 Macroeconomic & Statistical Multifactor Models

- Macroeconomic factor models \Rightarrow variables that affect future C.F and/or D.R to determine PV.
- Statistical factor Models \Rightarrow statistical methods are applied to historical returns.
- Five-factor macroeconomic BIRR (Burmeister, Roll, & Ross) model with factor definitions as:
 1. Confidence risk (C.R): unanticipated change in return difference b/w 20 year risky corporate & Govt. bonds.
 2. Time horizon risk (T.H.R): unanticipated change in return difference b/w 20 year govt. bond & 30-day T-bill.
 3. Inflation risk (I.R): unexpected change in inflation rate (stocks have negative exposure to this factor).
 4. Business cycle risk (B.C.R): unexpected change in level of real business activity.
 5. Market timing risk (M.T.R): portion of return unexplained by first four risk factors.
- Example of required return under this model is as follows:

$$r_i = T - \text{bill rate} + (\text{sen. to C.R} \times C.R) - (\text{sen. to T.H.R} \times T.H.R) - (\text{sen. to I.R} \times I.R) + (\text{sen. to B.C.R} \times B.C.R) + (\text{sen. to MTR} \times MTR)$$

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

- $r_i = R_F + \text{ERP} \pm \text{one or more premia/Discount}$
- Specific beta adjustments not applied to factor risk premiums.

4.3.1 Build-Up Approaches for Private Business Valuation

- $r_i = R_f + \text{ERP} + \text{size premium}_i + \text{specific company premium}$.
- Two additional considerations (adjustment to firm value rather than R.R).
 - Controlling V/S minority interests.
 - Lack of ready marketability.
- So-called modified CAPM formulation
 $R_f + \beta \times \text{ERP} + \text{size premium}$.

4.3.2 Bond Yield Plus Risk Premium (BYPRP)

- Can be viewed as build-up method for companies with publicly traded debt.
- BYPRP cost of equity = YTM (long term debt) + risk premium.
- YTM includes real rate + inflation + Default risk premium.
- Risk premium compensates for additional equity risk.

4.4 The Required Return on Equity: International Issues

- Global context required return issues are exchange rates and data & model issues in emerging markets.
- Exchange rate G/L from equity component not exactly offset by G/L from govt. security component of ERP.
- Country spread model
 $\text{ERP} = \text{ERP for developed market} + \text{country premium}$.
- Country premium (typically sovereign bond yield spread) represents additional risk of emerging markets.
- Country risk rating model \Rightarrow regression-based estimate of ERP (developed countries).
- Used this regression-based equation for less developed markets to predict required return for those markets.

5. THE WEIGHTED AVERAGE COST OF CAPITAL

- Required return of company's suppliers of capital is usually referred to cost of capital.
 - Analyst can use total firm value approach for equity valuation.
 - Corporations may deduct net interest expense from income in calculating taxes owed (just corporate taxes).
 - If suppliers of capital are creditors & common equity holders, then expression for WACC
- $$WACC = \frac{MVD}{MVD + MVCE} r_d (1 - \text{Tax rate}) + \frac{MVCE}{MVD + MVCE} r$$
- Marginal tax rates better reflect the future cost of fund raising compared to effective tax rates.
 - Analysts use targets weights instead of current market weights.
 - Before-tax required return on debt is typically YTM of company's debt.

6. DISCOUNT RATE SELECTION IN RELATION TO CASH FLOWS

- When discounting C.F to equity \Rightarrow required return to equity is appropriate.
- Discounting C.F to firm \Rightarrow cost of capital is appropriate.
- Real C.F should be discounted at real rate while nominal C.F should be discounted at nominal rate.
- Nominal approach is exact for equity valuation.

“INDUSTRY AND COMPANY ANALYSIS”

AR = Accounts Receivables
 AP = Accounts Payables
 WC = Working Capital
 TV = Terminal Value

IS = Income Statement
 FM = Financial Modeling
 BS = Balance Sheet
 DTA= Deferred Tax Asset
 DTL= Deferred Tax Liability

2. FINANCIAL MODELING: AN OVERVIEW

- Starting FM from I.S is logical because most companies derive majority of their value from future CF generation (determined from net income).
- Exceptions i.e. banks & insurance companies (value of assets & liabilities on BS is more relevant).

2.1 Income Statement Modeling: Revenue

- Segment disclosures in company's reports are richest source of information to analyze revenue.
- Accounting standards require separate financial information for any segment if that segment account for 10% or more of the revenue, operating income or assets of the combined company.
- Geographic analysis of revenue \Rightarrow place revenue into various geographic “buckets”.
 - Useful for global companies operating in multiple countries.
- Revenue analysis by segment \Rightarrow analyst classifies a company's revenue into various business segments.
- Revenue analysis through product line \Rightarrow most relevant for a company with a manageable small number of products.
- Top down approach \Rightarrow economy \Rightarrow sector or industry \Rightarrow company
- Bottom up approach \Rightarrow Inverse to top down approach
- Hybrid approach \Rightarrow combines elements of both approaches \Rightarrow uncover errors that may arise from using single approach.

2.1.1 Top-down Approaches to Modelling Revenue

Growth Relative to GDP Growth

Market Growth & Market Share

- Analyst first projects the growth rate of nominal GDP.
- Analyst then compares company's growth with GDP growth.
- Real GDP may be used to project volumes, inflation to project prices.

- Analyst forecasts growth in a particular market.
- Company's current market share & change in the market share is next step to analyze.

2.1.2 Bottom-up Approaches to Modelling Revenue

Time Series

Return on Capital

Capacity Based Measures

- Forecast based on historical growth rate.
- Simplest.
- Can also be used in top-down analysis.

Forecast based on BS accounts

- Projections based on capacity e.g. same store sales growth.

2.1.3 Hybrid Approaches to Modelling Revenue

- Most commonly used approaches.
- Volume & price approach \Rightarrow analyst makes separate projection for volumes & avg. selling price.

2.2 Income Statement Modelling: Operating Costs

- Analyst may consider matching the cost analysis to the revenue analysis depending upon the information availability.
- Analysts can use top-down, bottom up or hybrid view of costs.
- Fixed cost (FC) should pay particular attention while variable costs (VC) are directly linked to revenue growth.
- Best way to model VCs:
 - % of revenue or (projected unit volume \times unit variable costs)
- FC assumed to grow at its own rate based on future PP&E growth.
- Operating & gross margins tend to be +vely correlated with sales level in an industry that enjoys economies of scale.
- Uncertainty regarding costs estimates must also be considered by analyst.

2.2.1 Cost of Goods Sold

- Typically it's the single largest cost for manufacturing & merchandising companies.
- COGS & gross margin vary inversely.
- COGS have a direct link with sales thus forecasting the COGS as a % of sales is usually a good approach.
- Small error in COGS forecast may have a material impact on projected operating profits.
- Companies usually do not disclose their hedging positions.
- Analyst should consider the impact of company's hedging strategy.
- Gross margin differences among companies within a sector are logically related to differences in their operations.
- To estimate a realistic gross margin, competitors' gross margins can provide a useful cross check.

2.2.2 Selling, General, and Administrative Expenses

- Another main part of operating costs.
- Less direct relationship with sales as compared to COGS.
- Variable component of SG&A which is usually large can be estimated as % of sales.
- Other administrative & general expenses are less variable & \uparrow or \downarrow gradually over time.
- In addition to historical analysis of these expenses benchmarking a company against its competitors can be useful.

2.3 Income Statement Modelling: Non-operating Costs

- These items include interest income & expense, taxes, minority interest, income from affiliates & unusual charges.
- Interest income:
 - Depends on amount of investment & rate of return earned on investments.
 - Less significant component to most non-financial companies.
- Interest expense:
 - Depends on level of debt on BS & interest rate associated with the debt.

2.3.1 Financing Expenses

- Capital structure of a company is key variable used in projecting financing expenses.
- Notes to financial statements provide detail about the maturity structure of debt & corresponding IR.

2.3.2 Corporate Income Tax

- Large non-operating amount that affects profit substantially.
- Three types of tax rate:
 - Statutory tax rate \Rightarrow tax rate applying to a company's domestic tax base.
 - Effective tax rate \Rightarrow $\frac{\text{reported tax on IS}}{\text{Pre-tax Income}}$
 - Cash tax rate \Rightarrow $\frac{\text{Tax actually paid}}{\text{Pre tax Income}}$
- Diff. b/w cash tax & effective tax are reflected as DTA or DTL.
- Effective tax rate & cash tax rate are key to forecast tax expense & cash taxes.
- Difference b/w statutory tax rate & effective tax rate can arise due to following reasons.
 - Tax credits.
 - Adjustments to previous years.
 - Withholding tax on dividends.
 - Expenses not deductible for tax purpose.
- Onetime events must be adjusted while estimating tax rate.

2.4 Income Statement Modelling: Other Items

- Analysts often assume that dividends grow each year by a certain \$ amount or as a proportion of N.I.
- If a company holds > 50% of another company it will consolidate the affiliate's results with its own & will report minority interest.
- Share count is a key input in calculating intrinsic value & EPS.
- Market price of a stock is an important determinant of future share count changes.
- Analysts typically exclude unusual charges from their forecasts, as these changes are almost impossible to forecast.

2.5 Balance Sheet and Cash Flow Statement Modelling

- Some BS items including AR, AP & inventory are closely linked to IS projections.
- Working capital accounts can be best modeled through efficiency ratios.
 - Future AR can be projected by assuming # of days sales outstanding & combining that assumption with sales projection.
 - Analyst can project future inventory by assuming an inventory turnover rate & combining that assumption with COGS projection.
- Analyst can modify projections through top-down & bottom up consideration.
 - In the absence of a specific opinion on WC \Rightarrow historical performance to persist may be an assumption by analyst (bottom-up-approach).
 - Specific view of future WC \Rightarrow analysts began with a forecast for large sector of economy (top-down approach).
- Projections of PP&E are less directly tied to IS for most companies:
 - Net PP&E mainly depends on capex & depreciation.
 - Depreciation forecasts \Rightarrow based on historical dep. & disclosure about dep. schedule.
 - Capex forecast \Rightarrow depends on future need for new PP&E.
 - Maintenance capex \Rightarrow to sustain current business.
 - Growth capex \Rightarrow required to expand the business.

2.5 Balance Sheet and Cash Flow Statement Modelling

- Future capital structure projections:
 - Leverage ratios (e.g. debt to equity, debt to capital) can be useful for projecting future debt & equity level.
- Return on invested capital (ROIC) & return on capital employed (ROCE) can be determined once IS & BS are constructed.
 - $ROIC = \frac{\text{Net operating profit less adjusted taxes usually EBIT}}{\text{Invested Capital}}$
 - Invested capital = operating assets – operating liabilities.
 - ROIC is better than ROE because it is not affected by degree of financial leverage.
 - Sustainably higher ROIC is a sign of a competitive advantage.
 - $ROE = \frac{\text{Operating Profit}}{\text{Capital employed}}$
 - Pretax measure which is useful in comparing companies with different tax structure.
- Analysts usually make assumptions regarding use of future CFs (e.g. share repurchase, dividend etc.) for projecting future CF statement.

2.6 Scenario Analysis and Sensitivity

- Projections involve uncertainty, requiring scenarios to consider in addition to most likely “base case result”.
- Sensitivity analysis \Rightarrow effect on the estimate of intrinsic value (IV) by changing one assumption at a time.
- Scenario analysis \Rightarrow changing multiple assumptions at the same time to view impact on IV.
- Large, mature, slow growing, non-cyclical businesses may have upside & downside scenarios close to the base case.
- For most companies, range of possibilities will be approximately symmetrical & bell curve.

3. THE IMPACT OF COMPETITIVE FACTORS ON PRICES AND COSTS

- Competition affect forecasts & incorporating competitions into financial forecasting can be a challenging task.
- Porter's “five forces” framework can be used as a tool to think about how competitions will affect financial results.

Porter's Five Competitive Forces

Threat of Substitute

- \uparrow Substitutes & \downarrow switching cost will \downarrow pricing power & vice versa.

Rivalry among Existing Companies

- \downarrow Pricing power in industries that are fragmented, \downarrow growth, \uparrow exit barriers, \uparrow fixed cost.

Bargaining Power of Suppliers

- \downarrow Profitability if suppliers have influence over price or quantity supplied.

Bargaining Power of Buyers

- \downarrow Profitability if buyers have greater ability to demand lower prices &/or control over quantity

Threat of New Entrants

- Downward pressure on profitability if above market returns are present.
- \uparrow Barriers to entry, \downarrow threat of new entrants.

4. INFLATION AND DEFLATION

- Overall ↑ or ↓ in prices of goods & services (inflation & deflation) can significantly affect the forecasts of a company's performance.
- Impact of inflation & deflation differs from company to company & within a company (for revenues & costs).

4.1 Sales Projections with Inflation and Deflation

4.1.1 Industry Sales and Inflation or Deflation

- Industry structure can be an important factor in determining the relationship b/w ↑ in input cost & ↑ in price of end products.
- In case of price elastic demand, company's efforts to pass on inflation through ↑ prices can ↓ volumes if there are cheaper substitutes available.
- Inflationary environment ⇒ raising prices too late will result in profit margin squeeze & acting too soon could result in volume loss.
- Deflationary environment ⇒ lowering prices too soon will result in ↓ gross margin & waiting too long will result in volume ↓.

4.1.2 Company Sales and Inflation or Deflation

- Revenue projections = expected volume × price development.
- If demand is price inelastic (elastic) ⇒ revenues will benefit (decline) from inflation.
- To reflect different rates of the cost of inflation among countries, an international company should take into account the geographic mix of its operations.
- If inflation of the country of export > company's domestic inflation, pricing gains may be wiped out by currency loss.
- Likely pricing of a product is dependent on identifying products' major input cost.
- Company strategy is also an important factor while determining price.

4.2 Cost Projections with Inflation and Deflation

4.2.1 Industry Costs and Inflation or Deflation

- Following factors can influence forecasting of the industry costs:
 - Purchasing characteristics of an industry.
 - Monitoring the underlying drivers of input prices.
 - Competitive environment within industry participants.

4.2.2 Company Costs and Inflation or Deflation

- Segmentation of industry's cost by category & geography is helpful in forecasting company's cost.
- Analyze whether cheaper alternatives & ↑ efficiency can be a possibility to offset the impact of ↑ input prices.

5. TECHNOLOGICAL DEVELOPMENTS

- Technological developments (TDs) have an impact on individual businesses & industries.
- If TDs result in a new product that threatens to cannibalize demand for an existing product \Rightarrow unit forecast (new product) combined with an expected cannibalization factor is used to estimate the impact on future demand for the existing product.
- If changes in technology lead to \downarrow manufacturing cost, supply curve will shift to right (more production at same price).
- If technology leads to attractive substitute products, demand curve will shift to the left.

6. LONG-TERM FORECASTING

- Certain factors may influence the time horizon of forecasting including investment strategy, cyclical, & company specific factors etc.
- Analyst's employer preferences may be another factor that can influence forecast time horizon.
- Forecast period should be long enough to allow the business to reach an expected mid cycle level of revenues & earnings.
- Normalized earnings \Rightarrow expected level of mid cycle earnings of a company (excluding usual or temporary factors).
- To better represent normalized earnings, long-term projections are better than short-term projections.
- Important considerations when deriving TV based on long term projections:
 - Historical multiple -based approach \Rightarrow assumptions \Rightarrow past is relevant to the future in term of growth & required return.
 - DCF approach \Rightarrow analyst should normalize terminal year CF before using in projection.
- Challenges for analyst:
 - Inflection point estimation.
 - To forecast economic disruption.

7. BUILDING A MODEL

Example

“DISCOUNTED DIVIDEND VALUATION”

RF = Risk free

MP = Market Price

FCFF = Free cash flows to firm

FCFE = Free cash flows to equity

PV = Present Value

GGM = Gordon growth model

DCF = Discounted cash flows.

DDM = dividend discount model

RIM = Residual income model

1. INTRODUCTION

- DCF models \Rightarrow view the intrinsic value of common stock as the present value of expected future cash flows.
- Four steps in applying DCF analysis to equity valuation
 - i. Choosing the class of DCF model.
 - ii. Forecasting the cash-flows.
 - iii. Choosing a discount rate methodology.
 - iv. Estimating the discount rate.
- Here dividends are an appropriate definition of cash flows & class of model is DDM.
- Basic objective of any DDM is to value a stock.

2. PRESENT VALUE MODELS

- PV models constitute a demanding & rigorous approach for valuing assets.

2.1 Valuation Based on the Present Value of Future Cash Flows

- Value of asset relates to benefits or returns we expect to receive from holding it (future cash flows).
- Money has a time value (money received in future is worth less than same amount received today).
- Two elements of DCF valuation.
 - Estimating the CF.
 - Discounting the CF (economic rationale)
- Discount rate for RF cash flows is RF rate.
- Future CFs for equity are not known with certainty (they are risky) requires two adjustments.
 - Discount the expected CF.
 - Adjust the discount rate to reflect the risk.

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

V₀ = value of asset at time t=0n = number of CF in the life of asset (∞ for equities)CF_t = Expected CF at time t.

r = the discount rate or required rate of return.

2.2 Streams of Expected Cash Flows

Three Types of DCF Models

Dividend Discount Model

- Investors holding shares receive cash return in the form of dividends.
- DDM accounts for reinvested earnings.
- Dividends are less volatile than earnings & other return concepts so less sensitive to short-term fluctuations.
- Company might not pay dividends (no cash, unprofitable, or very profitable).
- Generally mature companies tend to pay dividends.
- DDM perspective is that of minority ownership.
- Applying DDM to non-dividend paying shares is theoretical.

Free C.F Models

- A company can add to cash (or use up cash) by selling goods & services.
- For a going concern some of CFO is not "free".
- FCFF = CF that can be withdrawn by bondholders and shareholders without economically impairing company.
- Value of common equity = PV of FCFF - MV of debt.
- FCFE = CFO - cap. expenditure.
- FCFF is a pre-debt FCF concept; FCFE is a post debt FCF concept.
- FCFF is easier to apply in several cases such as leverage is expected to change significantly.
- FCF concept is very popular (can be applied to non-dividend-paying companies).
- Appropriate for control perspective.

Residual Income Model

- When impractical to apply DDM or FCF, third approach RIM.
- RI = earnings in excess of investor's required return on beginning investment.
- In contrast to accounting income, RI attempts to measure value added in excess of opportunity cost.
- RI model states that stock's value is BV plus PV of expected future residual earnings.
- RI model can be applied to both dividend- & non-dividend paying stocks.
- RI model \Rightarrow when CF is negative.
- RI requires a detailed knowledge of accruals.
- If quality of accounting disclosure is good analyst may use RI model.

- Analyst may find that one model is more suitable to particular valuation problem.

3. THE DIVIDEND DISCOUNT MODEL

- DDM is the simplest & the oldest PV approach to valuing stock.

3.1 The Expression for a Single Holding Period

- Shareholder who buys & holds shares, the CF are dividends & MP of share.
- MP should reflect expected dividends subsequent to sale.
- If investor wishes to hold share for one year the value of stocks:

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

Where

V_0 = value of stock today $t=0$.

P_1 = Expected price per share at $t=1$.

D_1 = Expected dividend per share for year 1.

r = required rate of return.

3.2 The Expression for Multiple Holding Periods

- If investor plans hold stock for two years, the value of stock is:

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

- For any finite holding period, the value of stock is:

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

- If holding period extends to indefinite future, the stock value is present value of all expected future dividend (forecasting problem).

$$V_0 = \frac{D_1}{(1+r)^1} + \dots + \frac{D_n}{(1+r)^n} \dots \text{ or } V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

- Two broad approaches to simplify the forecasting problem.

- Assign a growth pattern for future dividends (constant growth, two or three stages of growth).
- Finite number of dividends can be forecasted individually up to a terminal point; from this point onwards forecast either remaining dividends through stylized growth pattern or share price at terminal point by using some method (e.g. multiples).

4. THE GORDON GROWTH MODEL

- Dividends grow indefinitely at a constant rate (this assumption is applied to general DDM).

4.1 The Gordon Growth Model Equation

$$V_0 = \frac{D_0(1+g)}{r-g} \text{ or } V_0 = \frac{D_1}{r-g}$$

- Where g is constant growth rate.
- For this equation $r > g$ makes sense whereas $r=g$ or $r < g$ does not make sense.
- Model values are very sensitive to “ r ” & “ g ”.
- GGM applies to dividend-paying stocks.
- GGM is most appropriate for companies with earnings growth nominal comparable to or lower than economy’s growth rate.
- Growth rate of economy is measured by growth in GDP.
- If earnings growth rate is above economy’s growth rate \Rightarrow use multistage DDM.
- Analysts have often used the GGM to value broad equity market indices.
- GGM can be used to value fixed-rate perpetual preferred stock as:

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

Where dividend growth rate equal to zero.

4.2 The Links Among Dividend Growth, Earnings Growth, & Value Appreciation in the Gordon Growth Model

- Dividends growing at a constant rate g , stock value also grows at g as well.
- “ g ” in GGM is the rate of value or capital appreciation.
- If prices are efficient, price is indeed expected to grow at rate of g .
- Another characteristic of GGM \Rightarrow components of total return stay constant through time.

4.3 Share Repurchases

- Companies can distribute free CF to shareholders in the form of share repurchases.
- Corporations do not view themselves as committed to maintain share repurchases at any specified level.
- Share repurchases are harder to forecast than cash dividends.
- Share repurchases are neutral in their effect on wealth of ongoing shareholders (if at market price).
- DDM is a valid valuation approach even when the company being analyzed engages in share repurchases.

4.4 The Implied Dividend Growth Rate

- Diff. b/w estimated values of a stock & its actual market value might be explained by different growth rate assumptions.
- Given price (V_0), expected next period dividend (D_1), and required return (r) the growth rate can be inferred.
- Calculation of implied growth rate provides an alternative perspective on valuation of stocks (fairly valued, over or undervalued).

4.5 The Present Value of Growth Opportunities

- Value of stock is
 - Value of company without earnings reinvestments.
 - PV of growth opportunities.
- Earnings growth may increase, leave unchanged, or reduce shareholder wealth depending upon relationship b/w g & opportunity cost of funds.
- Company without positive expected NPV projects is defined as a non-growth company.
- Earnings will be flat in perpetuity assuming a constant ROE.
- The no-growth value per share is

$$= \frac{E_1}{r}$$
- The actual value per share is

$$V_0 = \frac{E_1}{r} + PV\text{Go}$$
- The flexibility to adopt investments to new circumstances and information is valuable.
- High level of managerial flexibility or good business opportunities \Rightarrow higher value of PVGO
- $\frac{P_0}{E_1}$ or $\frac{P_0}{E_1}$ or $\frac{P}{E} = \frac{1}{r} + \frac{PV\text{Go}}{E_1}$
- $1/r$, value of P/E for no growth company; the 2nd component of P/E value relates to growth opportunities.
- Value of growth & value of assets in place generally have different risk characteristics.

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

- P/E expression has two uses:
 - When used with forecasts of the inputs to the model, the analyst obtains a justified P/E (fair, warranted or justified on the basis of fundamentals).
 - To weight whether the forecasts of earnings growth built into the current stock price are reasonable.
- Trailing P/E = MP per share / trailing 12 months EPS.
- Leading P/E = MP per share / next 12 month EPS.
- Leading & trailing P/E can be developed from GGM.

$$\frac{P_0}{E_1} = \frac{D_1}{E_1} = \frac{1-b}{r-g} = \text{leading } \frac{P}{E} \quad \frac{P_0}{E_0} = \frac{D_0(1+g)}{E_0} = \frac{(1-b)(1+g)}{r-g} = \text{Trailing } \frac{P}{E}$$

4.7 Estimating a Required Return using Gordon growth Model

- GGM can be used to estimate stock's required return (assuming efficient prices).

$$r = \frac{D_0(1+g)}{P_0} + g = \frac{D_1}{P_0} + g$$

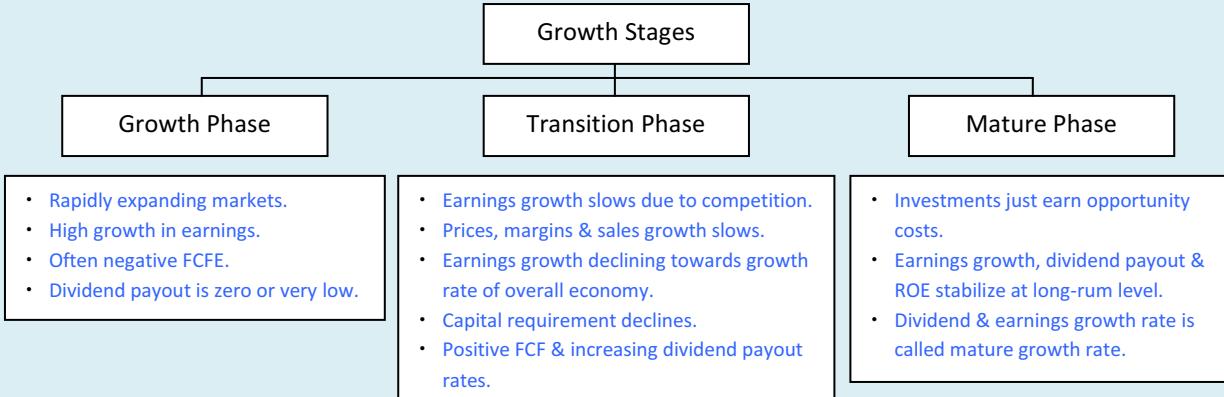
- r is composed of two parts; dividend yield $\frac{D_1}{P_0}$ & capital gains yield (g).

4.8 The Gordon Growth Model: Concluding Remarks

- Appropriate for dividend-paying companies with stable future dividend & earnings growth rate.
- Analysts use it to judge whether an equity market is fairly valued or not & for estimating equity risk premium.
- Output is very sensitive to "g" & "r".

5. MULTISTAGE DIVIDEND DISCOUNT MODELS

- Constant growth under GGM is not a realistic assumption, growth falls into three stages.



5.1 Two-Stage Dividend Discount Model

Two Versions

General two-stage Model

- Stage 1 represents abnormal growth.
- Transition to mature growth in stage 2 is abrupt.

H-Model

- Growth rate assumed to decline from abnormal to mature rate during stage 1.

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

- Two-stage DDM is useful where supernormal growth rate for a few years, after which growth rate falls to a sustainable level.
- Possible limitation \Rightarrow transition stage abrupt.
- Analysts estimate terminal value through multiple or GGM.
- Some analysts use different discount rates for different growth phases.

5.2 Valuating a Non-Dividend-Paying Company

- Stock currently paying no dividends does not mean principles of DDM do not apply.
- Non-dividend-paying company can use a multistage DDM in which first-stage dividend equals zero.
- If it is difficult to estimate timing of initiation of dividends & dividends policy then analyst may prefer FCF or RI model.

5.3 The H-Model

- Growth linearly declines through the supernormal growth period until it reaches a normal rate at the end.

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

Or

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

Where H = half life in years of the high-growth period.

- In equation one the 1st term is PV of dividend stream if it grows at g_L forever. The 2nd term is extra value occurring to stock because of supernormal growth.
- Longer the supernormal growth period & larger the extra growth rate ($g_s - g_L$) \Rightarrow higher the share value.
- H-model is an approximation model; for long extraordinary growth period or for a large diff. in growth rates the analyst may abandon the approximation model.

5.4 Three-Stage Dividend Discount Models

- Two versions
 - General three-stage model (three distinct stages of growth).
 - Growth rate in middle stage assumed to decline linearly.
- The process of using this model involves four steps.
 - i. Gather the required inputs.
 - ii. Compute the expected dividends in first stage & find the sum of their PV.
 - iii. Apply the H-model to 2nd & 3rd stages to estimate their value as of beginning of 2nd stage, then find PV.
 - iv. Sum of values obtained in 2nd & 3rd step.

5.5 Spreadsheet (General) Modeling

- Spreadsheets allow the analyst to build complicated models that would be very cumbersome to describe using algebra.
- Several analysts can work together or exchange information by sharing their spreadsheet models.

5.6 Estimating a Required Return Using Any DDM

- Given current price & all inputs to a DDM except for the required return, an IRR can be calculated.
- If price does not equal intrinsic value, the expected return will need to be adjusted to reflect the additional component of return.
- $$GGM = r = \frac{D_1}{P_0} + g$$
- $$H - model = r = \left(\frac{D_0}{P_0} \right) [(1 + g_L) + H (g_s - g_L)] + g_L$$
- When short- & long-term growth rates are same H model reduces to GGM.
- Analyst must find the rate of return such that the PV of future expected dividends equals the current stock price.

5.7 Multistage DDM: Concluding Remarks

- Multistage DDMs accommodate a variety of patterns of future stream of expected dividends.
- Multistage DDMs make stylized assumptions about growth based on a lifecycle of business.

6. THE FINANCIAL DETERMINANTS OF GROWTH RATES

- Dividend growth rate (g) = earnings retention ratio (b) \times return on equity (ROE).

6.1 Sustainable Growth Rate

- Rate that can be sustained for a given level of ROE assuming capital structure is constant.
- Sustainable growth rate = $g = b \times ROE$.
- Lower (higher) the earnings retention ratio, the lower (higher) growth rate in dividends \Rightarrow dividend displacement of earnings.
- External equity is more costly than internal equity for several reasons e.g. investment banker fees.
- Continuous issuance of new stock is not a practical funding alternative.
- Growth of capital through issuance of new debt can be sustained for considerable periods.
- Target % of debt to total capital \Rightarrow need to issue debt to maintain percentage as equity grows through reinvested earnings.

6.2 Dividend Growth Rate, Retention Rate, and ROE Analysis

- DuPont Model.

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

- 1st term is profit margin, higher profit margin, higher ROE (direct relation).
- 2nd term is total asset turnover (company's efficiency) which also has direct relation with ROE.
- $g = \frac{\text{Net income} - \text{Dividends}}{\text{Net income}} \times \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{shareholders' equity}}$ this expression is called PRAT model P = profit margin R = Retention rate A = asset turnover, T = financial leverage.
- Profit margin & asset turnover determine ROA while retention rate & financial leverage reflect financial policies.
- ROE hold exactly only when ROE is calculated using beginning-of-period shareholders' equity.
- Analysts prefer to use avg. total assets in calculating ROE.
- Analyst should be careful in projecting historical financial ratios into the future when using this analysis.

6.3 Financial Models and Dividends

- Spreadsheets are used for more complex dividend models.
- Company's ability to pay dividend in future can be predicted using one of these models.

“FREE CASH FLOW VALUATION”

DCF = Discounted cash flow

IV = intrinsic value

PV = present value

FCF = free cash flows

WCI = working capital investment

FCI = fixed capital investment.

1. INTRODUCTION TO FREE CASH FLOWS

- IV is PV of expected future CF.
- FCF \Rightarrow CF available for distribution to shareholders.
- FCF approach is used for many reasons (e.g. no dividends. Dividends paid significantly different from capacity to pay etc.)
- Value of common equity \Rightarrow by using FCFE or FCFF – MV of debt.

2. FCFF & FCFE VALUATION APPROACHES

2.1 Defining Free Cash Flow

FCFF

- CF to suppliers of capital after operating expenses & necessary investments in W.C & F.C.
- Capital suppliers are common stockholders, bondholders & sometimes preferred stockholders.

2.2 Present Value of Free Cash Flow

FCFE

- CF to common equity holders after operating exp., Interest & principle payments, investment in W.C & F.C.

2.3 Single-Stage (Constant-Growth FCFF & FCFE Models)

2.3.1 Constant-Growth FCFF valuation Model

- $FCFF_t = FCFF_{t-1}(1 + g)$
- $Firm\ value = \frac{FCFF_1}{WACC - g}$

2.3.2 Constant-Growth FCFE Valuation Model

- $FCFE_t = FCFE_{t-1}(1 + g)$
- $Equity\ value = \frac{FCFE_1}{r - g}$

2.2.1 Present Value of FCFF

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

- Equity value = firm value – MV of debt

2.2.2 Present Value of FCFE

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

- Value per share = $\frac{\text{Total equity value}}{\text{No.of shares}}$

3. FORECASTING FREE CASH FLOW

3.1 Computing FCFF from Net Income

- $FCFF = NI + NCC + Int (1 - \text{tax rate}) - FCI_{nv} - WCI_{nv}$
- If noncash \downarrow in N.I > noncash \uparrow in N.I \Rightarrow adjustment is positive & vice versa.
- After-tax interest is added back because it is CF to one of company's capital providers (similar treatment for preferred dividend).
- FCI_{nv} represents fixed capital necessary to support current & future operations.
- Cash & cash equivalents & short-term debt (notes payable & current portions of long term debt) ignore while calculating change in WC.

3.2 Computing FCFF from the Statement of Cash Flows

- $FCFF = CFO + Int (1 - \text{tax rate}) - FC_{inv}$.
- Consider treatment of interest paid, if taken out of N.I & CFO (as under U.S.GAAP), then after-tax interest must be added back to get FCFF.
- $CFO = NI + NCC - WC_{inv}$.
- Interest paid is considered as operating or financing activity under IFRS.

3.3 Noncash Charges

- Analyst should verify the NCC to ensure that FCFF estimate provides reasonable basis for forecasting.
- If company is growing (ability to indefinitely defer tax liability) adding back deferred taxes to N.I is warranted & vice versa in case of DTA.

Noncash Items and FCFF

Noncash Item	Adjustment to NI to Arrive at FCFF
Depreciation	Added back
Amortization and impairment of intangibles	Added back
Restructuring charges (expense)	Added back
Restructuring charges (income resulting from reversal)	Subtracted
Losses	Added back
Gains	Subtracted
Amortization of long-term bond discounts	Added back
Amortization of long-term bond premiums	Subtracted
Deferred taxes	Added back but calls for special attention

3.4 Computing FCFE from FCFF

- $FCFE = FCFF - Int (1 - \text{tax rate}) + \text{Net borrowing}$.
- FCFE is the amount a company can afford to pay out as dividends (often dividends differ from FCFE).
- $FCFE = NI + NCC - FCInv - WCInv + \text{Net borrowing}$.
- $FCFE = CFO - FC Inv + \text{Net borrowing}$.

3.5 Finding FCFF & FCFE from EBIT or EBITDA

- $FCFF = EBIT (1 - \text{tax rate}) + \text{Dep.} - FCInv - WCInv$.
- $FCFF = EBITDA (1 - \text{tax rate}) + \text{Dep.} (\text{tax rate}) - FCInv - WCInv$.
- Many noncash adjustments are not required when starting with EBIT or EBITDA.
- FCFE can also be calculated from EBIT & EBITDA by subtracting $\text{Int} (1 - \text{tax rate})$ & adding net borrowing to above FCFF equations.
- Noncash charges that affect taxes must be accounted for

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

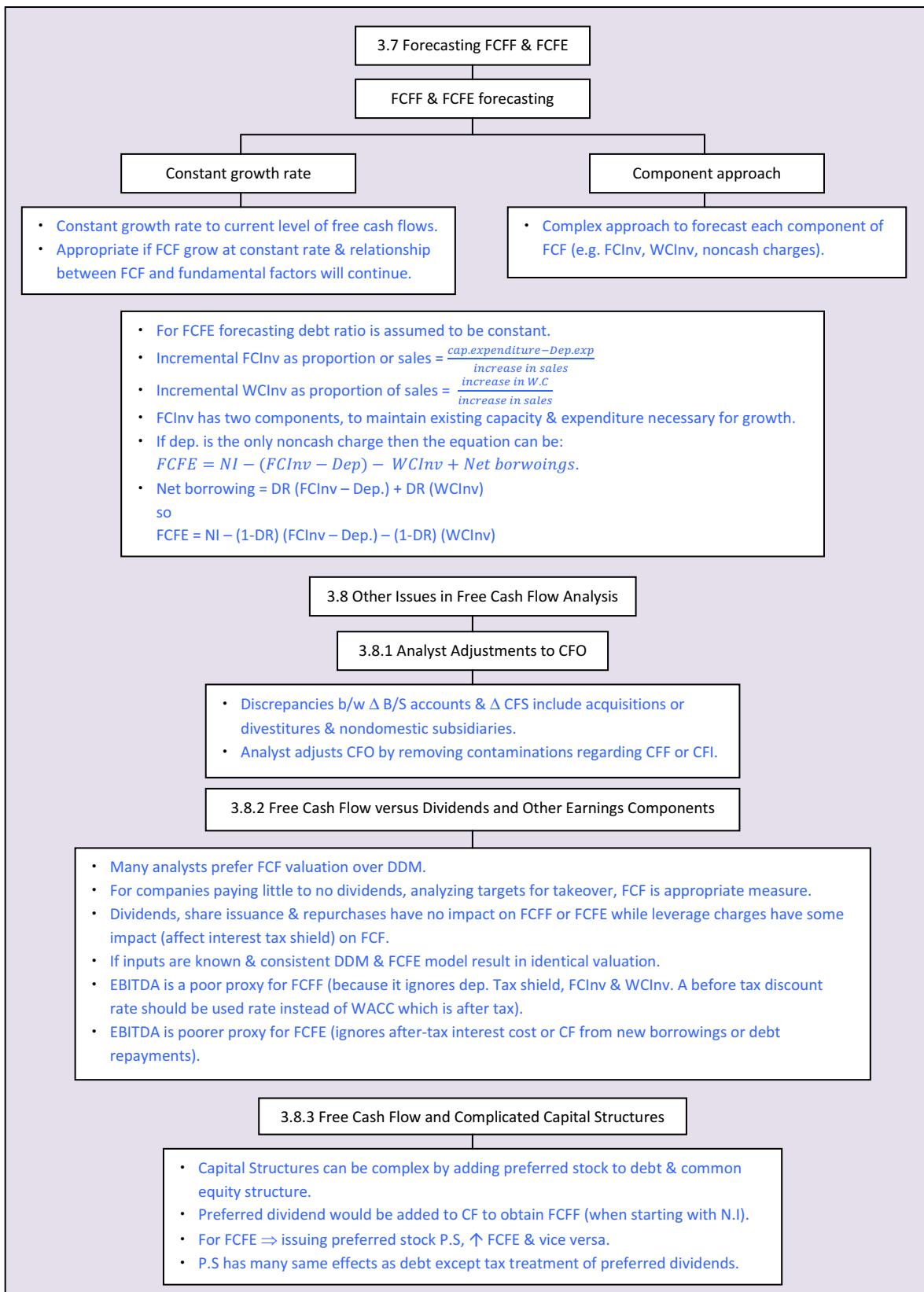
- Up till now calculation of FCF is *sources* based, it can also be *uses* based.

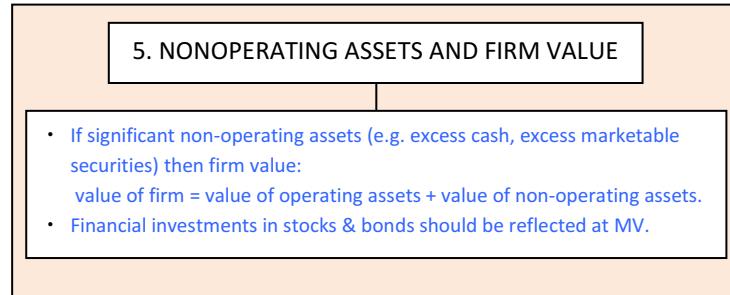
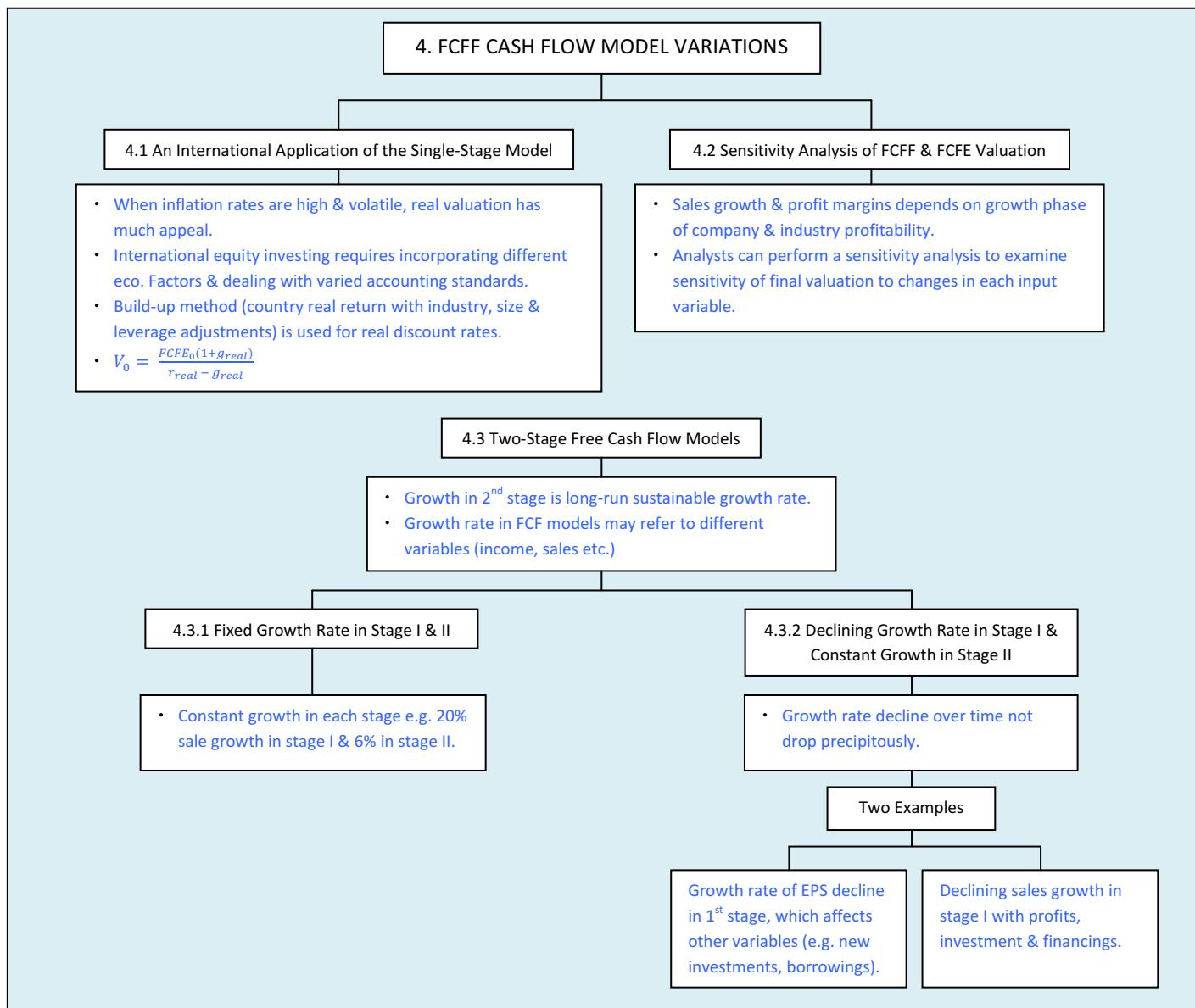
Uses of FCFF

Uses of FCFE

- Increase in cash balance + Net payment to debt providers + payments to providers of equity capital.
 - These uses must be equal to sources of FCFF.

- Increase in cash balance + payments to equity capital providers.
 - Uses of FCFE must equal to sources of FCFE.





“MARKET-BASED VALUATION: PRICE AND ENTERPRISE VALUE MULTIPLES”

DCF = Discounted Cash Flows

FV = Fair Value

BVPS = Book Value Per Share

NE = Normalized Earnings

ROA = Return On Assets

ROE = Return On Equity

EY = Earnings Yield

IR = Interest Rate

RI = Residual Income

NCC = Noncash Charges

WC = Working Capital

CFO = Cash Flow From Operation

DY = Dividend Yield

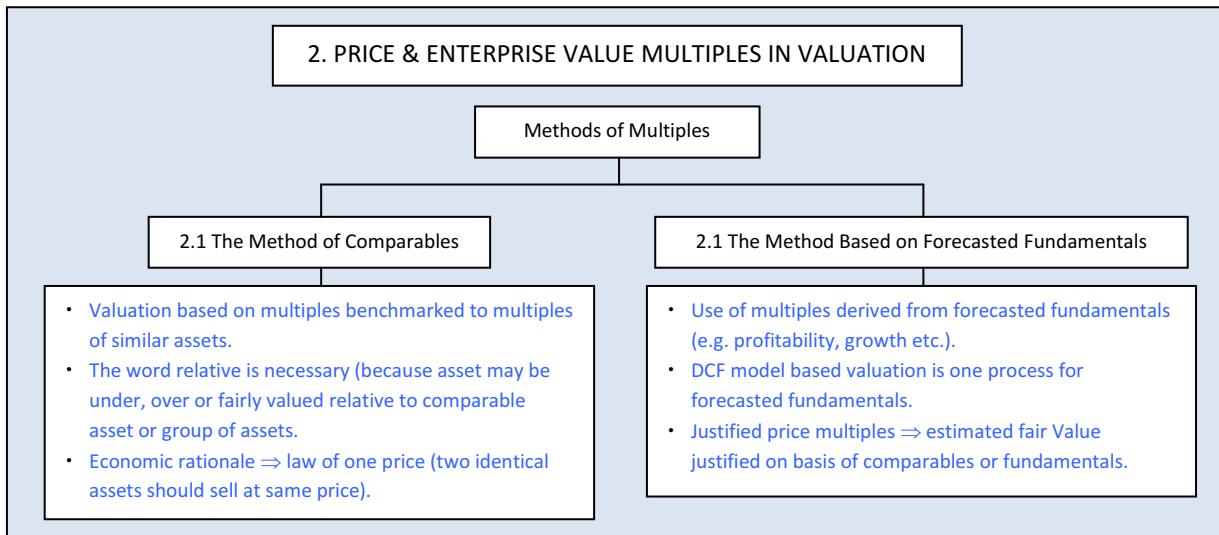
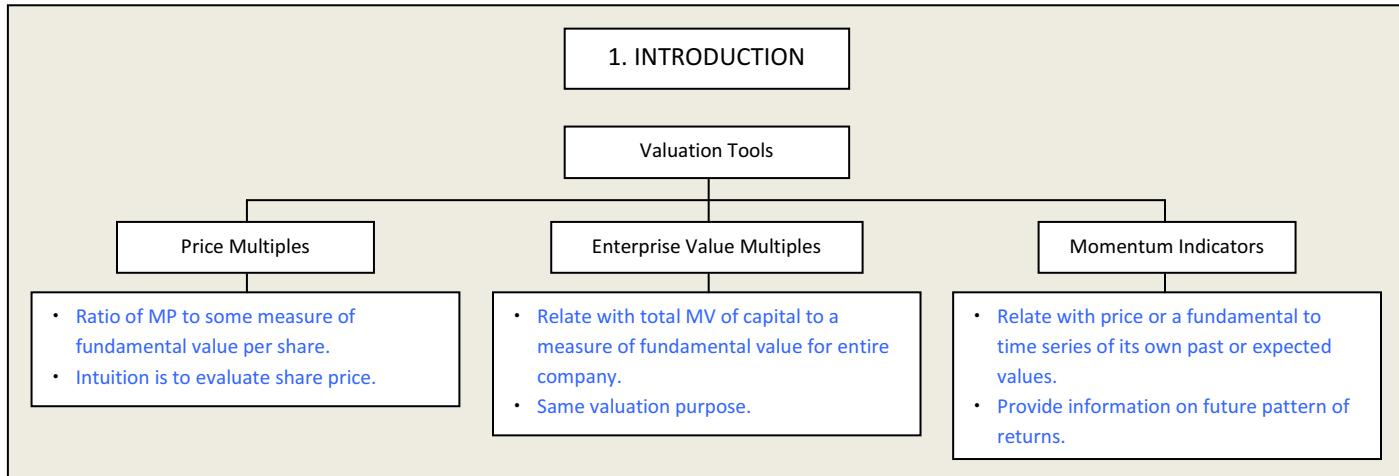
EV = Enterprise Value

ROIC = Return On Invested Capital

TIC = Total Invested Capital

SD = Standard Deviation

HM = Harmonic Mean



3. PRICE MULTIPLES

3.1 Price to Earnings

Ratio of MP (easily determinable) to EPS (based on complex accrual accounting rules).

Rationales & Drawbacks

Rationales

- Earning power \Rightarrow chief driver of investment value.
- Widely recognized & used.

Drawbacks

- EPS can be zero or negative relative to price so no economic sense.
- Recurring components difficult to distinguish from transient components.
- Accounting estimates & choices may distort EPS.

3.1.1 Alternative Definitions of P/E

Trailing P/E

Current MP divided by most recent four quarter EPS.

Forward P/E

Current price divided by next year's expected earnings.

3.1.2 Calculating the Trailing P/E

3.1.2.1 Analyst Adjustments for Nonrecurring Items

- Nonrecurring earnings are removed by analyst.
- Identification of nonrecurring items requires detailed analysis (I.S., footnotes etc.).
- CF component of earnings should receive greater weight than accrual component.

3.1.2.2 Analyst Adjustments for Business-Cycle Influences

- Somewhat different from company-specific effects.
- Trailing EPS often depressed or negative at bottom of cycle & vice versa.
- Normalized EPS \Rightarrow EPS expected under mid-cyclical conditions.
- Normalized earnings for a loss reporting cyclical company can also be calculated as
 - By multiplying total assets to long-run ROA.
 - By multiplying total equity to long-run ROE.

Methods of Calculating Normalized Earnings

Historical Avg. EPS

- Avg. EPS over most recent full cycle
- Not account for changes in business's size.

Average ROE

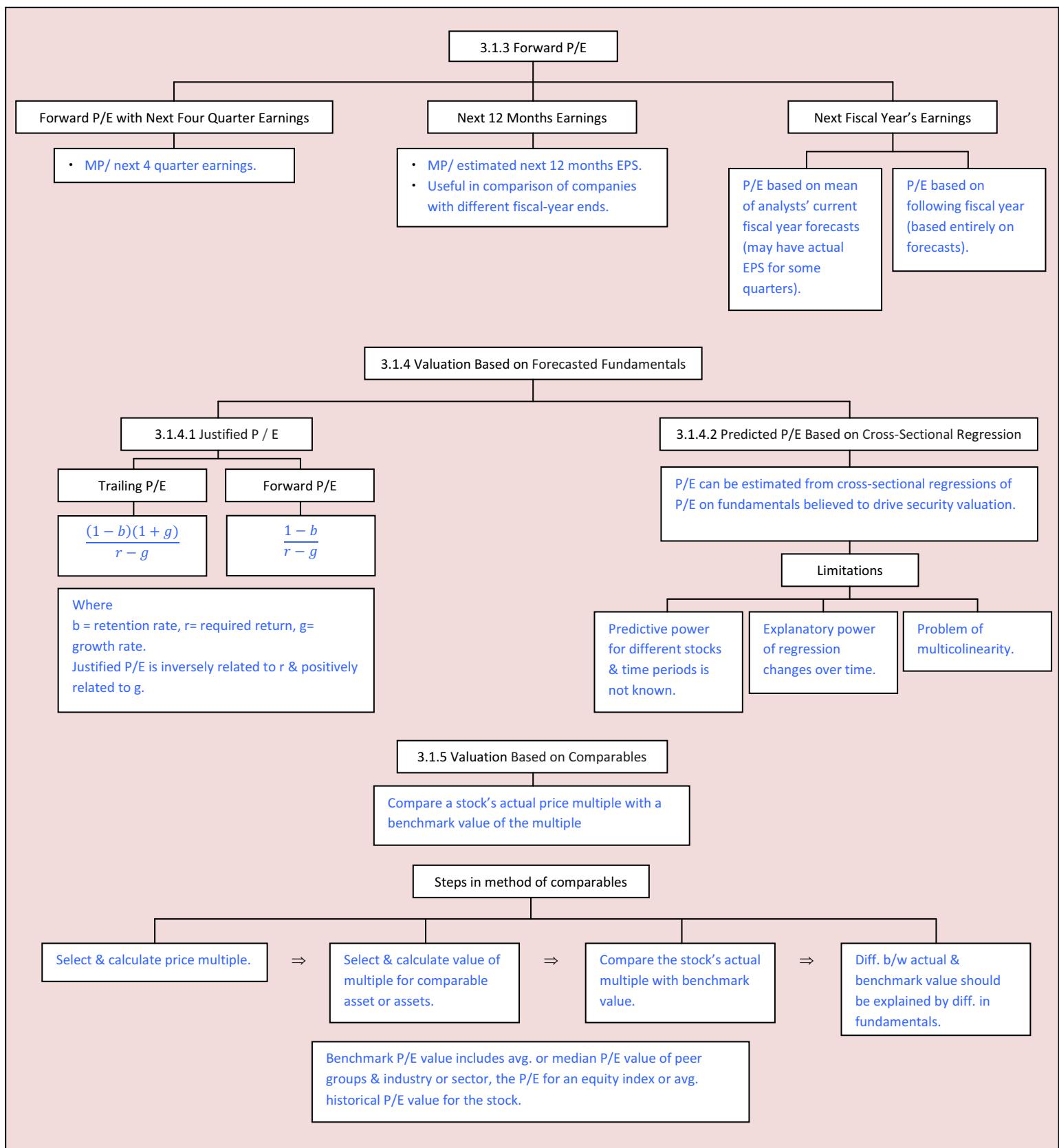
- Avg. ROE (recent cycle) \times BVPS.
- Consider business size.

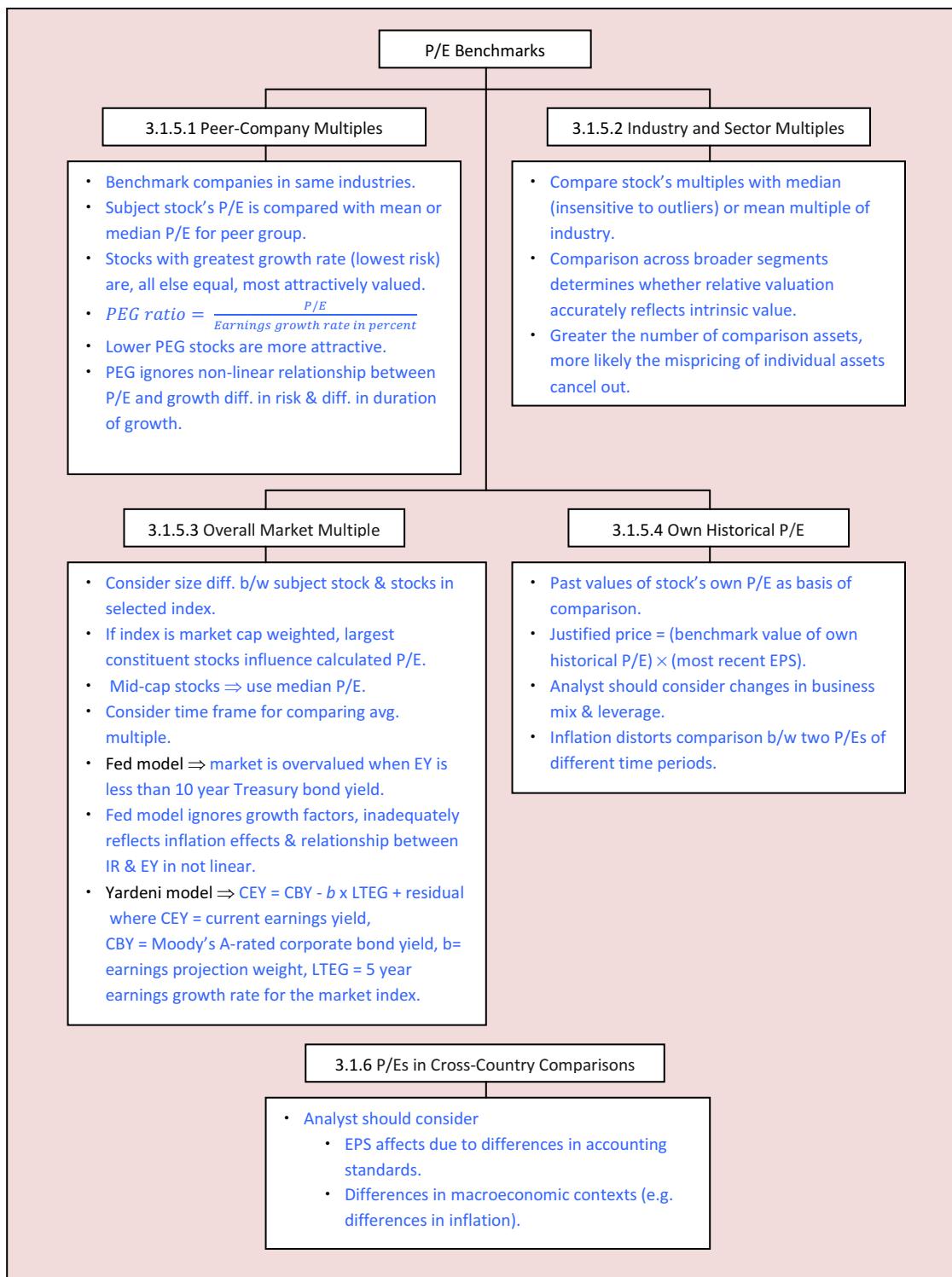
3.1.2.3 Analyst Adjustments for Comparability with Other Companies

- Analyst adjusts EPS for differences in accounting methods.
- Usually FSA adjustments also incorporated in P/E analysis.

3.1.2.4 Dealing with Extremely Low, Zero, or Negative Earnings

- Analyst may use normalized EPS if current earnings are zero or negative.
- Inverse price ratio (earnings yield) is another solution.
- Ranked by highest to lowest P/E, securities are ranked costly to cheapest & vice versa when ranked by EY.





3.1.7 Using P/Es to Obtain Terminal Value in Multistage Dividend Discount Models

Terminal price multiples \Rightarrow multiples used to estimate terminal value.

Terminal Price Multiples

Based on Fundamentals

Trailing Multiple

By dividing both sides of GGM by EPS at time n (final stage begins).

Leading Multiple

Dividing both sides by EPS at time n+1.

Based on Comparables

Trailing Multiple Based Terminal Value

$$V_n = \text{Benchmark value of forward terminal } P/E \times E_n$$

Leading Multiple Based Terminal Value

$$V_n = \text{Benchmark value of forward terminal } P/E \times E_{n+1}$$

Calls for specific estimates.

- Based on market data
- Terminal value may reflect mispricing.

3.2 Price to Book Value

$$P/B = \frac{MP \text{ per share}}{BV \text{ per share}}$$

Rationales & Drawbacks

Rationales

- BV is generally positive (cumulative BS amount).
- BVPS is more stable than EPS.
- Appropriate for liquid asset companies.
- Appropriate for companies that are going out of business.

Drawbacks

- Ignores certain assets (e.g. human capital).
- Valuation is misleading when level of assets used by companies differ significantly.
- Accounting effects & difference (e.g. R&D) may impair comparability.
- Inflation & technological changes create difference b/w book value & market value.
- Share issues or repurchases distort historical comparisons.

3.2.1 Determining Book Value

$$BVPS = \frac{\text{Total assets} - \text{Total liabilities} - \text{Preferred stock}}{\text{No. of shares outstanding}}$$

Adjustments in P/B Ratio

- Tangible BVPS = common equity – intangible assets.
- Exclusion of all intangibles may not be warranted (e.g. patents which are separable from the entity and sold).

Certain adjustments for enhancing comparability (e.g. two firms with different inventory accounting)

B/S should be adjusted for significant off-balance sheet assets & liabilities & diff. in accounting standards.

3.2.2 Valuation Based on Forecasted Fundamentals

- Assuming GGM & using expression $g = b \times ROE$ the justified P_0/B_0 is calculated as follows:

$$\frac{P_0}{B_0} = \frac{ROE - g}{r - g}$$

- Large ROE in relation to r , higher justified P/B ratio.

- Justified P/B based on R.I valuation is

$$\frac{P_0}{B_0} = 1 + \frac{PV \text{ of expected future residual earnings}}{B_0}$$

3.2.3 Valuation Based on Comparables

- Follow steps given in section 3.1.5.
- P/B should consider ROE, risk and expected earnings growth differences.

3.3 Price to Sales

Rationales & Drawbacks

Rationales

- Sales are less subject to distortion than other fundamentals.
- Sales can never be negative, so P/S can always be used.
- Sales are more stable than EPS.
- P/S is appropriate for stocks of mature, cyclical & zero-income companies.

Drawbacks

- High sales growth does not assure operating profits
- Share price reflects the effects of debt financing while sales are a pre-financing debt measure.
- Ignore cost structure differences among companies.

3.3.1 Determining Sales

- $P/S = \frac{MP \text{ per share}}{\text{Annual net sales per share}}$
Where net sales = total sales - returns & customer discounts.
- Analyst should evaluate revenue recognition practices before relying on P/S.
- If questionable revenue recognition practices \Rightarrow avoid investment or \uparrow risk premium.

3.3.2 Valuation Based on Forecasted Fundamentals

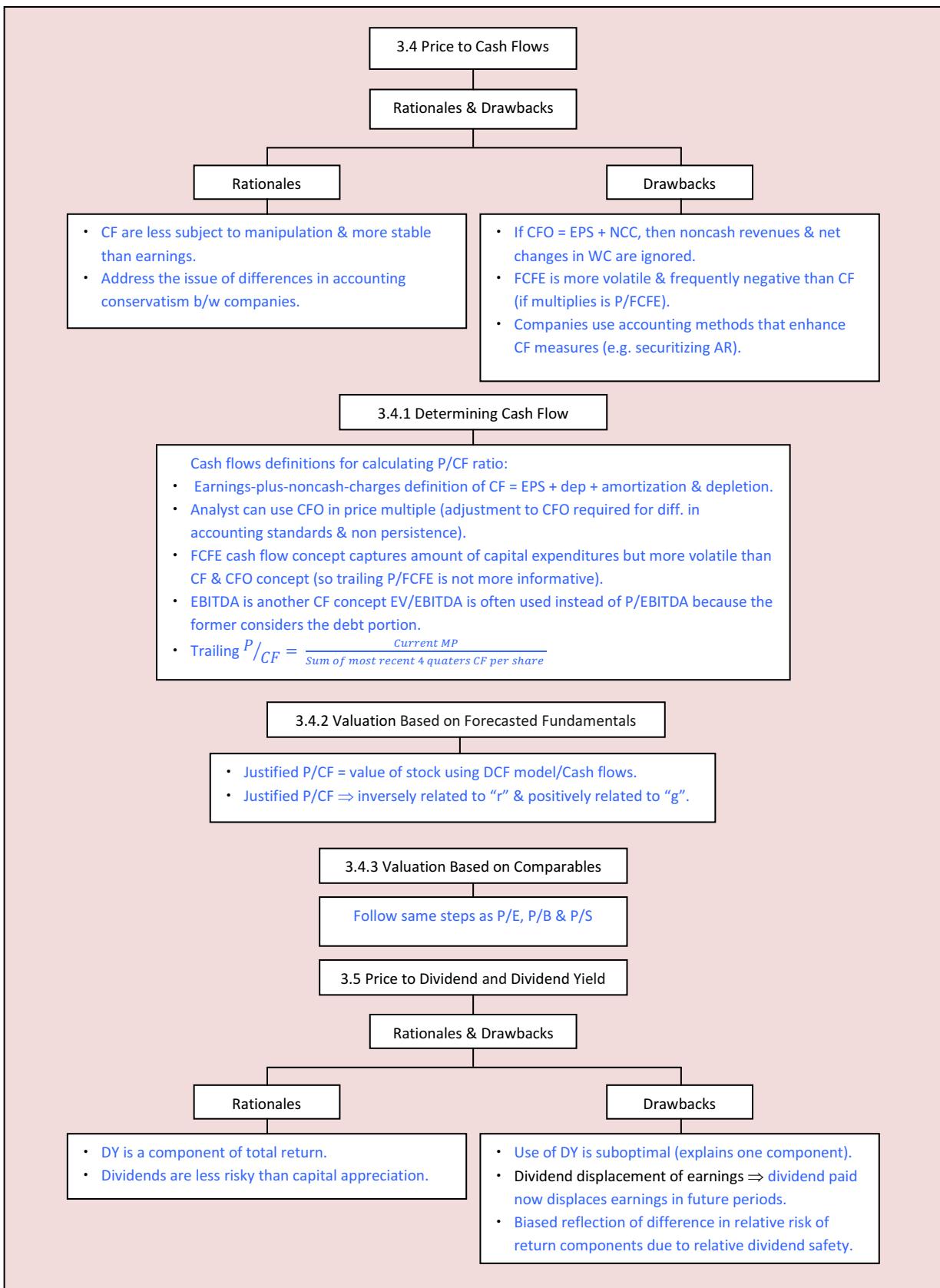
- In terms of GGM

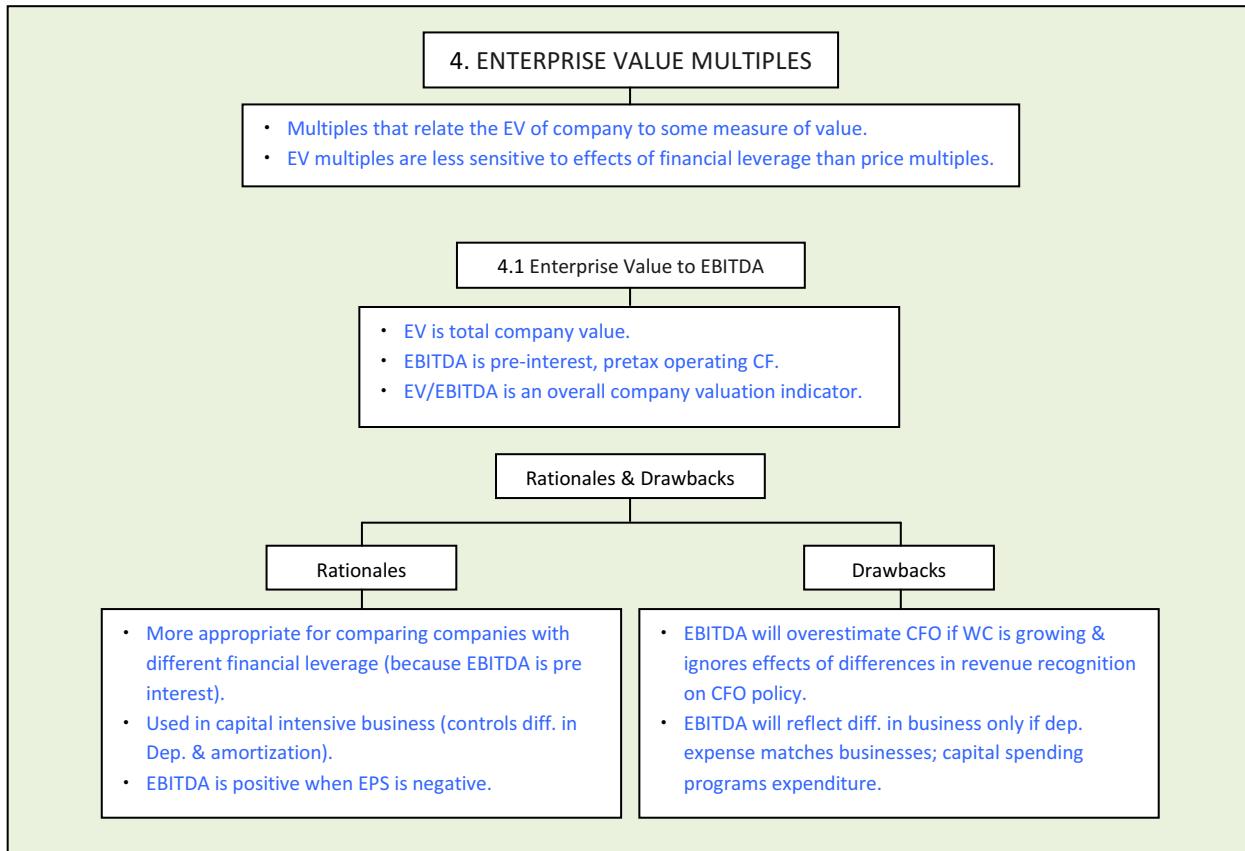
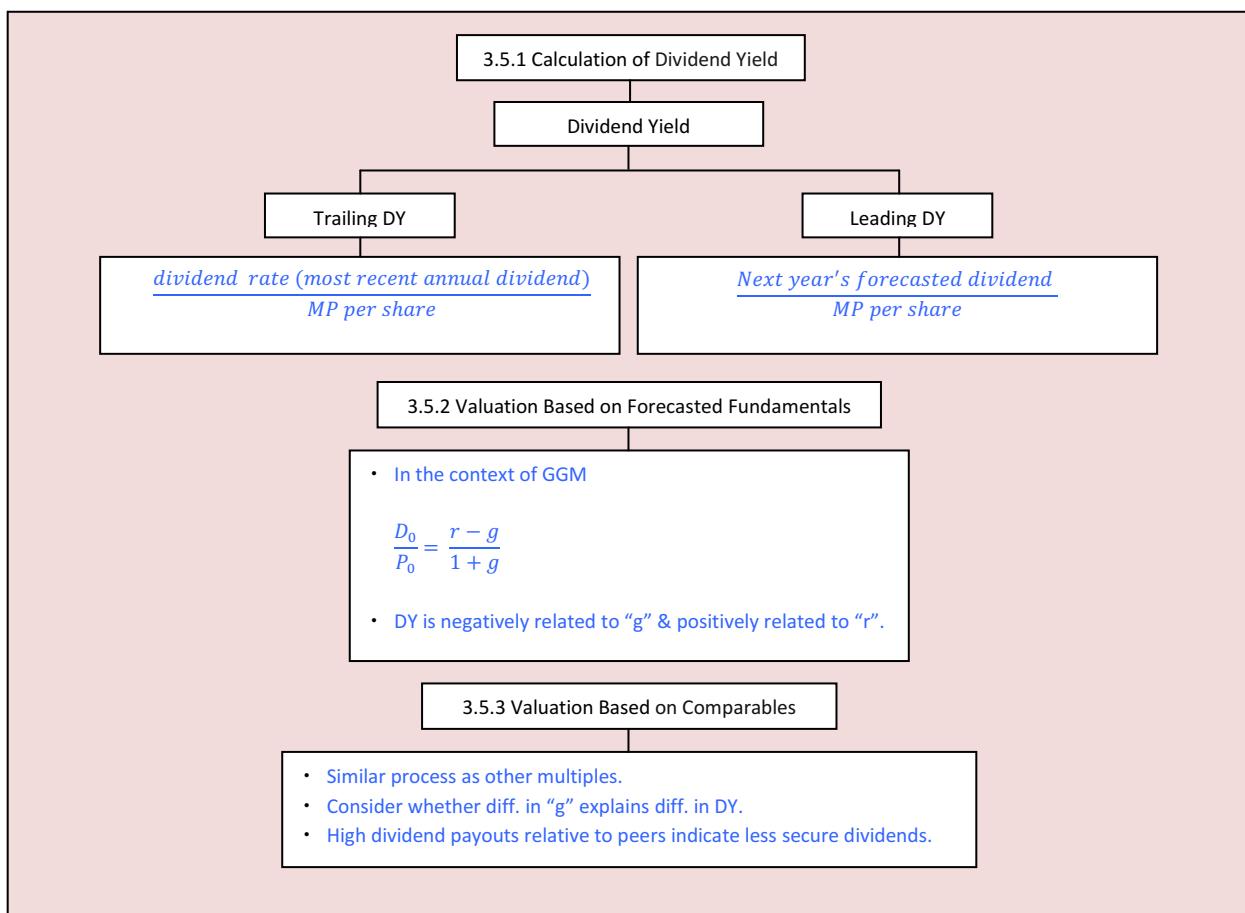
$$\frac{P_0}{S_0} = \frac{(E_0/S_0)(1-b)(1+g)}{r-g}$$

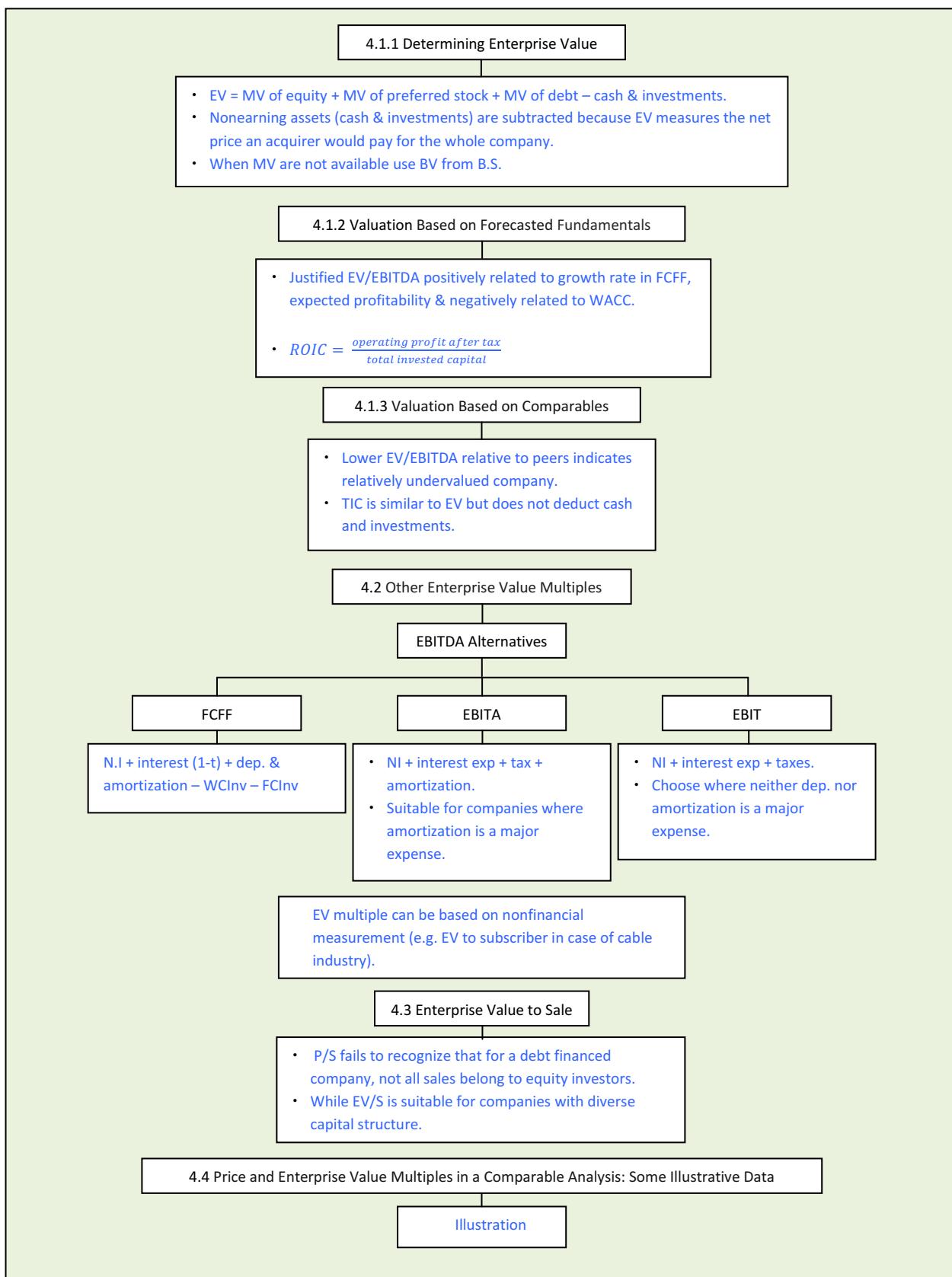
- P/S is an increasing function of profit margin & earnings growth rate.
- We can also derive 'g' by restating the above equation.

3.3.3 Valuation Based On Comparables

- Follow steps given in section 3.1.5.
- P/S usually based on trailing sales, but can be based on forecasted sales.







5. INTERNATIONAL CONSIDERATIONS WHEN USING MULTIPLES

- Across border comparisons involve diff. in accounting methods.
- Cultural, economic difference & resulting risk & growth differences.
- Accounting differences affect comparability of all price multiples.
- P/CFO & $\frac{P}{FCFE}$ least affected while P/B , P/E & multiples based on EBITDA most affected by accounting differences.

6. MOMENTUM VALUATION INDICATORS

- Unexpected earnings (earnings surprise) \Rightarrow diff. b/w reported & expected earnings.

$$UE_t = EPS_t - E(EPS_t)$$
- scaled earning surprise = $\frac{\text{unexpected earnings}}{\text{SD of analyst's earning forecast}}$
- standardized unexpected earnings (SUE) = $\frac{\text{earning surprise}}{\text{SD of earning surprise}}$
- Smaller the historical size of forecast errors; the more meaningful a given size of EPS forecast error.

Relative-Strength Indicators

Compare stock's performance with its own past performance or performance of group of stocks.

- Price momentum \Rightarrow indicator, which compares stock's performance with its past performance, is the stock's compound rate of return.
- Rational \Rightarrow pattern of reversal exists.

- Other definition \Rightarrow stock's return over a recent period to return over a longer period.
- A simple indicator is = $\frac{\text{stocks performance}}{\text{equity index performance}}$
- If this ratio \uparrow , stock price \uparrow relative to index.

Momentum indicators may provide a clue when market price converges to intrinsic value.

7. VALUATION INDICATORS: ISSUES IN PRACTICE

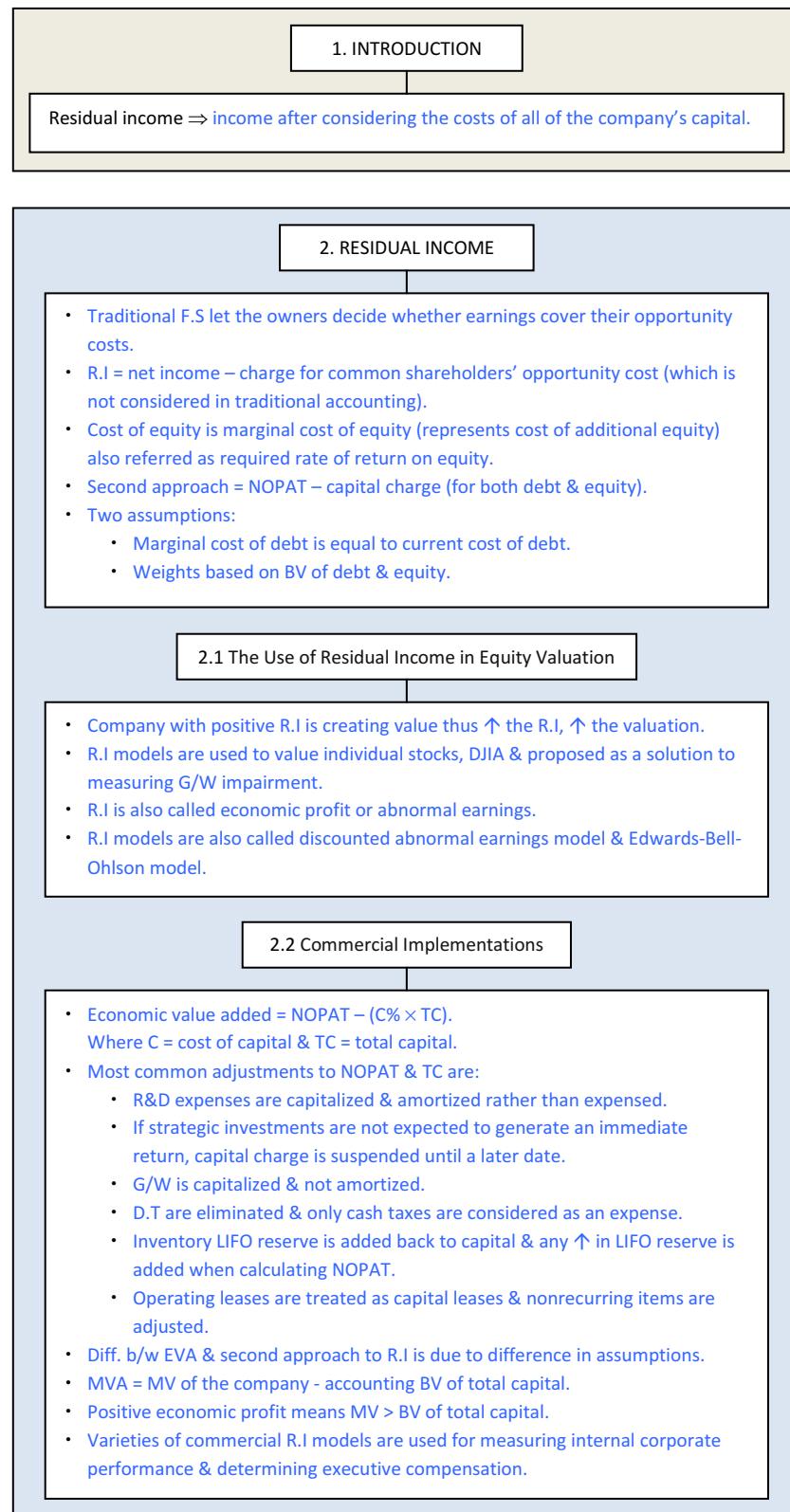
7.1 Averaging Multiples: The Harmonic Mean

- $\text{Harmonic Mean (HM)} = X_H = \frac{n}{\sum_{i=1}^n (1/X_i)}$
 Where X_i is ratio of individual holding
- $\text{Weighted harmonic mean} = X_{WH} = \frac{1}{\sum_{i=1}^n (W_i/X_i)}$
 Where W_i are portfolio value weights & $X_i > 0$ for $i = 1, 2, \dots, n$.
- HM P/E gives less weight to higher P/E & vice versa.
- HM reduces impact of larger outliers while median mitigates effect of outliers.

“RESIDUAL INCOME VALUATION”

R.I = Residual Income
 F.S = Financial Statements
 NOPAT = Net Operating Profit after Tax
 BV = Book Value
 DJIA = Dow Jones Industrial Average
 DCF=Discounted Cash Flows

TV = Terminal Value
 FCF = Free Cash Flows
 OCI = Other Comprehensive Income
 DT = Deferred Taxes
 MVA = Market Value Added
 EVA = Economic Value Added
 A&L = Assets & Liabilities
 DDM=Dividend Discount Model



3. THE RESIDUAL INCOME MODEL

- Companies that earn more (less) than cost of capital should sell for more (less) than BV.
- Intrinsic value of equity is sum of two components;
 - Current BV of equity.
 - PV of expected future RI.
- $$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{RIt}{(1+r)^t} = B_0 + \sum_{t=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}$$

Where

V_0 = value of a share of stock today (t=0)
 B_0 = current per share BV of equity
 B_t = expected BV of equity at time t
 r = cost of equity
 E_t = expected EPS for period t
 RI_t = expected per share RI ($E_t - rB_{t-1}$)
- When EPS > per share cost of equity, RI is positive & vice versa.

3.1 The General Residual Income Model

- R.I model has a clear relationship with DDM (above model can be derived from DDM).
- Clean surplus accounting \Rightarrow income reflects all changes in BV of equity other than ownership transactions.
- $B_t = B_{t-1} + E_t - D_t$
- General expression for R.I model based on the work of Edwards & Bell & Ohlson & Feltham is stated as:

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - r) B_{t-1}}{(1 - r)^t}$$

Here ROE uses beg. BV of equity rather avg. BV in denominator.

3.2 Fundamental Determinants of Residual Income

- Justified $\frac{P_0}{B_0} = \frac{ROE - g}{r - g}$ or $1 + \frac{ROE - r}{r - g}$
- Single stage (constant growth) R.I model $\Rightarrow V_0 = B_0 + \frac{ROE - r}{r - g} B_0$
 - If ROE = r then $V_0 = B_0$
 - 2nd term is PV of expected economic profits.
- Justified $\frac{P_0}{B_0}$ is directly related to expected future RI.
- Tobin's q = $\frac{MV \text{ of debt \& equity}}{replacement \text{ cost of total assets}}$

Although similar to P/B, Tobin's q has some obvious differences;

- Numerator includes MV of total capital & denominator uses total assets rather equity.
- Assets are valued at replacement cost (consider inflation impact) rather than historical cost.

3.3 Single-Stage Residual Income Valuation

- Assumes constant earnings growth rate & ROE.
- Implied growth rate can be assessed by inputting current price into model & solving for "g".
- Drawback \Rightarrow model assumes that excess ROE above cost of equity will persist indefinitely.
- Abnormally high ROE, \uparrow competition, \downarrow return & vice versa.
- Over time, company's ROE will revert to mean value & at some point RI will be zero.

3.4 Multistage Residual Income Valuation

- Used to forecast R.I for a certain time horizon & then estimate a terminal value based on continuing R.I at the end of that horizon.
- Continuing R.I \Rightarrow R.I after the forecast horizon.
- R.I often models ROE fading toward the cost of equity (R.I approaches to zero).
- In R.I valuation BV often captures a large portion of total value & TV may not be a large component of total value (contrasts with other multistage approaches e.g. DDM, DCF).
- One of the following assumptions is made for continuing R.I;
 - R.I continues indefinitely at a positive level.
 - R.I is zero from terminal year forward.
 - R.I \downarrow to zero as ROE reverts to cost of equity.
 - R.I reflects the reversion of ROE to some mean level.
- Finite horizon model of R.I valuation assumes certain premium over book value $(P_T - B_T)$ so:

$$V_0 = B_0 + \sum \frac{(E_t - rB_{t-1})}{(1+r)^t} + \frac{P_T - B_T}{(1+r)^T}$$
 - For long forecast periods this premium may be treated as zero & for short periods it must be calculated.
- R.I model (R.I fades over time)

$$V_0 = B_0 + \sum_{t=1}^T \frac{(E_t - rB_{t-1})}{(1+r)^t} + \frac{E_T - rB_{T-1}}{(1+r-\omega)(1+r)^{T-1}}$$
- Persistence factor (ω) represents that behavior of R.I fades over time (b/w zero & one).
- Persistence factor "1" mean R.I will not fade at all & "0" mean R.I will not continue after initial forecast horizon.
 - \uparrow The persistence factor, \uparrow stream of R.I in final stage.
 - Persistence factor varies from company to company.

Lower Residual Income Persistence	Higher Residual Income Persistence
Extreme accounting rates of return (ROE)	Low dividend payout
Extreme levels of special items (e.g., nonrecurring items)	High historical persistence in the industry
Extreme levels of accounting accruals	

4. RESIDUAL INCOME VALUATION IN RELATION TO OTHER APPROACHES

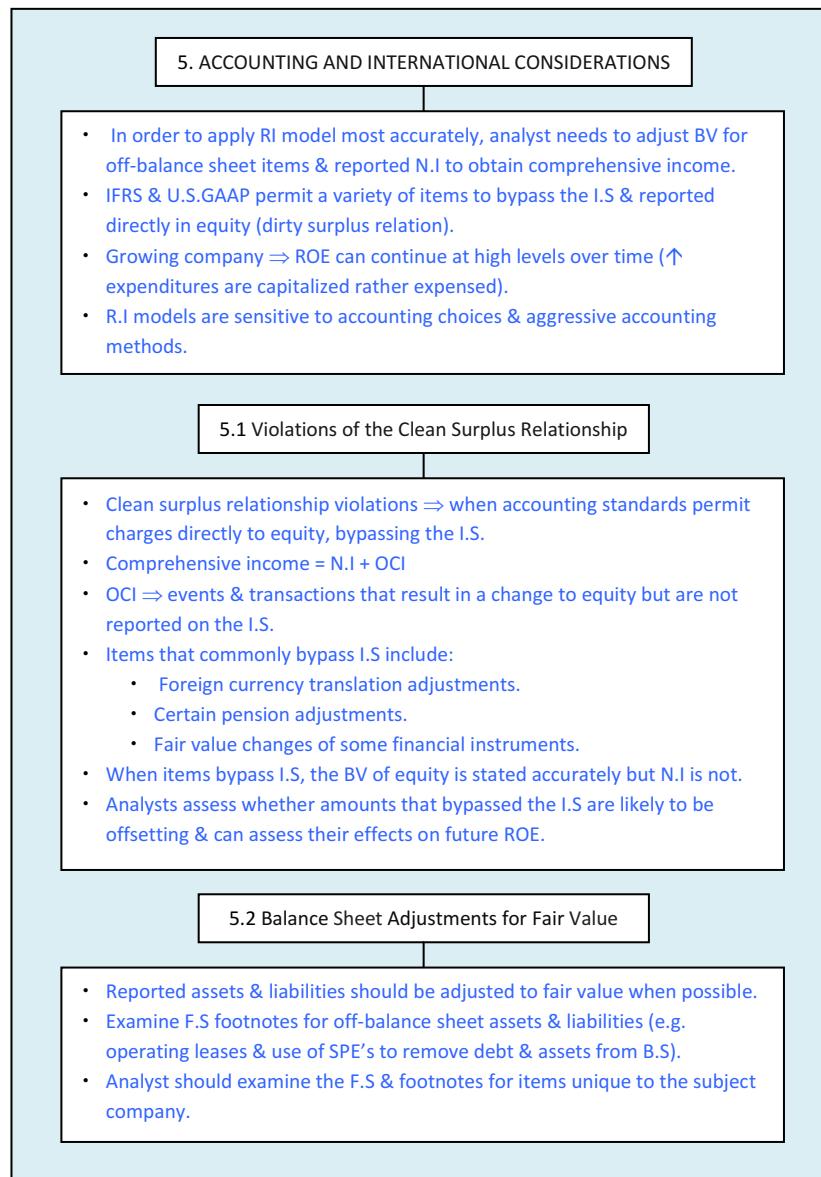
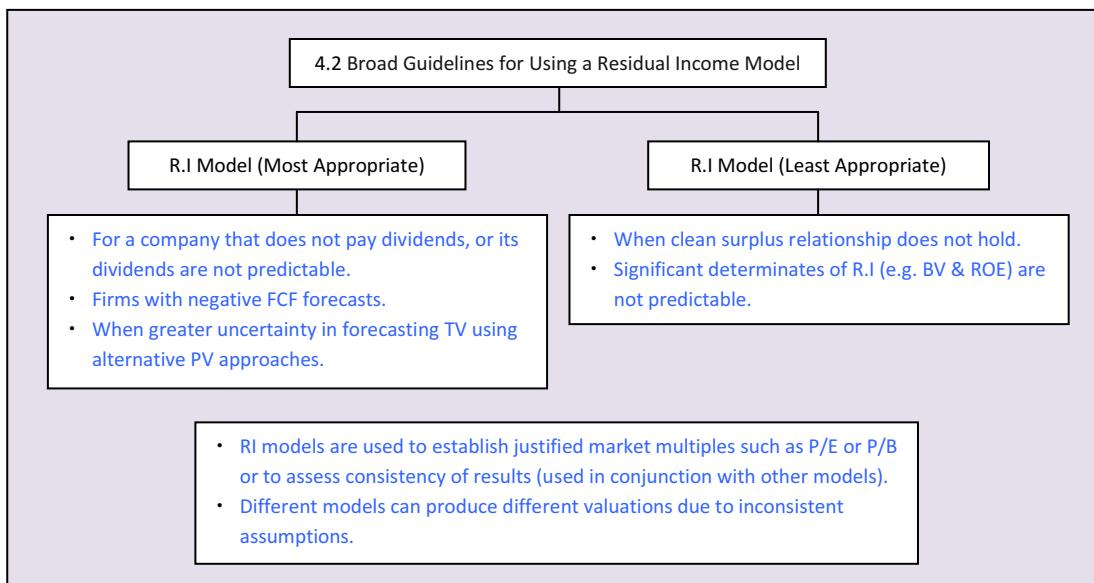
- Total PV should be consistent under all valuation models (DDM, FCF or R.I) if applied correctly.
- Earlier value recognition under R.I model has a practical advantage (less sensitive to terminal value estimate).

4.1 Strengths and Weaknesses of the Residual Income Model

Strengths

Weaknesses

- | | |
|---|--|
| <ul style="list-style-type: none"> TV does not make up a large portion of total PV relative to other models. R.I models use readily available accounting data. Applied to companies with negative CF or not paying dividend currently. Focuses on economic profitability & can be used when CF are unpredictable. | <ul style="list-style-type: none"> Accounting data is subject to manipulation & require significant adjustments. Model requires that clean surplus relationship hold. Model assumes that cost of debt capital is reflected appropriately by interest expense. |
|---|--|



5.3 Intangible Assets

- These assets can have a significant effect on BV.
- Separately identifiable intangibles \Rightarrow appropriate to include these in determination of BV of equity.
- Intangible assets often are not recognized as assets unless they are obtained in an acquisition (require special consideration).
- For a mature company, ROE should reflect the productivity of R&D expenditures (higher revenues to offset expenditures over time).
- R&D (capitalizing v/s expensing) \Rightarrow significant implication for long-term ROE \Rightarrow analyst should be careful.

5.4 Nonrecurring Items

- Forecast of future R.I. should be based on recurring items.
- Misclassifications (e.g. nonoperating income to operating income) can lead to $\uparrow\downarrow$ of future R.I. if no adjustments are made.
- No adjustments to BV are necessary for these items (because nonrecurring G/L are reflected in the value of assets in place).

5.5 Other Aggressive Accounting Practices

- Companies may engage in activities that accelerate revenues in the current period.
- Analyst should carefully examine the use of reserves when assessing R.I.

5.6 International Considerations

- Measures of BV & earnings differ internationally (due to differences in international accounting standards).
- Even within a single set of accounting standards companies make choices & estimates that can affect valuation.
- Three primary considerations in applying R.I. model internationally:
 - Availability of reliable earnings forecasts.
 - Clean surplus relationship hold.
 - Accounting rules do not result in delayed recognition of value changes.

"PRIVATE COMPANY VALUATION"

PC= Private Company
 NE= Normalized Earnings
 FCFF= Free Cash Flows To Firm
 FCFE= Free Cash Flow To Equity
 DR= Discount Rate
 TV= Terminal Value
 FCF= Free Cash Flows

CCM= Capitalized Cash Flow Methods
 MVIC= Market Value of Invested Capital
 CP= Control Premium
 PTM= Prior Transaction Method
 DLOC= Discount For Lack Of Control
 DLOM= Discount For Lack Of Marketability

1. INTRODUCTION TO FREE CASH FLOWS

Valuation of equity of private companies is a major field of equity valuation.

2. THE SCOPE OF PRIVATE COMPANY VALUATION

PCs range from single employee to large successful companies.

2.1 Private and Public Company Valuation: Similarities and Contrasts

Company-Specific factors

Stage in life cycle

- PCs may at earliest stage or include large, stable, or failed companies.
- Public companies typically advanced in their life cycle.

Size

- PC are small size, ↑ risk premium, ↓ growth prospects companies.
- Public company ⇒ ↑ access to capital.

Overlap of shareholders & management

- Less external pressure & agency issues & longer term perspective in PC.

Quality/depth of management

Small PC are less attractive & have lower management depth therefore ↑ risk, ↓ growth.

Quality of financial & other information

- High quality information in public company due to detailed disclosure requirements
- Limited information in PC, ↑ risk.

Pressure from short-term investors

Short-term stock price performance pressure in public companies, longer term perspective in PC.

Tax concern

Tax reduction is more important goal for PC (greater benefit to owner)

Stock-Specific factors

Liquidity of equity interest

Less liquid stocks in PC so ↓ share price.

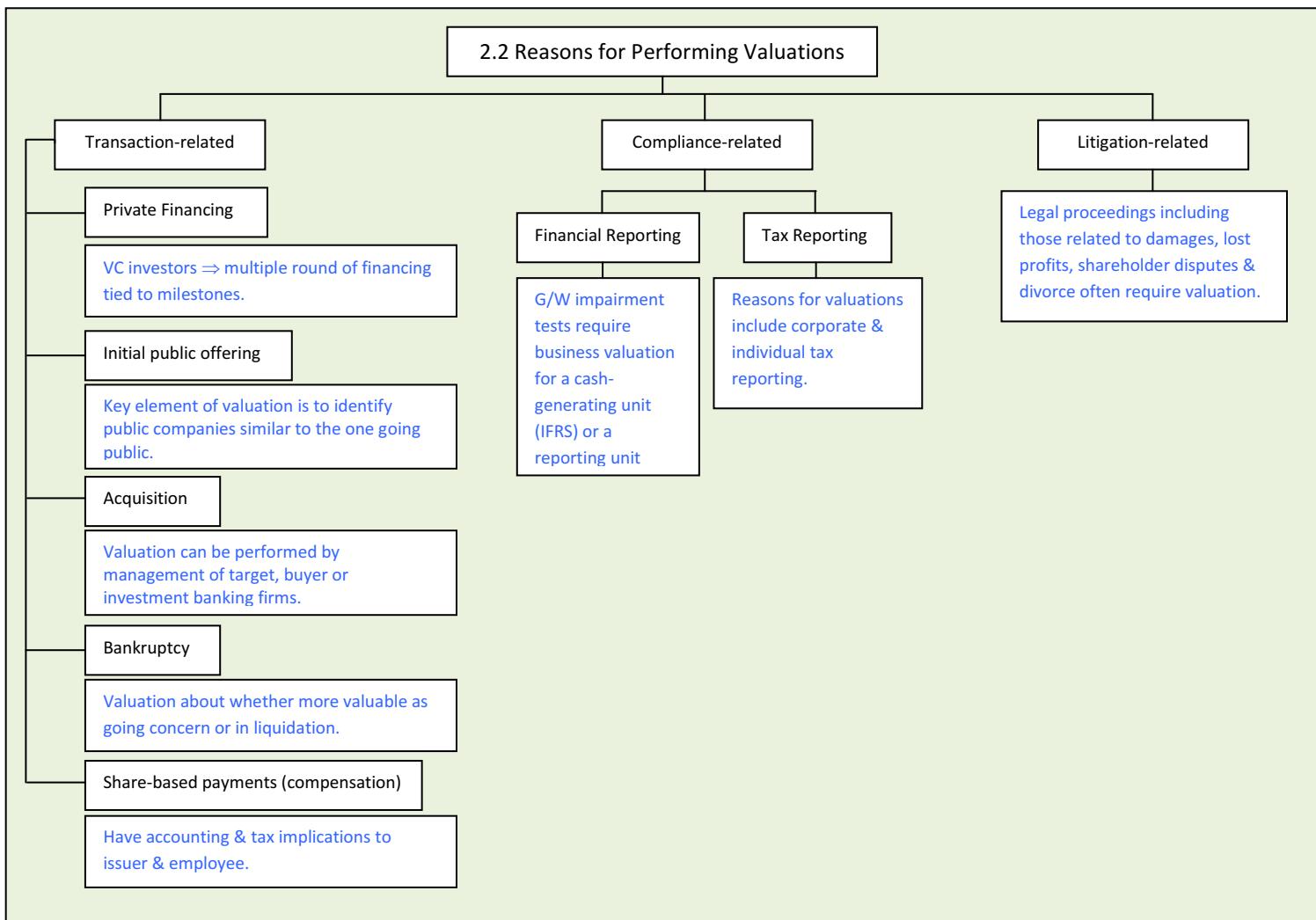
Concentration of control

Leads to benefit some shareholders at cost of others in PC.

Potential agreements

- Agreements to restrict ability to sell shares, ↓ marketability.

- Stock-specific factors ⇒ negative for PC.
- Company specific factors ⇒ can be positive or negative.



3. DEFINITIONS (STANDARDS) OF VALUE

- Specifies how value is understood.
- Key elements in determining definition ⇒ status of company & use of valuation.

Major definitions of value

Fair Market Value

Price at which property changes hands b/w hypothetical willing & able buyer & seller at arm's length.

Market Value

Estimated amount for which property exchanges on date of valuation b/w a willing buyer & seller in arm's length after proper marketing.

Fair Value

Financial Reporting

IFRS

U.S.GAAP

Fair Value (litigation)

Generally similar to definitions of financial reporting.

Investment Value

- Value to a particular investor based on requirements & expectations.
- Focus on specific buyer rather than value in a market context.

Intrinsic Value

True "or" real value on basis of evaluation or available facts & become MV when other investors reach the same conclusion.

Price received for asset or paid for transfer in a current transaction b/w market place participants.

Price received to sell an asset or paid to transfer a liability b/w participants at measurement date.

4. PRIVATE COMPANY VALUATION APPROACHES



4.1 Earnings Normalization & Cash Flow Estimation Issues

4.1.1 Earnings Normalization Issues for Private Companies

- NE \Rightarrow Economic benefits adjusted for nonrecurring or unusual items to eliminate anomalies.
- Compensation expenses are overstated in PC, \downarrow taxable income & tax expenses.
- Personal expenses may be included as expenses of PC.
- Some analysts separate real estate owned by PC from operating company (consider non-operating asset).
- If real estate is leased to PC by a related entity, lease expense requires adjustment to market rental rate.
- Further adjustment can be related to inventory accounting methods, depreciation assumptions & capitalizing v/s expensing.
- Reviewed financial statement \Rightarrow provides an opinion letter with assurance less than audited F.S.
- Compiled FS \Rightarrow not accompanied by auditor's opinion letter (greater analytical adjustment).

4.1.2 Cash Flow Estimation Issues for Private Companies

- FCFF \Rightarrow use to value firm.
 - FCFE = use to value equity.
 - Future CF estimation \Rightarrow wide range CF uncertainty (project possible future scenarios).
 - Discount rate should reflect risk of achieving projected CF.
- Overall company value

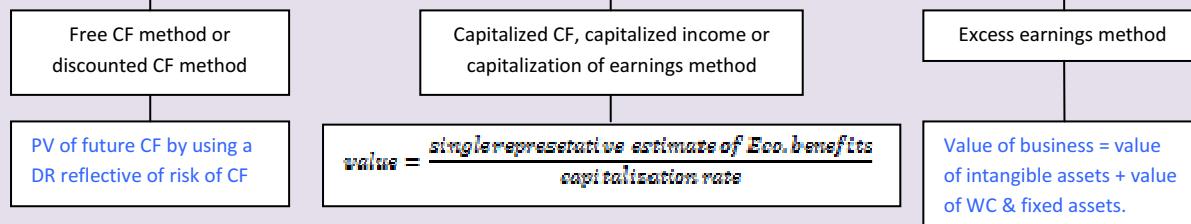
Probability-weighted avg. of company's estimated scenario values.

Expected future CF should be discounted at a single discount rate.
- Appraiser should be aware of managerial basis (e.g. overstate value in G/W impairment testing).
 - FCFF = EBIT – estimated taxes + Dep. – capex – WCInv.
 - FCFE = FCFF – after tax interest exp. + net new borrowing.
 - FCFF valuation is more robust if substantial capital structure changes (WACC less sensitive to change in financial leverage).

4.2 Income Approach Methods of Private Company Valuation

- Value is based on future income & cash flows.
- Assets are probable future economic benefits (both IFRS & U.S. GAAP provide support for this method).

Forms of Income Approach



$$\text{value} = \frac{\text{single representative estimate of Eco. benefits}}{\text{capitalization rate}}$$

4.2.1 Required Rate of Return: Models & Estimation Issues

Application of size premiums

Size premiums are frequently used in return requirement of PC, not in public companies.

Use of the CAPM

CAPM is not appropriate for small PC valuation (not comparable to public companies).

Expanded CAPM

CAPM + small size & company-specific risk premium.

Elements of build-up approach

- When comparable public company is not available.
- Excludes application of β .
- Expanded CAPM (excluding β) + industry risk premium.

Relative debt availability & cost of debt

- Less debt availability to PC, rely more on equity \uparrow WACC.

Discount rate in an acquisition context

Use cost of capital consistent with riskiness of targets CF (instead of buyer's own cost of capital).

Discount rate adjustment for projection risk

- Lesser amount of information concerning PC, \uparrow uncertainty in projections, \uparrow DR.
- Management less experienced in forecasting future performance.

4.2.2 Free Cash Flow Method

- FCF valuation may involve projecting FCF for a number of years (5-year practical guideline) & a terminal value estimate.
- Terminal value through price multiples or capitalized CF method.
- Company in a high growth industry \Rightarrow rapid growth incorporated twice if multiples are used to estimate TV.

4.2.3 Capitalized Cash Flow Method

- Estimates value based on value of a growing perpetuity (stable growth FCF model).
- Rarely used in private & public companies, suitable for PC with no available projections.

$$V_f = \frac{FCFF_1}{(WACC - g_f)} \text{ where } g_f = \text{sustainable growth rate of FCF to the firm.}$$

$$V_E = \frac{FCFE_1}{(r - g)} \text{ where } r \text{ is required return on equity.}$$

4.2.4 Excess Earnings Method

- Estimate earnings remaining after deducting amounts that reflect required returns to WC & fixed asset.
- Excess earnings are capitalized by using CCM formula to obtain estimates of value of intangible assets.
- Used to value intangible assets & very small businesses.
- Value of business = value of WC & fixed assets + capitalized value of intangibles.

4.3 Market Approach Methods of Private Company Valuation

Guideline public company

- Value based on comparable public co. multiples.
- Relative risk & growth prospects differences are adjusted.

Guideline transaction method

- Value based on multiples of actually acquired public or private companies.
- Relates to sales of entire companies.

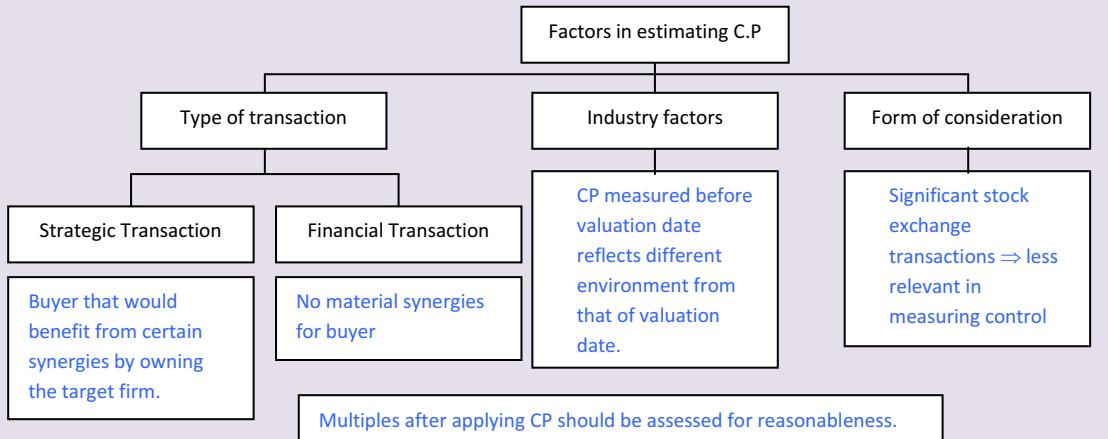
Prior transaction method

Value based on actual stock transactions of subject PC

- Finding & assessing comparable companies is challenging.
- Lack of marketability in PC create uncertainty in determining price multiples.
- Mature PC, EBITDA & EBIT multiples are frequently used.
- MVIC = MV of debt & equity.
- Equity value = MVIC – value of debt.
- Highly leveraged & volatile performance company \Rightarrow face value of debt is not appropriate (use matrix pricing i.e. estimate MV of debt).
- Very small PC \Rightarrow N.I based multiples are commonly used.
- Extreme small PC \Rightarrow revenue based multiples.
- Nonfinancial metrics of valuation in certain industries (e.g. price per bed in hospital).

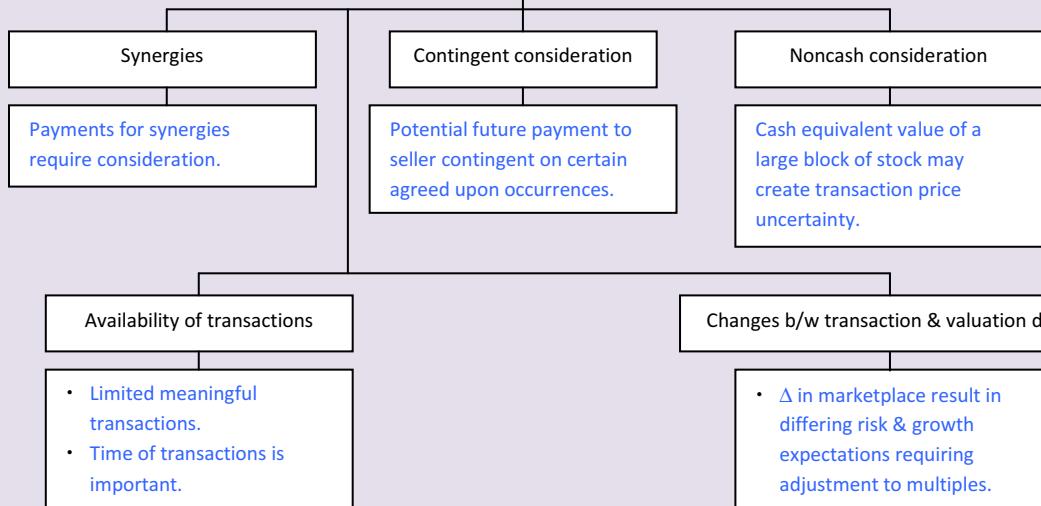
4.3.1 Guideline Public Company Method

- Advantages \Rightarrow large pool of guideline companies, financial & trading information is available.
- Disadvantages \Rightarrow comparability & subjectivity issues in risk & growth adjustments.
- Control premium CP \Rightarrow value of controlling interest – value of non controlling.



4.3.2 Guideline Transactions Method

Factors in Transaction – based Multiples



4.3.3 Prior Transaction Method

- Valuation based on actual price paid or multiple implied from transaction.
- More relevant in considering the value of minority equity interest.
- PTM is the most meaningful evidence of value if available, timely & arm's length.

4.4 Assets-Based Approach to Private Company Valuation

- Value of ownership = FV of assets – FV of liabilities.
- Rarely used for valuation of going concerns (tangible & intangible asset valuation difficulty).
- Better approach if value in liquidation is greater than going concern value.
- Also appropriate for resource, financial companies & holding companies.
- Management fees, carried interest, relative growth & profit, tax effect & diversification also affect value of an interest in a pooled investment vehicle.

4.5 Valuation Discount & Premiums

- Application of control premium & DLOC & marketability discount may be fact-specific and estimates vary dramatically.
- Timing of potential liquidity event is a key consideration (e.g. PC pursuing IPO may receive a modest valuation discounts).

4.5.1 Lack of Control Discount

- Amount or % reflects the absence of some or all powers of control.
 - Necessary for valuing noncontrolling interest if value of total equity is based on a controlling interest basis.
 - The effect on value of the lack of control is uncertain
 - Data for estimating DLOC are limited & interpretations vary.
- $$DLOC = 1 - \left[\frac{1}{(1+CP)} \right]$$
- The valuation is considered to be the Controlling Interest Value, generated by CCM & FCF methods, if CF & DR are estimated on controlling interest basis.

4.5.2 Lack of Marketability Discounts

- Amount or % deducted from ownership to reflect absence of marketability.
 - DLOM quantified through restricted stock transactions & IPOs.
 - Restricted stock \Rightarrow identical to freely traded stocks of public company except for the trading restrictions.
 - Stock sale prior to IPO, another source of marketability discount.
- $$\% DLOM \text{ using put options} = \frac{\text{value of at-the-money put option}}{\text{value of stock before DLOM}}$$
- Key assumptions are the expected term until a liquidity event & level of company volatility.
 - Put option analysis provides ability to address risk through the volatility estimates but put options do not provide liquidity for the asset holding.
 - In addition to DLOC & DLOM, key person discounts, portfolio discount etc. exists.
 - DLOC & DLOM are multiplicative and are applied in sequence.

4.6 Business Valuation Standards & Practices

- ↑ role of FV estimates \Rightarrow greater focus on valuation estimates, practices & standards.
- Standard compliance mostly is at the option of the individual appraiser (because buyers & users are often not so aware of such services).

“THE TERM STRUCTURE AND INTEREST RATE DYNAMICS”

2. Spot Rates and Forward Rates

- Spot curve \Rightarrow it represents the term structure of interest rates at any point in time.
- Forward rate \Rightarrow interest rate that is determined today for a loan that will be initiated in a future time period.
- Forward curve \Rightarrow the term structure of forward rate for a loan made on a specific initiation date.
- Forward pricing model \Rightarrow it describe the valuation of forward contracts on no-arbitrage argument.
 - $P(T^* + T) = P(T^*) F(T^*, T)$

2.1 The Forward Rate Model

- Forward rate model is used to establish that when the spot curve is upward (downside) sloping, the forward curve will lie above (below) the spot curve.
- Two interpretations of forward rates:
 - Can be viewed as breakeven interest rates.
 - Rate that can be locked.
- Par curve \Rightarrow it represents the YTM on coupon paying government bonds priced at par over a range of maturities.
 - It can be used to construct a zero coupon yield curve.
- Bootstrapping \Rightarrow the process of determining zero coupon rates by using the par yields.

2.2 Yields to Maturity in Relation to Spot Rates and Expected and Realized Returns on Bonds

- Yield to maturity (YTM) \Rightarrow most familiar pricing concept in bond markets.
- Principal of no arbitrage shows that a bond's value is the sum of the present values of payments discounted by their corresponding spot rates, the YTM of the bond should be some weighted average of spot rates used in the valuation of the bond.
- YTM is the expected rate of return for a bond that is held until its maturity (assumptions \Rightarrow (i) all coupon & principal payments are made in full (ii) coupon are reinvested at original YTM).
- YTM is poor estimate of expected return if
 - Interest rates are volatile.
 - Yield curve is steeply sloped.
 - Significant default risk.
 - If bond has embedded options.

2.3 Yield Curve Movement and the Forward Curve

- Forward contract price remains unchanged as long as future spot rates evolve as predicted by today's forward curve.
 - The forward contract value is expected to increase if expected future spot rate will be lower than what is predicted by the prevailing forward rate & vice versa.

2.4 Active Bond Portfolio Management

- One way to outperform the bond market's return is to anticipate changes in interest rate relative to the projected evaluation of spot rates reflected in today's forward curves.
- Riding the yield curve \Rightarrow buying bonds with a maturity longer than that the investment horizon to earn a total return greater than the return on a maturity-matching strategy (assumption \Rightarrow no change in level & shape of yield curve over an investment horizon).
- As a bond approaches maturity, it is valued at successively lower yields & higher prices when the yield curve slopes upward.

3. The Swap Rate Curve

3.1 The Swap Rate Curve

- Swap rate \Rightarrow the interest rate for the fixed rate leg of an interest rate swap.
- Swap rate curve \Rightarrow the yield curve of swap rates.
- Swap market is highly liquid because:
 - A swap does not have multiple borrowers or lenders.
 - Swaps provide one of the most efficient ways to hedge interest rate risk.

3.2 Why Do Market Participants Use Swap Rates When Valuing Bonds

- The investor can adjust the swap spread by using swap curve as benchmark so that the swap would be fairly priced given the spread.

3.3 How Do Market Participants Use the Swap Curve in Valuation?

- The yields on zero coupon bonds determine the swap curve which in turn can be used to determine bond value.

3.4 The Swap Spread

- Swap spread \Rightarrow spread paid by the fixed rate payer of an interest rate swap over the rate of the on-the-run treasury security of the same maturity.
- Swap curve is mostly used because:
 - It reflects the default risk of private entities.
 - Swap rates are more comparable across counties.
 - Swap market has more maturities than do govt. bond markets.
 - Swap rates are used for yields with a maturity of more than one year.
- Z-spread \Rightarrow constant basis point spread that would need to be added to the implied spot yield curve so that the discounted cash flows of a bond are equal to its current market price (More accurate measure of credit & liquidity).

3.5 Spreads as a Price Quotation Convention

- I-Spread \Rightarrow bond rates net of the swap rates of the same maturities.
- TED spread \Rightarrow difference b/w LIBOR & yields on a T-bill of matching maturity.
 - An \uparrow (\downarrow) in TED spread is a sign that lender believe the risk of default on interbank loan is \uparrow (\downarrow).
- LIBOR – OIS spread \Rightarrow difference b/w LIBOR & the overnight indexed swap (OIS) rate.

4. Traditional Theories of the Term Structure of Interest Rates

4.1 Local Expectations Theory

- Pure expectations theory \Rightarrow it states that the forward rate is an unbiased predictor of the future spot rate.
 - Broadest interpretation \Rightarrow bonds of any maturity are perfect substitutes for one another.
 - Assumption \Rightarrow risk- neutrality
 - Conflict \Rightarrow investors are risk averse.
- Local expectations theory \Rightarrow more rigorous version.
 - It states that the expected return for every bond over short time periods is the risk-free rate.
 - Assumption \Rightarrow no arbitrage exists.
 - This theory differs from the unbiased expectations theory in that it can be extended to a world characterized by risk.
 - No risk premiums for very short holding periods.
 - Theory is applicable to risk-free as well as risky bonds.

4.2 Liquidity Preference Theory

- This theory asserts that liquidity premiums exist to compensate investors for the added interest rate risk.
- These premiums increase with maturity.
- The forward rate provides an estimate of the expected spot rate that is biased upward by the amount of liquidity premium.
- Liquidity preference theory fails to completely explain the term structure.
- The existence of liquidity premiums implies that the yield curve will typically be upward sloping.

4.3 Segmented Markets Theory

- SMT allows for lender & borrower preferences to influence the shape of the yield curve.
- According to this theory, yields are solely a function of the supply & demand for funds of a particular maturity rather than reflection of expected spot rates or liquidity premiums.
- Theory is consistent where asset/liability management constraints exist.

4.4 Preferred Habitat Theory

- Similar with SMT in proposing that many borrowers & lenders have strong preferences for particular maturities but it does not assert that yields at different maturities are determined independent of each other.
- Institutions will be willing to deviate from their preferred maturities if additional returns justify so.
- Theory is closer to real world phenomena.
- The reflection of preferred habitat can also be seen in quantitative easing in 2008 by Federal Reserve.

5. Modern Term Structure Models

- These models provide quantitative description of how interest evolves.
- Models are based on assumptions which can't be completely accurate in depicting the real world.

5.1 Equilibrium Term Structure Models

- These are models that seek to describe the dynamics of the term structure using fundamental economic variables that are assumed to affect interest rates.
- Characteristics of these models:
 - They are one-factor or multifactor models.
 - They make assumptions about the behavior of factors.
 - These are more sparing with respect to the numbers of parameters that must be estimated compared with arbitrage free term structure models.

Models

5.1.1 The Cox–Ingersoll–Ross Model

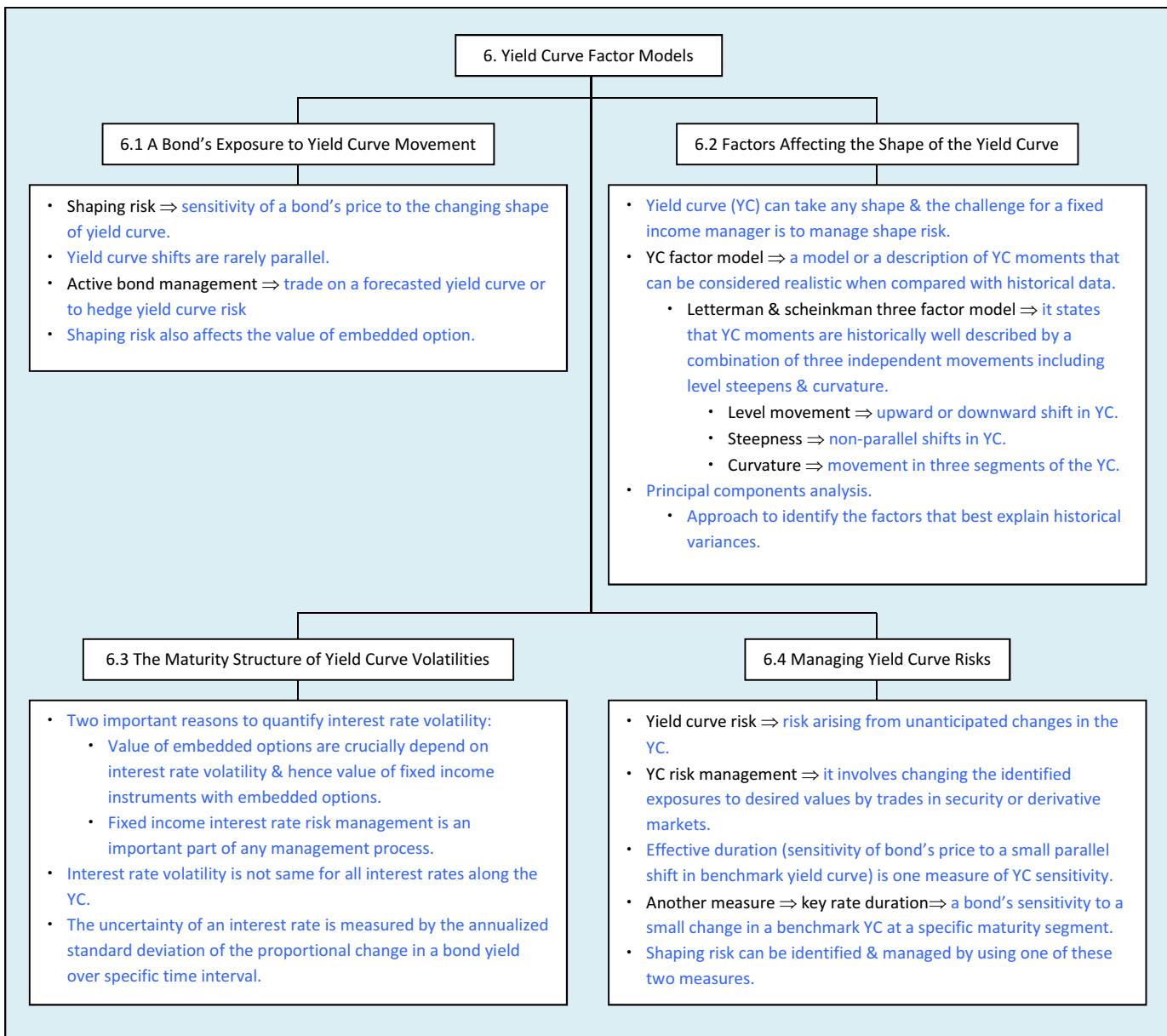
- This model assumes that every individual has to make consumption & investment decision with his limited capital.
- CIR model can explain interest rate movements in terms of an individual's preferences for investment & consumption as well as the risks & returns of the productive processes of the economy.
- Short term interest rates tend to move in bonded range & show a mean reversion tendency.

5.1.2 The Vasicek Model

- An equilibrium term structure model which also capture mean reversion.
- Unlike CIR model, interest rates are calculated assuming that volatility remains constant over the period of analysis.
- Disadvantage \Rightarrow it is theoretically possible for the interest rate to become negative.
- Investors can use these two models to determine mispricing if parameters of the models are believed to be correct.

5.2 Arbitrage-Free Models: The Ho–Lee Model

- In AFMs, the analysis starts with the observed market prices of a reference set of financial instruments with the assumption that the reference set is correctly priced.
- These models overcome problem of finite number of free parameters as the case with vasicek & CIR models.
- Ho – Lee model:
 - It uses the relative valuation concept of black-Sholes option model.
 - Assumption \Rightarrow yield curve moves in a way that is consistent with a no-arbitrage condition.
 - Model generates a symmetrical distribution of future rates, negative interest rates are possible.
- Modern interest rate theories are proposed for the most part to value bonds with embedded options.



“THE ARBITRAGE-FREE VALUATION FRAMEWORK”

1. INTRODUCTION

2. The Meaning of Arbitrage-Free Valuation

- Arbitrage – free valuation \Rightarrow valuation that determines security values that are consistent with the absence of arbitrage opportunities (riskless profits without any net investments).
- Principle of no arbitrage is an implication of the idea that identical assets should sell at the same price.
- Fundamental principle of valuation \Rightarrow value of any financial asset is equal to the present value of its expected future cash flows.
- Value of bond with embedded options = sum of arbitrage free bond with option + arbitrage free value of each of the options

2.1 The Law of One Price

- Law of one price \Rightarrow it states that two perfectly substitute goods must sell for the same current price in the absence of transaction costs otherwise arbitrage opportunity will exist.

2.2 Arbitrage Opportunity

- Types of arbitrage opportunities.
 - Value additivity \Rightarrow value of the whole equals the value of the parts.
 - Dominance \Rightarrow Financial asset with a risk-free payoff in the future must have a positive price today.

2.3 Implications of Arbitrage-Free Valuation for Fixed-Income Securities

- Stripping \Rightarrow process of separating the bond's individual cash flow & trade them as zero-coupon securities.
- Reconstitution \Rightarrow process of recombining the appropriate individual zero coupon securities & reproducing the underlying coupon treasury.
- Arbitrage profits are possible when value additivity does not hold.

3. Interest Rate Trees and Arbitrage-Free Valuation

3.1 The Binomial Interest Rate Tree

- First step in binomial valuation method \Rightarrow present the benchmark par curve by using bonds of a particular country or currency.
- For bonds with interest rate dependent CFs, interest rate volatility is a consideration.
- Lognormal interest rate model has two properties:
 - Non negativity of interest rates (IRs).
 - Higher volatility at higher interest rates.

3.2 What Is Volatility and How Is It Estimated?

- Variance \Rightarrow measure of dispersion of a probability distribution.
- Standard deviation \Rightarrow square root of the variance.
- In a lognormal distribution, volatility is measured relative to current level of rates,
- Methods commonly used to estimate IR volatility:
 - By estimating historical IR volatility.
 - Implied volatility through market prices of IR derivatives.

3.3 Determining the Value of a Bond at a Node

- Backward induction valuation \Rightarrow method used to value bond at a particular node.
- Value of a bond at any node will depend on future CFs.
- We fill par values at maturity & work back from right to left to find value at a desired node.
- The relevant discount rate to use is the one-year forward rate at the node.

3.4 Constructing the Binomial Interest Rate Tree

- First step in binomial IR tree construction is to calibrate a binomial IR tree to match a specific term structure (to ensure model is arbitrage free).
- Finding the rates in the tree is an iterative process & the IRs are found numerically.
- If we use a higher estimate of volatility the possible forward rates may spread out on the tree.
- If lower estimate of volatility, the rate should collapse to the implied forward rates from the current yield curve.

3.5 Valuing an Option-Free Bond with the Tree

- Binomial IR tree should produce the same value as discounting the CFs with the spot rates.

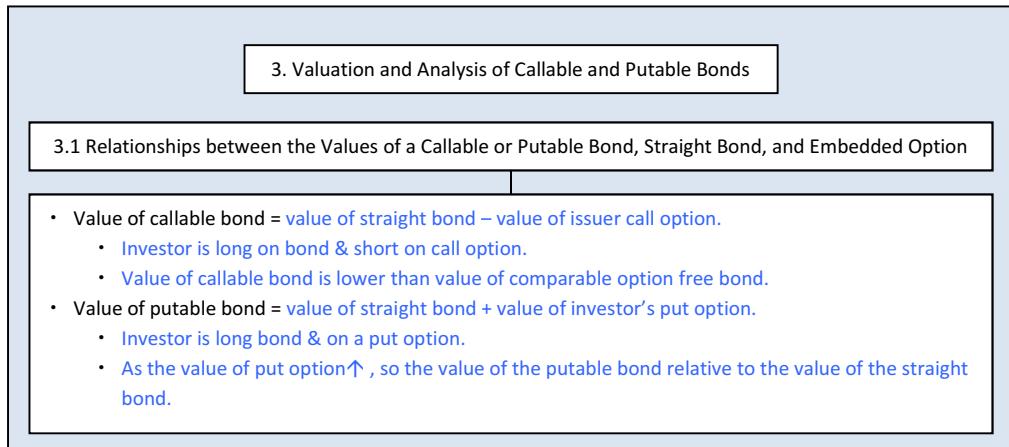
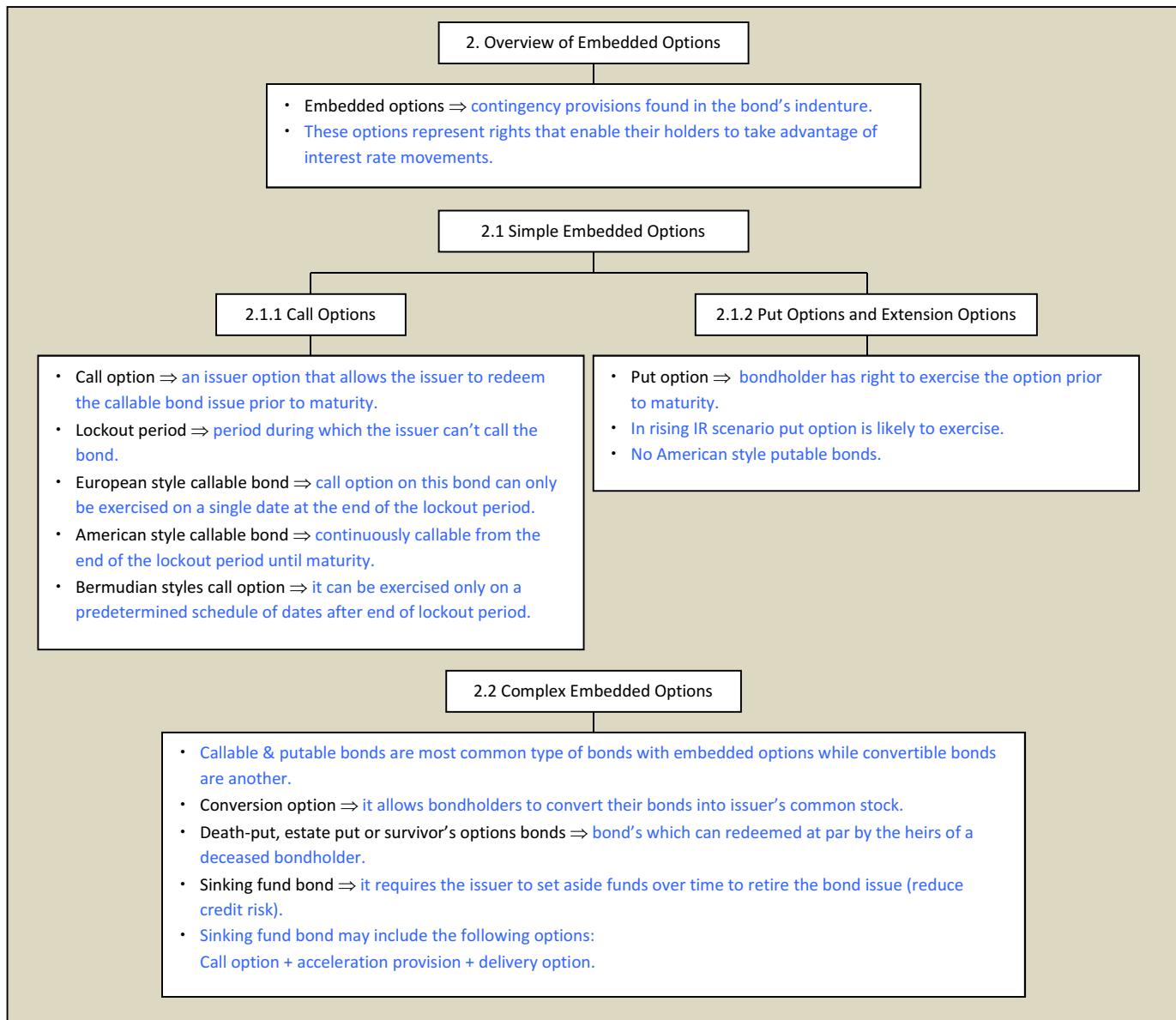
3.6 Path-wise Valuation

- Path-wise valuation \Rightarrow an alternative approach to backward induction in a binomial tree.
- Path-wise valuation calculates the PV of a bond for each possible IR path & then takes the average of these values across paths.
- The approach produces same value as the backward induction method.
- Steps in path-wise valuation:
 - Specify all potential paths.
 - Determine PV along each potential path.
 - Calculate the avg. across all possible paths.

4. Monte Carlo Method

- Monte Carlo method \Rightarrow method for simulating a sufficiently large number of potential IR paths in an effort to discover how a value of a security is affected.
- Monte Carlo method is often used when a security's CFs are path dependent.
- The benchmark term structure is represented by the current spot rate curve such that the avg. PV across the scenario IR paths for each benchmark bond equals its market value (arbitrage free valuation).
- \uparrow The number of paths, \uparrow the accuracy of the estimate.
- Monte Carlo method is input dependent.
- Modelers also assume "mean reversion in IRs" in Monte Carlo simulation.

“VALUATION AND ANALYSIS: BONDS WITH EMBEDDED OPTIONS”



3.2 Valuation of Default-Free and Option-Free Bonds: A Refresher

- Future CFs of default free, option free bond should be discounted at spot rate corresponding to CFs payment data.
- Spot rates can be inferred from readily available information of on-the-run sovereign bonds of various maturities.

3.3 Valuation of Default-Free Callable and Putable Bonds in the Absence of Interest Rate Volatility

3.3.1 Valuation of a Callable Bond at Zero Volatility

- Borrower will exercise the call option when the value of the bonds future CFs is higher than the call price.
- Example.

3.3.2 Valuation of a Putable Bond at Zero Volatility

- Investor will exercise the put option when the value of the bonds future CFs is lower than the put price.
- Option holders may be risk averse & may exercise early even if the option is worth more alive than dead.

3.4 Effect of Interest Rate Volatility on the Value of Callable and Putable Bonds

3.4.1 Interest Rate Volatility

- Value of any type of option will \uparrow with the \uparrow in volatility.
- Effect of interest rate volatility on the value of bonds with options is critical.

3.4.2 Level and Shape of the Yield Curve

3.4.2.1 Effect on the Value of a Callable Bond

- All else equal, value of call option \uparrow as the yield curve flattens.
- Value of call option \uparrow further if yield curve actually inverts.

3.4.2.2 Effect on the Value of a Putable Bond

- Value of put option \downarrow as yield curve moves from being upward sloping to downward sloping.

3.5 Valuation of Default-Free Callable and Putable Bonds in the Presence of Interest Rate Volatility

- Valuation procedure of a bond with embedded option in the presence of interest rate (IR) volatility is as under:
 - Generate an IR tree based on the given yield curve & IR volatility assumptions.
 - At each node of the tree, determine whether the embedded options will be exercised.
 - Apply the backward induction valuation methodology to calculate the bond's present value.

3.5.1 Valuation of a Callable Bond with Interest Rate Volatility

Example

3.5.2 Valuation of a Putable Bond with Interest Rate Volatility

Example

3.6 Valuation of Risky Callable and Putable Bonds

- Two approaches to value bonds that are subject to default risk:
 - ↑ The DR above the default-free rate to reflect default risk.
 - By making the default probabilities explicit.

3.6.1 Option-Adjusted Spread

- Two standard approaches to construct a suitable yield curve:
 - Use an issuer specific yield curve (more satisfactory but less convenient).
 - Uniformly raise the one year forward rates derived from the default free benchmark yield curve by a fixed spread (z-spread).
- When valuing risky bonds with embedded options, option-adjusted spread (OAS) is used to construct IR tree.
- OAS ⇒ A constant spread that when added to all the one-period forward rates on the IR tree makes the arbitrage-free value of the bond equal to its market price.
- Option free bond ⇒ Z-spread = OAS at zero volatility.
- OAS lower (larger) than that for a bond with similar characteristics & credit quality indicates that the bond is likely overpriced (underpriced).

3.6.2 Effect of Interest Rate Volatility on Option-Adjusted Spread

- The IR dispersion on the tree is volatility dependent & so is the OAS.
- Scenario analysis over a specified investment horizon is another application of valuing bond with embedded options.
- There is a trade-off b/w reinvestment of cash flows & change in the bond's value over a specified investment horizon.

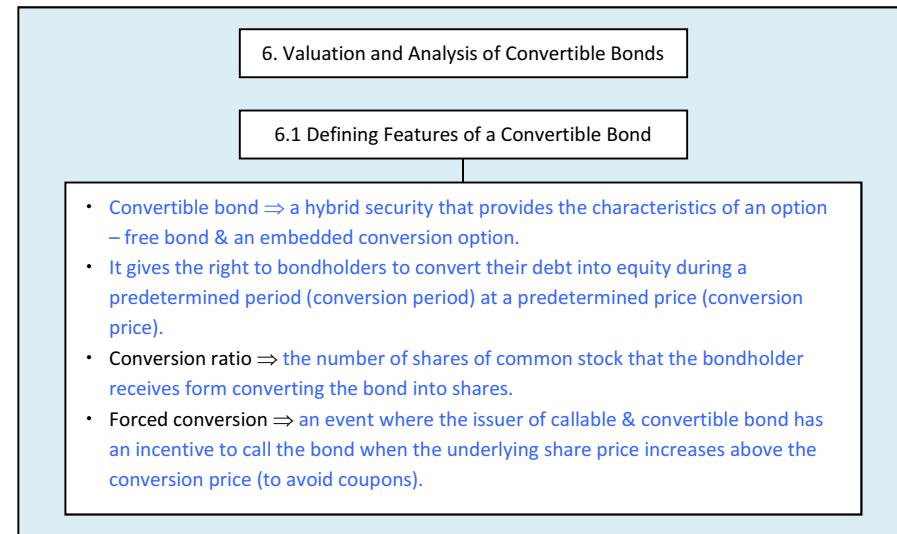
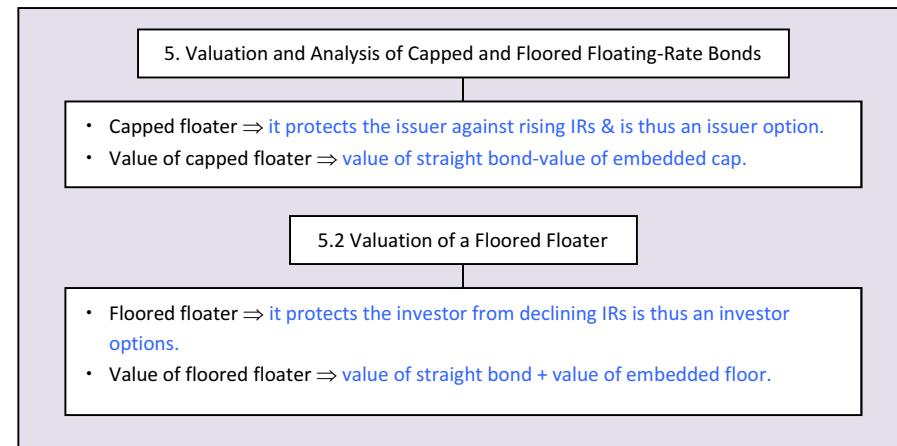
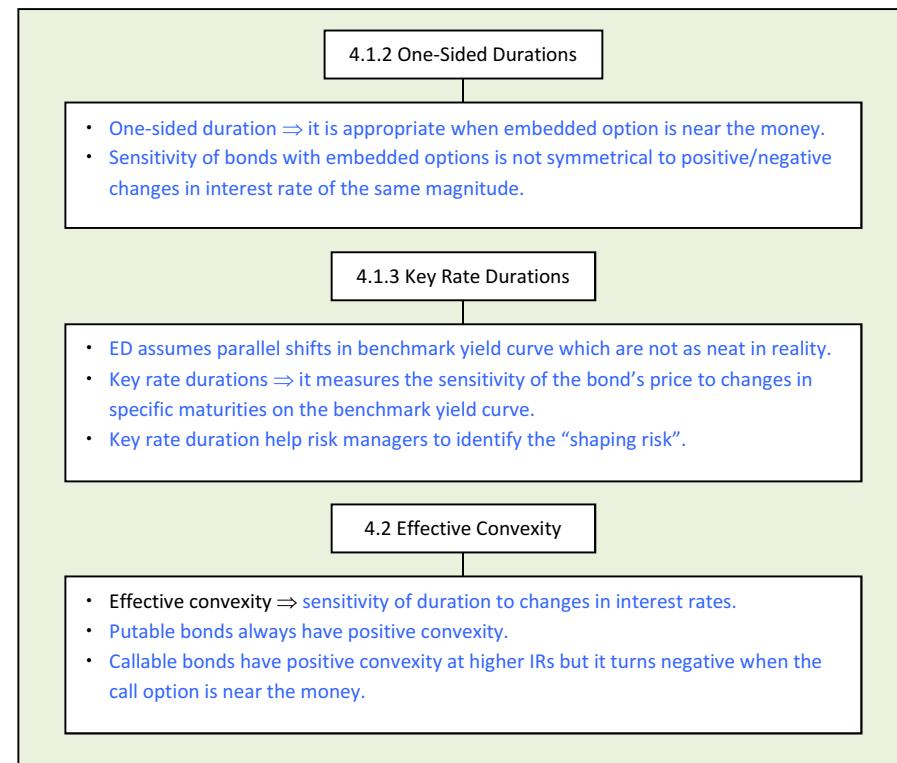
4. Interest Rate Risk of Bonds with Embedded Options

4.1 Duration

- Duration ⇒ it measures the sensitivity of bonds price to changes in the bond's yield to maturity.
- Bonds with embedded options ⇒ effective duration is an appropriate measure.

4.1.1 Effective Duration

- It indicates the sensitivity of the bond's price to a 100 bps parallel shift to the benchmark yield curve.
- Effective duration (ED) of a callable & putable bond < ED of straight bond.



6.2 Analysis of a Convertible Bond

- 6.2.1 Conversion Value
 - **Conversion value = Underlying share price × Conversion ratio.**
- 6.2.2 Minimum Value of a Convertible Bond
 - **Minimum value of a convertible bond is equal to the greater of**
 - The conversion value and
 - The value of the underlying option-free bond.
- 6.2.3 Market Conversion Price, Market Conversion Premium per Share, and Market Conversion Premium Ratio
 - **Market conversion premium per share = Market conversion price – Underlying share price**
 - **Market conversion price** ⇒ price that investors effectively pay for the underlying common stock if they buy the convertible bond & then convert it into shares.
 - **Market conversion premium ratio** ⇒ premium or discount investors have to pay as a percentage of the current market price of the shares.
- 6.2.4 Downside Risk with a Convertible Bond
 - **Investors use the straight value as a measure of the downside risk of a convertible bond.**
 - **All else equal, the ↑ the premium over straight value, the less attractive the convertible bond.**
- 6.2.5 Upside Potential of a Convertible Bond
 - **Upside potential of a convertible bond depends primarily on the prospects of the underlying common stock.**

6.3 Valuation of a Convertible Bond

- **Value of convertible bond = Value of straight bond + Value of call option on issuer's stock.**
- **Value of callable convertible bond = Value of straight bond + Value of call option on the issuer's bond – Value of issuer call option.**
- **Value of callable putable convertible bond = Value of straight bond + value of call option on issuer's stock – Value of call option + Value of investor put option.**

6.4 Comparison of the Risk–Return Characteristics of a Convertible Bond, the Straight Bond, and the Underlying Common Stock

- **Busted convertible** ⇒ when the underlying share price is well below the conversion price (bond-like risk return characteristics of security).
- If underlying share price > conversion price ⇒ convertible bond exhibits mostly stock risk – return characteristics.
- In between the bond & stock ⇒ hybrid instrument.
- The call option component increases in value as the underlying share price approaches the conversion price.
 - If the underlying share price exceeds the conversion price ⇒ rise in bond value is at least equal to share price increase.
- If the underlying share price is above the conversion price but decrease toward it, the relative change in the convertible bond price is less than the change in underlying share price (because convertible bond has a floor).



Expected release date: March 12, 2019

Team -FinQuiz

“CREDIT DEFAULT SWAPS”

CDS = Credit Default Swap
 CC = Credit Curve
 IR = Interest Rates

1. INTRODUCTIONS

- Credit derivative \Rightarrow instrument in which the underlying is a measure of a borrower's credit quality.
- CDS provides protection against default & from changes in the market's perceptions of a borrower's quality.

2. BASIC DEFINITIONS AND CONCEPTS

- Credit default swaps \Rightarrow a contract b/w a credit protection buyer & credit protection seller, where buyer makes a series of cash payments to the seller & receives a promise of compensation for credit losses resulting from default.
- CDS are somewhat similar to put option (buyer wins when underlying performs poorly).

2.1 Types of CDS

Single-Name CDS

- CDS on one specific borrower (called reference entity).
- Reference obligation \Rightarrow designated instrument being covered in agreement.
- Payoffs \Rightarrow cheapest to deliver obligation \Rightarrow debt instrument that can be purchased & delivered at the lowest cost.

Index CDS

- Involves a combination of borrowers.
- It is possible to trade indices of CDS.
- Participants can take positions on the credit risk of a combination of companies.
- Credit correlation is a key determinant of the value of an index CDS.
- \uparrow Default correlation, \uparrow cost to purchase protection.
- Diverse companies with low correlation, protection is less expensive.

Tranche CDS

- It covers a combination of borrowers but only up to pre-specified levels of losses.
- Tranche CDS is a small portion of the CDS market.

2.2 Important Features of CDS Markets and Instruments

- Notional amount \Rightarrow amount of protection being purchased.
- Each CDS contract has an expiration date as with all derivatives.
- CDS spread \Rightarrow periodic CDS payment from CDS buyer to CDS seller.

2.3 Credit and Succession Events

- Credit event \Rightarrow outcome that triggers a payment from a credit protection seller to the credit protection buyer.

Types of Credit Events

Bankruptcy

- It involves the establishment of a legal procedure that forces creditors to defer their claims.
- If bankruptcy plan established by court fails, it's likely to be a full liquidation of the company.
- At liquidation, court determines the payment to various creditors.
- Company normally continues to operate until liquidation occurs.

Failure to Pay

It occurs when a borrower does not make a scheduled payment of principal or interest on any outstanding obligation after a grace period (no formal bankruptcy filing).

Restructuring

- It refers to a number of possible events.
 - Reduction or deferral of principal or interest.
 - Change in seniority or priority of an obligation.
 - Change in currency in which payment will be made.
- Restructuring must be involuntary (forced on the borrower by the creditors).
- Succession event ⇒ it arises when there is a change in the corporate structure of the reference entity in which ultimate responsibility becomes unclear.

2.4 Settlement Protocols

- In case of credit event, CDs can be settled physically or through cash.
- Physical settlement ⇒ less common & involves actual delivery of the debt instrument.
- Cash settlement ⇒ credit protection seller pays cash to credit protection buyer up to loss suffered.
- Payout ratio = 1 - recovery rate.
- Payout amount = payout ratio × notional

2.5 CDS Index Products

- Market indices (CDS indices) can be classified by regions & credit quality.
- Investment grade index CDS are typically quoted in terms of spread while high yield are quoted in terms of price.
- Index components are updated by every six months by creating new series.
- Latest series are called on the run while older series are called off-the-run.
- Use ⇒ to take positions on the credit risk of the sectors covered by indices as well as to protect bond portfolio (similar to index components).
- Index CDS are more liquid than single name CDS.

2.6 Market Characteristics

- CDS trade in OTC market in a network of banks & other financial institutions.
- Credit insurance has existed for many years but insurance products are more consumer focused than commercial focused.
- Size of CDS market today is considerably less than it was just a few years ago.

3. BASICS OF VALUATION AND PRICING

- Derivatives \Rightarrow typically valued by constructing a hedge b/w the derivative & the underlying that produces a risk free position.
- Valuation principle is more difficult to apply on credit derivatives than conventional derivatives.

3.1 Basic Pricing Concepts

- Probability of default is most important element of CDS.
- Hazard rate \Rightarrow probability that an event will occur given that it has not already occurred (conditional probability).
- Loss given default \Rightarrow amount that will be lost if default occurs.
 - Expected loss = amount owned – expected recovery.
- Protection leg \Rightarrow contingent payment that protection seller may have to make to the protection buyer.
- Premium leg \Rightarrow series of payments the protection buyer promises to make to the protection seller.
- Estimated value of protection leg depends on:
 - Probability of each payment.
 - Timing of each payment.
 - Discount rate.
- Upfront payment \Rightarrow PV of protection leg – PV of premium leg.
 - If the result is $>$ ($<$) zero, the protection buyer (seller) pays the seller (buyer).

3.2 The Credit Curve

- Credit spread \Rightarrow rate in excess of LIBOR that investors expect to receive to justify holding the instrument.
- Credit spread \approx probability of default \times loss given default (%).
- Credit curve \Rightarrow credit spreads for a range of maturities of a company's debt.
- A hazard rate can affect the credit curve:
 - Constant hazard rate \Rightarrow flatten credit curve.
 - Upward sloping CC \Rightarrow greater likelihood in later years.
 - Downward sloping CC \Rightarrow greater probability of default in earlier years.

3.3 CDS Pricing Conventions

- Spread can easily compared with IR than with prices.
- PV of credit spread = upfront premium + PV of fixed coupon.
- Credit spread \approx (upfront coupon / duration) + fixed coupon.

3.4 Valuation Changes in CDS during Their Lives

- CDS value fluctuates during its lifetime similar to any traded financial instrument.
- Many factors can change over the life of the CDS including duration, probability of default, the expected loss given default & shape of CC.
- New market value of the CDS reflects gains/losses to the two parties.
- Profit for the buyer of protection \approx Δ in spread in BPS \times Duration \times Notional.
- % Δ in CDS price = Δ in spread in bps \times duration.

3.5 Monetizing Gains and Losses

- Monetizing gain/loss \Rightarrow opportunity to unwind the position & to capture gain/loss.
- Credit protection buyer (seller) gains if credit quality of the reference entity deteriorates (improves).
- Two ways of realizing a profit/loss on a CDS:
 - Exercise the CDS in response to a default.
 - Unwind the position by entering into a new offsetting CDS in the market.

4. APPLICATIONS OF CDS

- CDS has two uses:
 - To exploit an expected movement in underlying.
 - CDS facilitate trading opportunity in valuation differences b/w CDS & underlying.

4.1 Managing Credit Exposures

- A CDS is primarily used to \uparrow or \downarrow credit exposure.
- Lender's justification for using a CDS:
 - Illiquid bond or loan market.
 - Significant transaction costs.
- The main justification for selling credit protection is to profit from making markets.
- Naked CDS \Rightarrow a swap that is purchased by the party with no exposure to the reference entity.
- Long/short trade \Rightarrow when a party takes long position in one CDS & short position in another.
 - Bet that credit position of one entity will improve relative to other.
 - Curve trade \Rightarrow buying a CDS of one maturity & selling a CDS on the same reference entity with a different maturity.
 - A flatter (steeper) curve means that long term credit risk \downarrow (\uparrow) relative to short term risk.
 - In the short run, a curve steepening (flattening) trade is bullish (bearish).
- Value of longer-term CDS will be more sensitive than those of shorter term CDS.

4.2 Valuation Differences and Basis Trading

- CDS valuation disparities exist because of different assessments of the price of credit risk
- Difference in the credit spreads in bonds & CDS markets is the foundation of basis trade.
- General idea behind basis trade \Rightarrow mispricing is likely to be temporary & spread should converge when market recognizes disparity.
 - If the credit spread is \uparrow in the bond (CDS) market than the CDS (bond) market, it is said to be +ve basis.
- Synthetic CDO \Rightarrow combining default free securities with a combination of CDS as protection seller.
 - If synthetic CDO is lower cost than actual CDO \Rightarrow buy the former & sell the latter to capture arbitrage profit.

“PRICING AND VALUATION OF FORWARD COMMITMENTS”

Mkt. = Market
 Gen. = Generally
 Imp. = important
 Fwd. = Forward
 DC = Domestic
 Currency
 FC = Foreign
 Currency

1. INTRODUCTION

Fwd. Commitment \Rightarrow a contract where the price or rate of an underlying can be locked in to buy or sell at some future date or series of dates.

2. PRINCIPLES OF ARBITRAGE-FREE PRICING & VALUATION OF FORWARD COMMITMENTS

Fwd. Commitment Pricing: Price/rate when initiating the fwd. contract.

Fwd. Commitment Valuation: value of the contract after contract initiation.

Arbitrage-free Approach: is based on law of one price.

Assumption: Prices adjust to reach at 0 arbitrage profit.

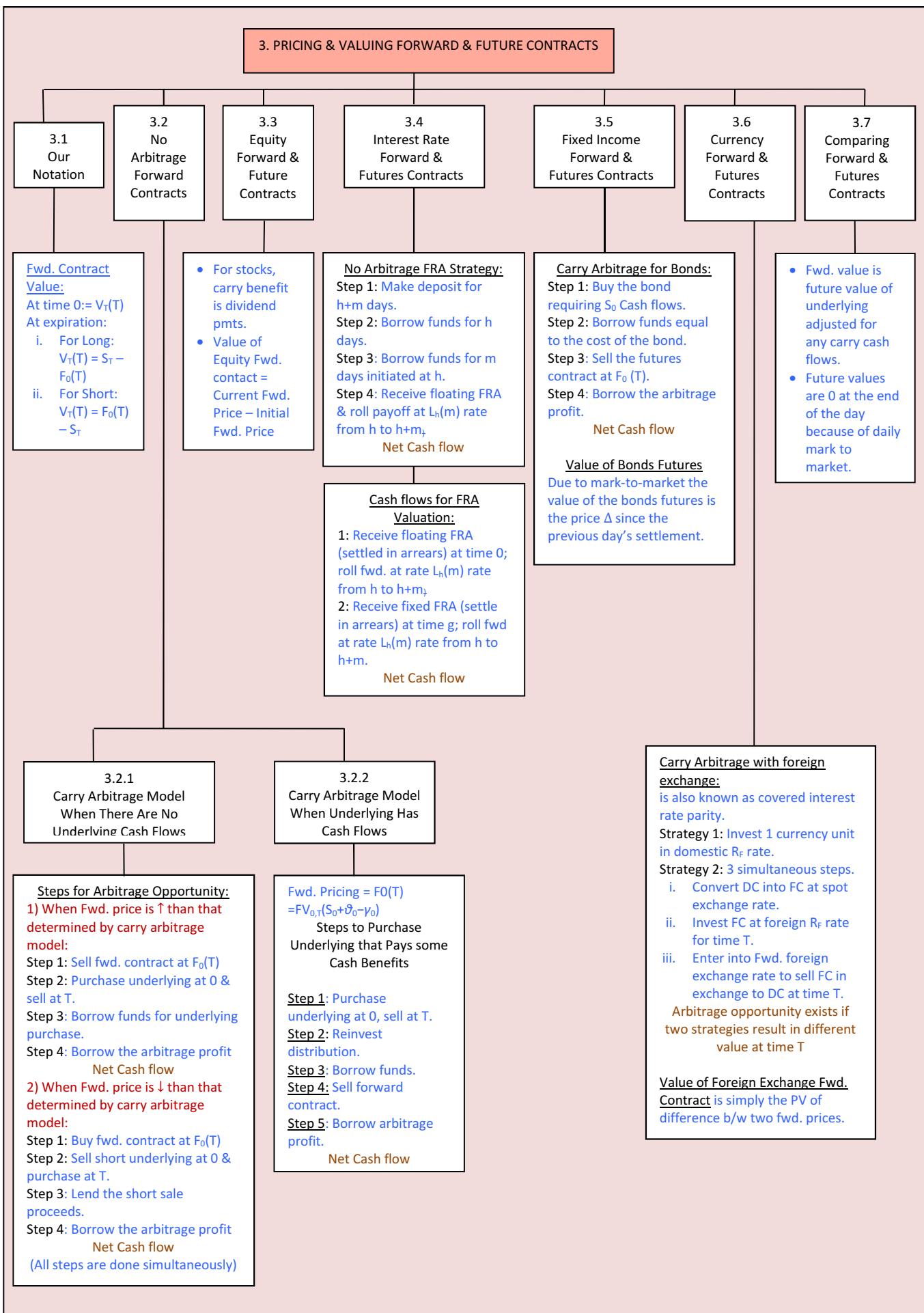
Two fundamental rules (from arbitrageurs' perspective):

Rule 1: Do not use own money

Rule 2: Do not take price risk

Four Key Assumptions Throughout This Reading:

- i. Replicating instruments are identifiable & investable.
- ii. No mkt. friction.
- iii. Short selling is allowed
- iv. Borrowing and lending is allowed at known risk-free rate.



4. PRICING & VALUING SWAP CONTRACTS

General approach to pricing & valuing swaps is using a replicating or hedge portfolio of comparable instruments

4.1 Interest Rate Swap Contracts

Cash Flows for Receive-Fixed Swap Hedge with Bonds:

Step 1: Receive fixed swap.

Step 2: Buy floating rate bond.

Step 3: Short sell fixed rate bond.

Net Cash flow

Swap Value for Fixed Rate Receiver & Floating Rate Payer = value of fixed bond – value of floating bond.

- Value of fixed bond $FB = C \sum_{i=1}^n PV_{0,ti}(1) + PV_{0,tn}(1)$
- Value of floating bond assumed to be 1 (at reset date)

Swap Pricing Equation = $\frac{1 - PV_{0,tn}(1)}{\sum_{i=1}^n PV_{0,ti}(1)}$

Interest rate Swap Valuation

For a receive-fixed interest rate swap, valuation can be achieved by entering into an offsetting swap i.e. receive floating pay fixed.

4.2 Currency Swap Contracts

- Four major types are: fixed for fixed, floating for fixed, fixed for floating & floating for floating.
- Key features of currency swaps include:

- Often involve an exchange of notional principle both at initiation & at expiration.
- Payment at each swap leg is in different currency unit.
- Each swap leg can either be fixed or floating.

Cash Flows for Currency Swap Hedged with Bonds:

Step 1: Enter currency swap.

Step 2: Short sell bond in currency a.

Step 3: Buy bond in currency b.

Net Cash flow

Currency Swap Valuation

Value of fixed for fixed currency swap = difference in a pair of fixed rate bonds in currency A and B. Then convert currency B bond into currency A through a spot foreign exchange transaction.

4.3 Equity Swap Contracts

- An OTC derivative contract where one party pays equity return & another pays either a different equity returns or rate or fixed series.

- Key features of equity swaps include:

- Equity leg can be an individual stock, published stock index or a custom portfolio.
- Equity leg can be with or without dividends.
- All the interest rate swap nuances exist with equity swap that have a fixed or floating interest rate leg.

Cash Flows for Receive-fixed Equity Swap Hedged with Equity & Bonds:

Step 1: Enter currency swap.

Step 2: Buy notional amount of equity.

Step 3: Short sell fixed rate bond.

Step 4: Borrow arbitrage profit.

Net Cash flow

Equity Swap Valuation

Valuing an equity swap after initiation is similar to the pricing of a comparable interest rate swap except that instead of adjusting floating rate bond, we adjust value of the notional amount of equity.

“Valuation of Contingent Claims”

i-rate = interest rate
 pmts. = payments
 Gen. = generally

1. INTRODUCTION

- Contingent claim \Rightarrow A derivative instrument that provides a right but not an obligation to its owner to payoff determined by an asset, rate or other derivative.
- Option valuation models are also based on the principle of ‘No-Arbitrage’.

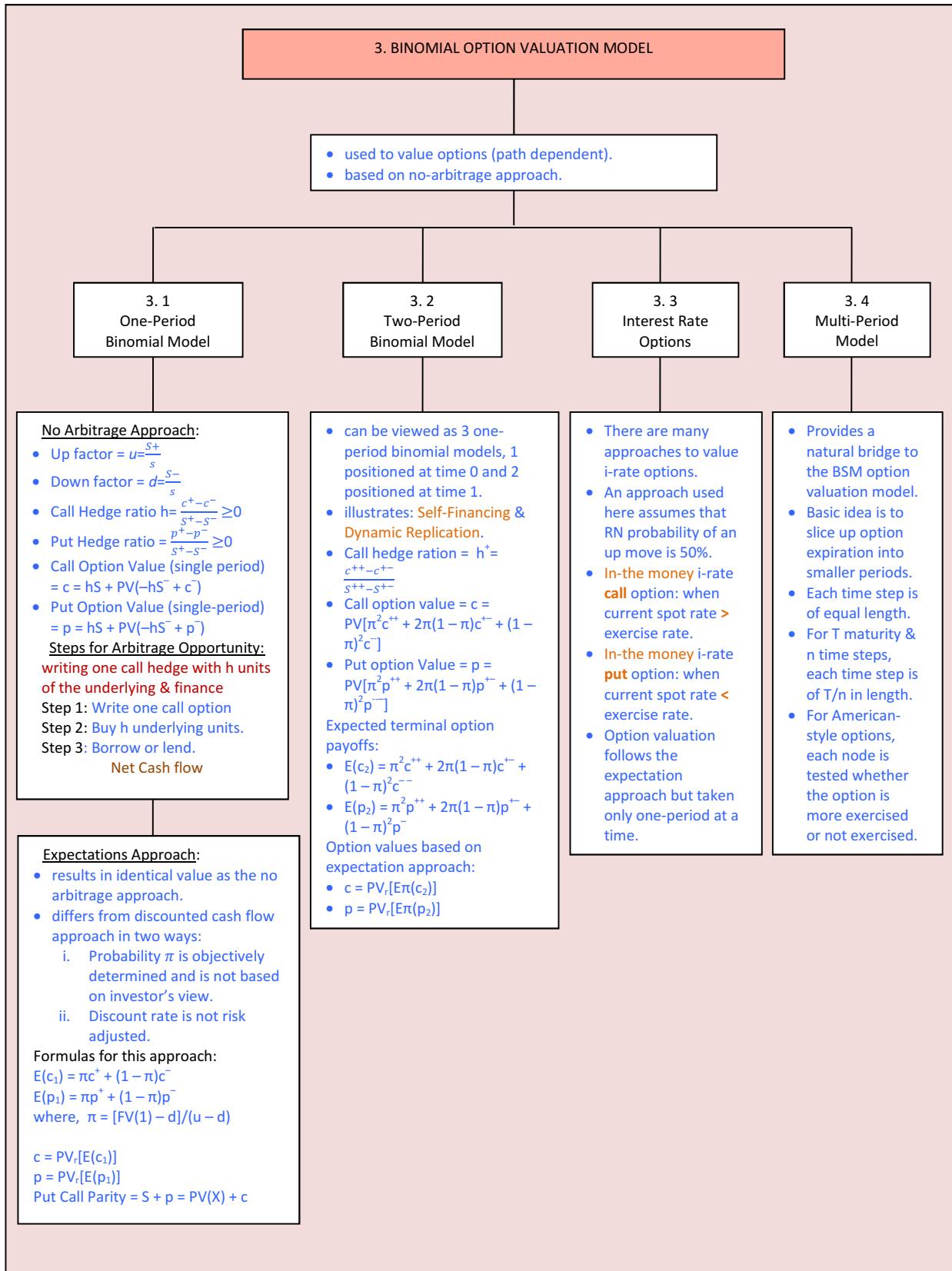
2. PRINCIPLES OF A NO-ARBITRAGE APPROACH TO VALUATION

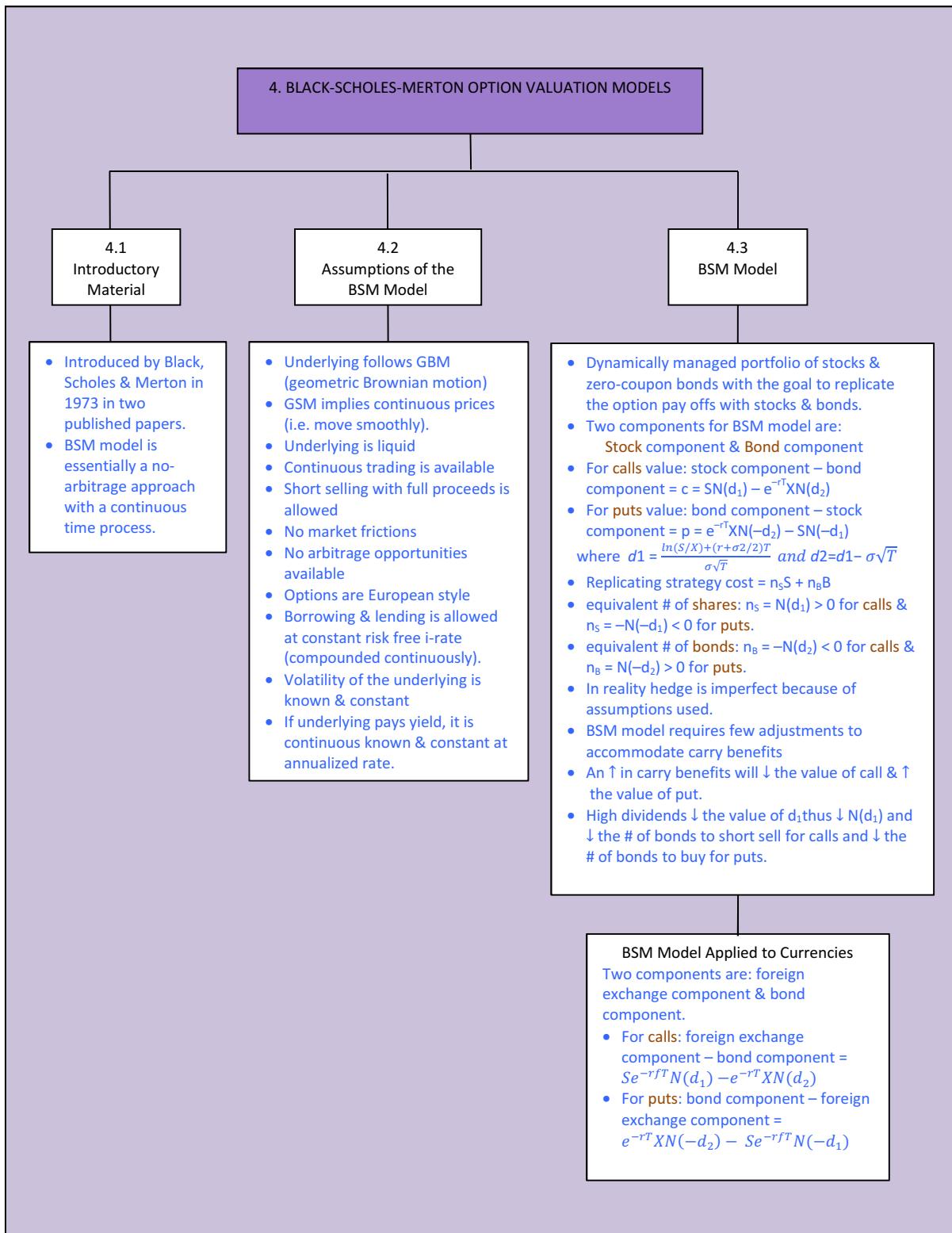
- Two fundamental rules (from arbitrageurs' perspective):
 - Rule 1: Do not use own money.
 - Rule 2: Do not take price risk
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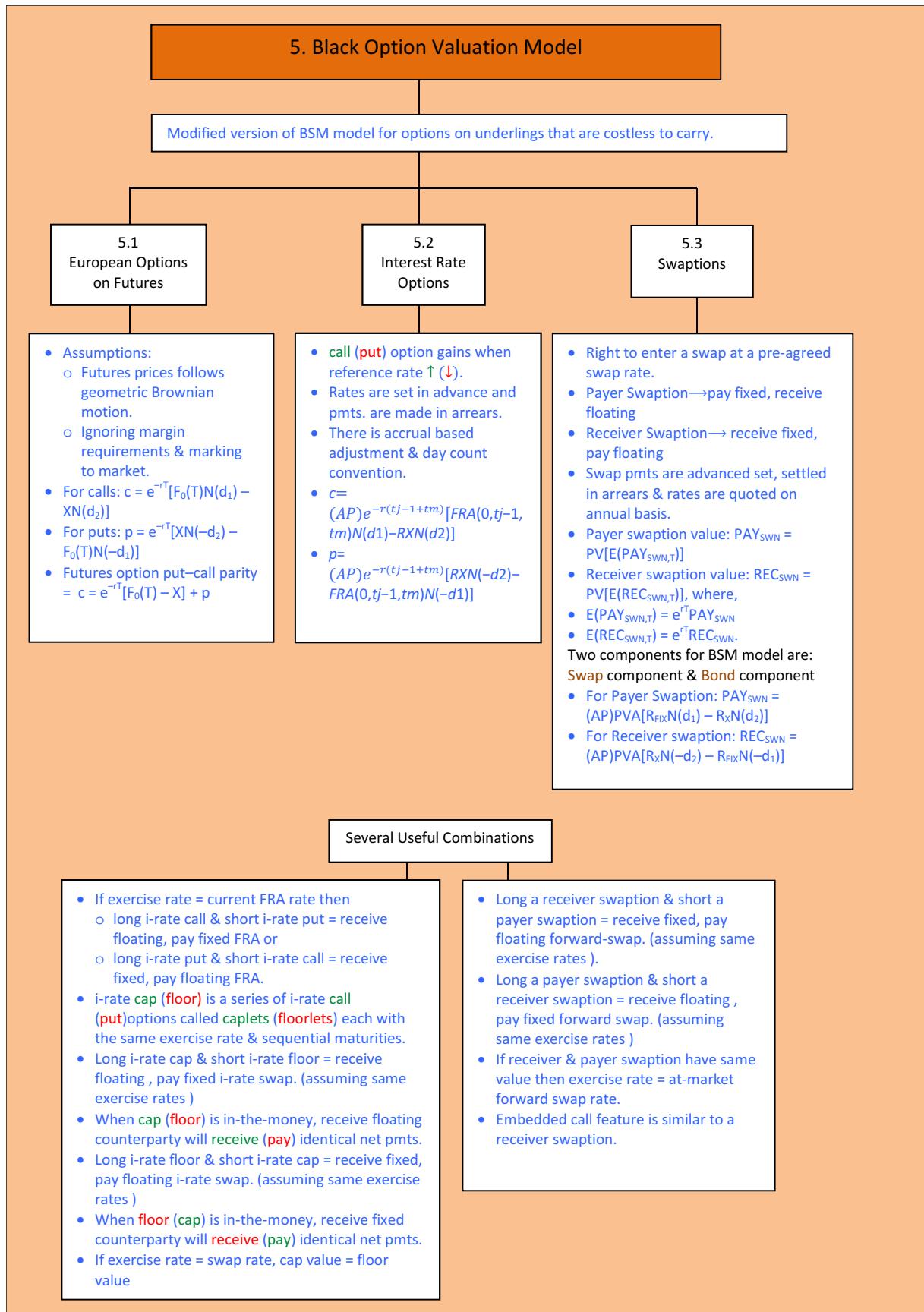
Key Assumptions for Option Valuation

- Replicating instruments are identifiable & investable.
- No mkt. friction.
- Short selling is allowed
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Key assumption of BSM Model \Rightarrow value of the underlying follows **geometric Brownian motion**, which implies lognormal distribution i.e. underlying's continuously compounded return is normally distributed.







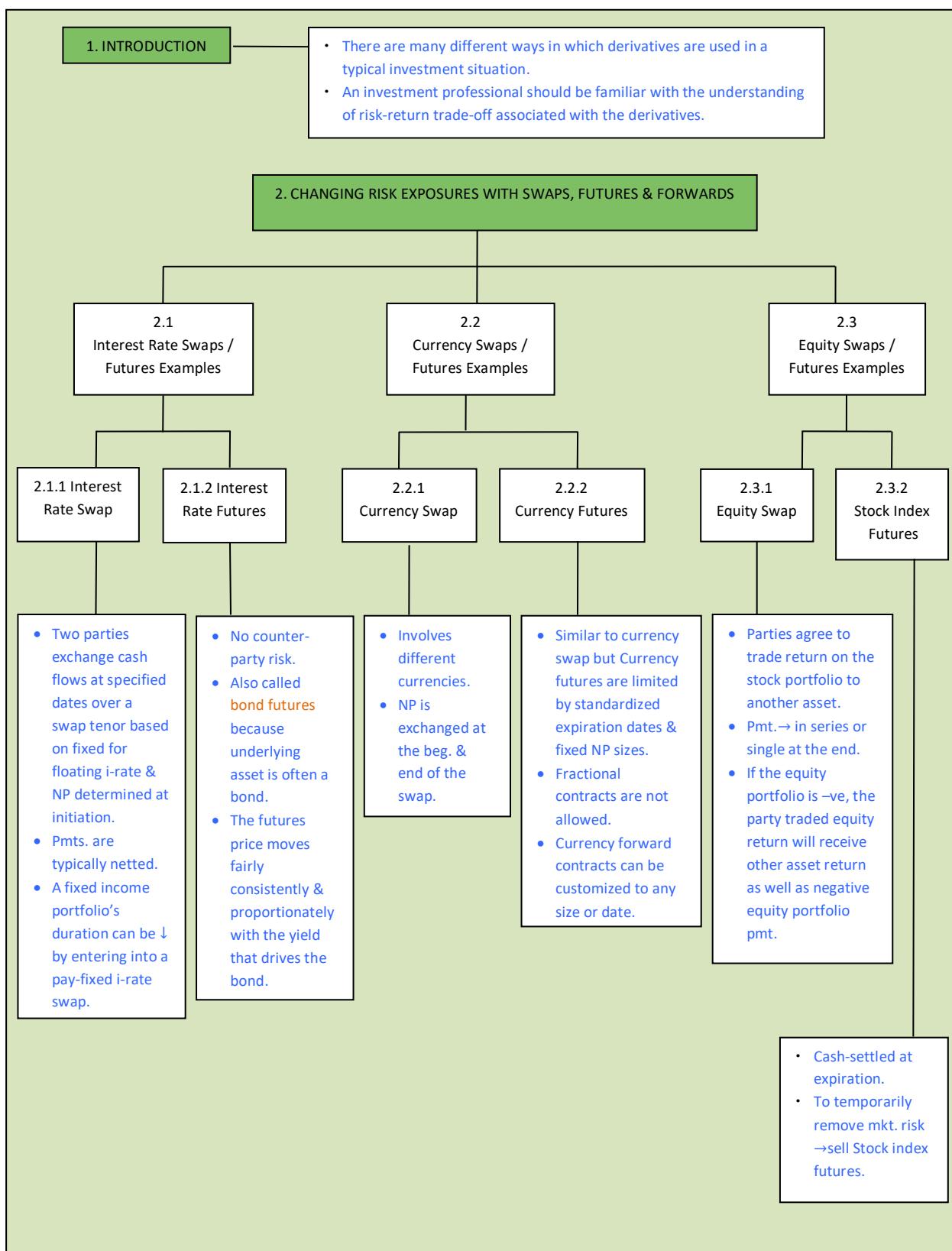
6. Option Greeks & Implied Volatility

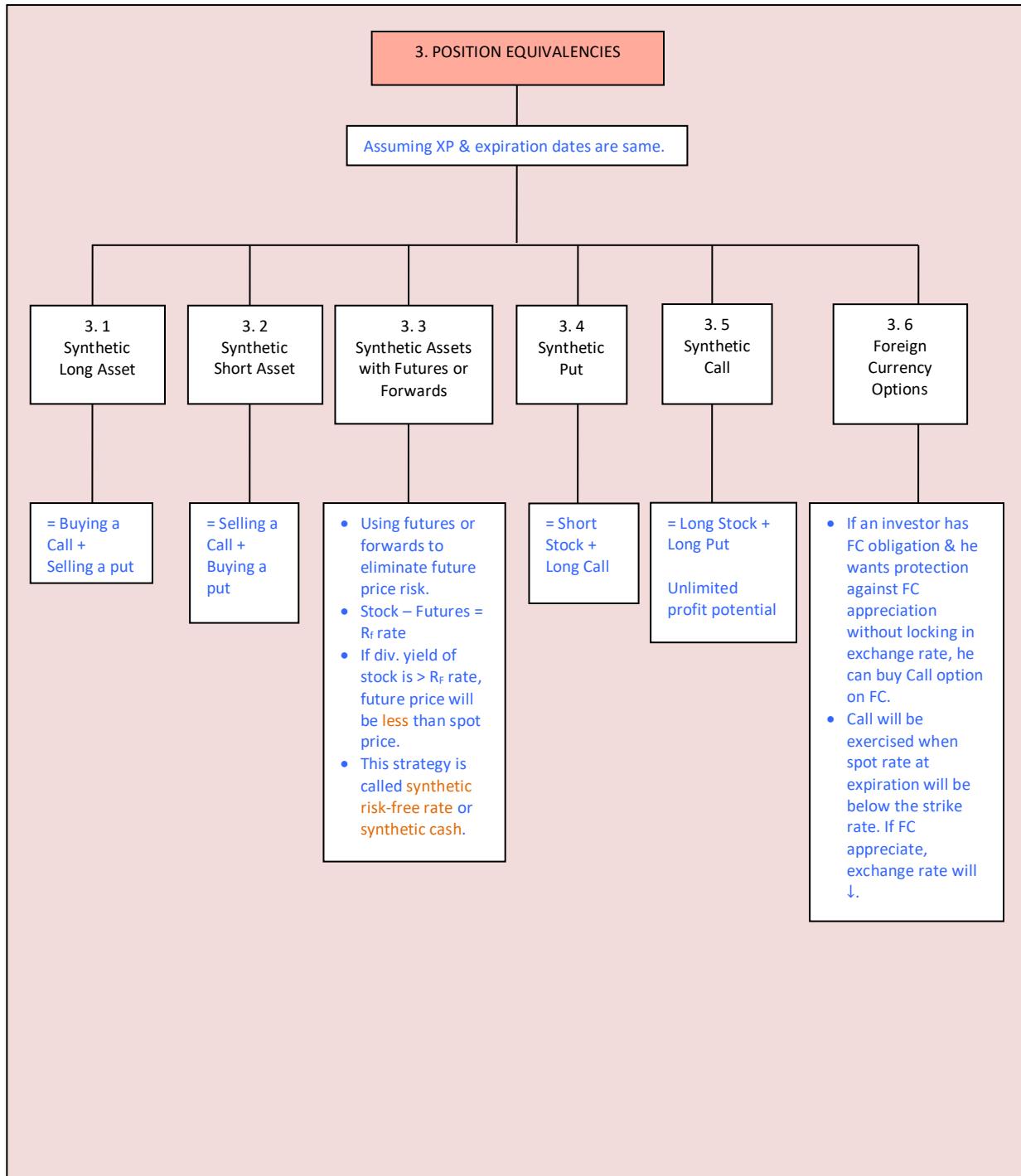
These are called static risk measures as they gauge Δ in value due to Δ in one measure keeping other measures constant.

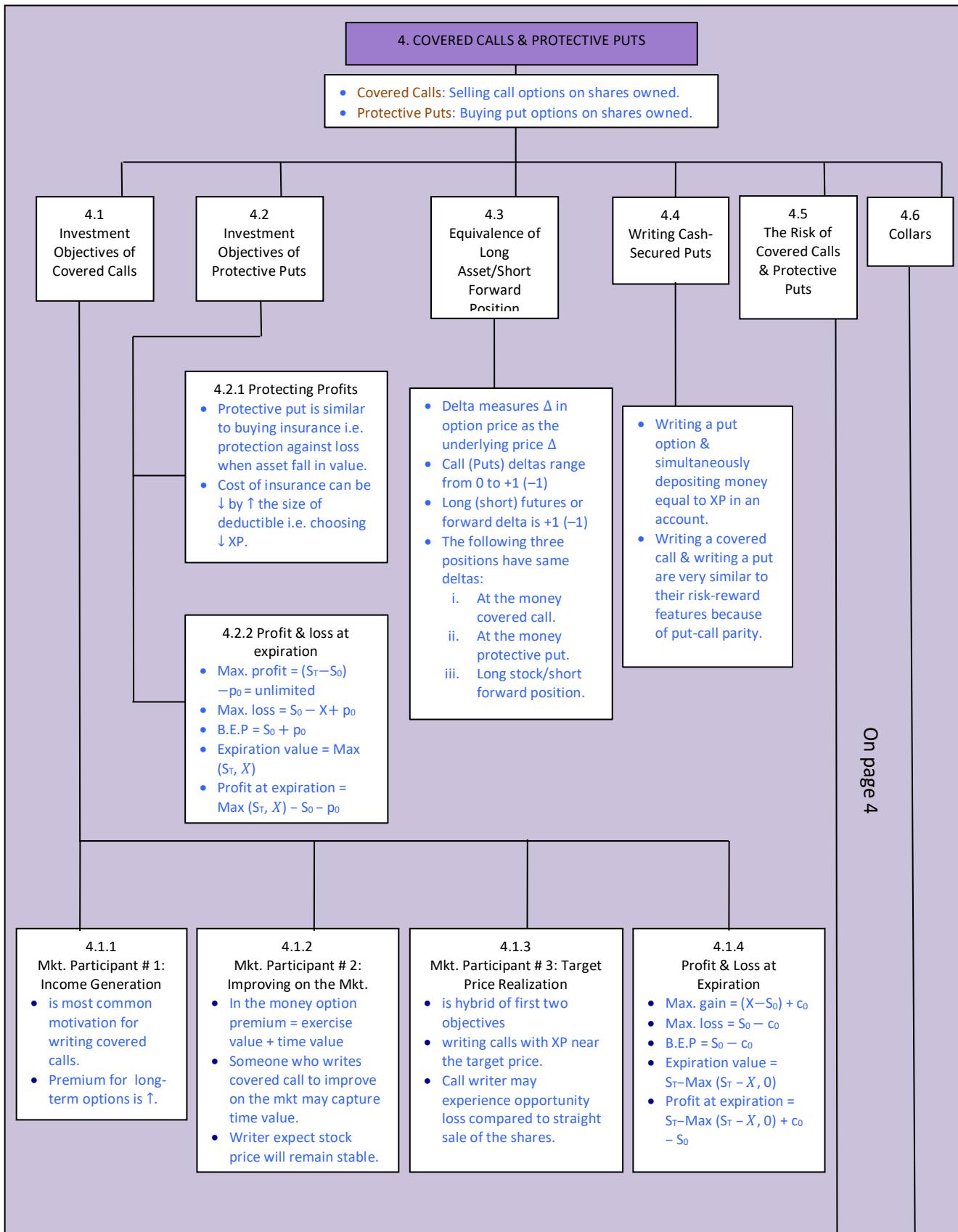


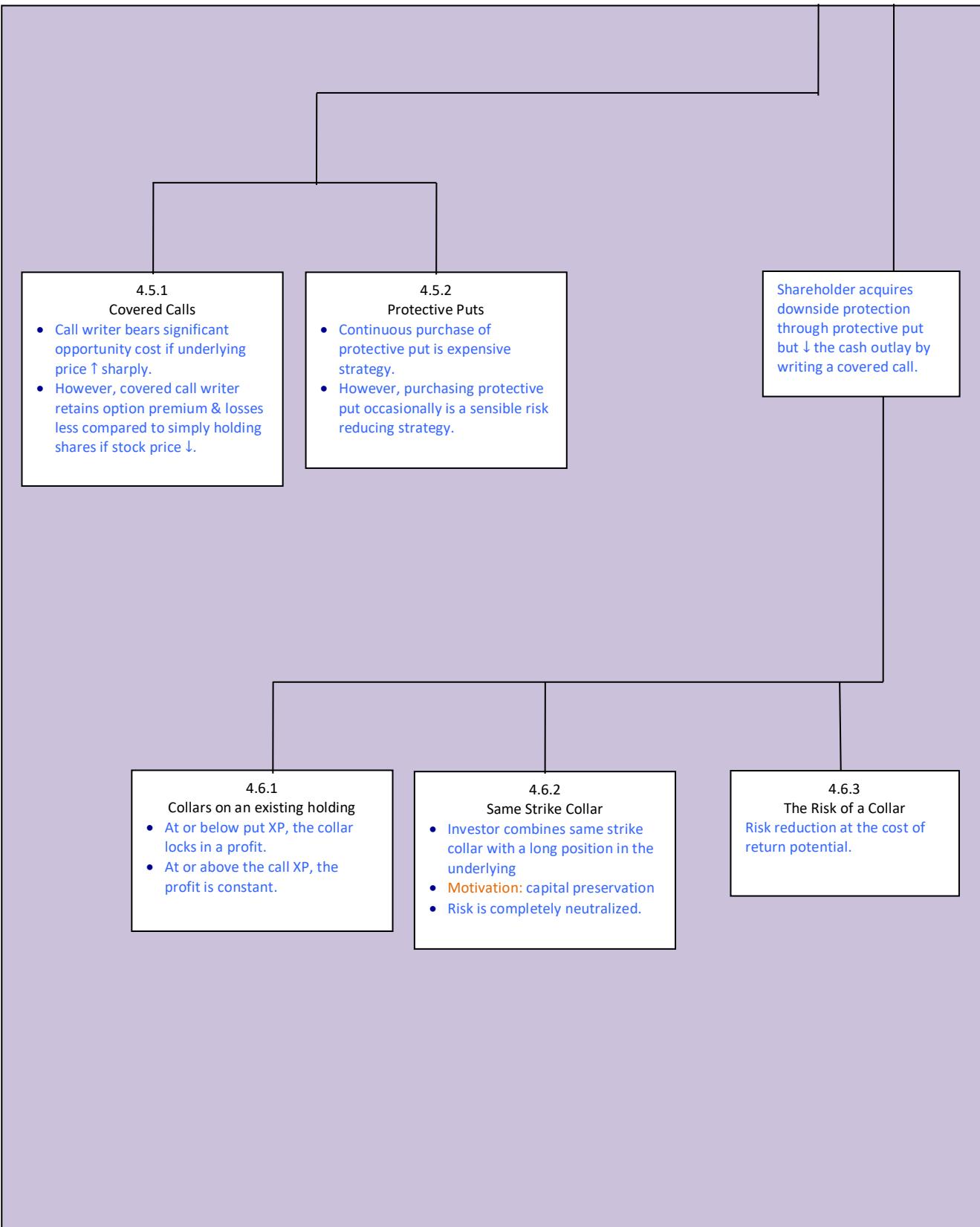
“Derivative Strategies”

i-rate = interest rate
 pmts. = payments
 Gen. = generally
 NP = notional principle
 Mkt. = market
 FC = foreign currency
 B.E.P = Breakeven Price
 XP = exercise price









5. SPREADS & COMBINATIONS

Option Spread: buying one call & writing another or buying one put & writing another with different XPs.
Option Combination: Typically uses both puts & calls e.g. Straddle.

5.1 Bull Spreads & Bear Spreads

5.2 Calendar Spread

5.3 Straddle

5.4 Consequences of Exercise

- A strategy in which a trader sells (or buys) a near-dated call & buys (or sells) a longer-dated one [same asset, same strike price].
- Long calendar spread: buying longer-dated option.
- Short calendar spread: buying near-term option.
- Calendar spread can be done with calls or puts.

- Long Straddle: Buying puts & calls [same asset, same XP].
- Short Straddle: writing both puts & calls [same asset, same XP].
- Directional play on the underlying volatility.
- Risk of long straddle is limited to the total option cost paid.

- For option writer, consequences of exercise can be significant & unexpected exercise may be quite inconvenient.

5.1.1 Bull Spread

5.1.2 Bear Spread

5.1.3 Refining Spreads

5.1.4 The Risk of Spreads

- Become valuable when price of the asset ↑.
- Can be constructed with puts or calls.
- Strategy: buying one option, writing another with ↑ XP.
- B.E.P for Call Bull Spread = $X_L + (C_L - C_H)$

- Become valuable when price of the asset ↓.
- Opposite of bull spread.
- Investor buy ↑ XP & sell ↓ XP.
- B.E.P for Put Bull Spread = $X_H - (p_L - p_H)$

Limit upside return potential as well as max. loss like collars.

5.1.3.1 Adding a Short Leg to a Long Position

- e.g.
- initial position: Long Call
 - Subsequent Position: Long Call + Short Call

5.1.3.2 Multiple Strikes

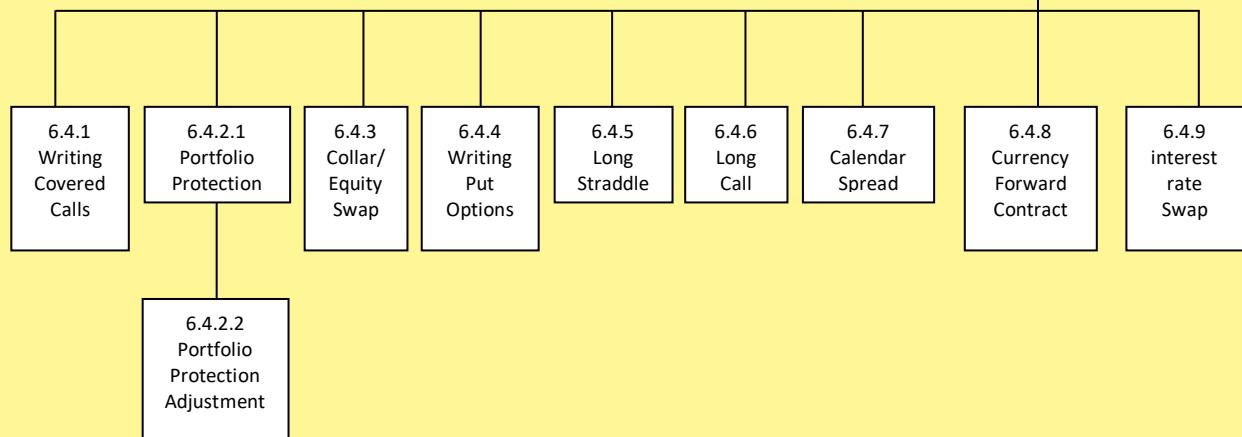
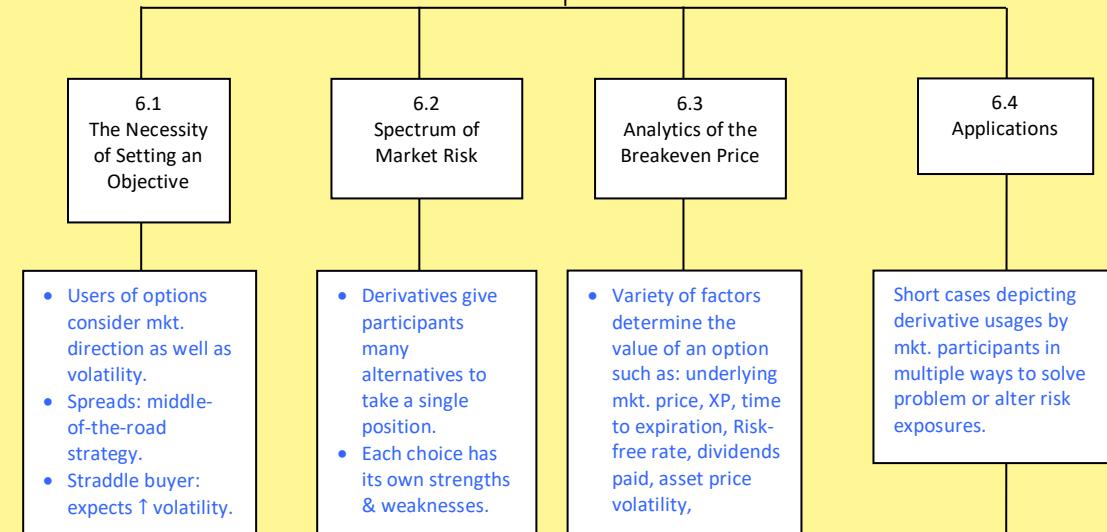
- e.g.
- initial position: Long Call
 - Subsequent Position: Writing a mix of two or more options

5.1.3.3 Spreads as a Volatility Play

- Spreads: directional play.
- Spread traders can take advantage of Δ in volatility level.

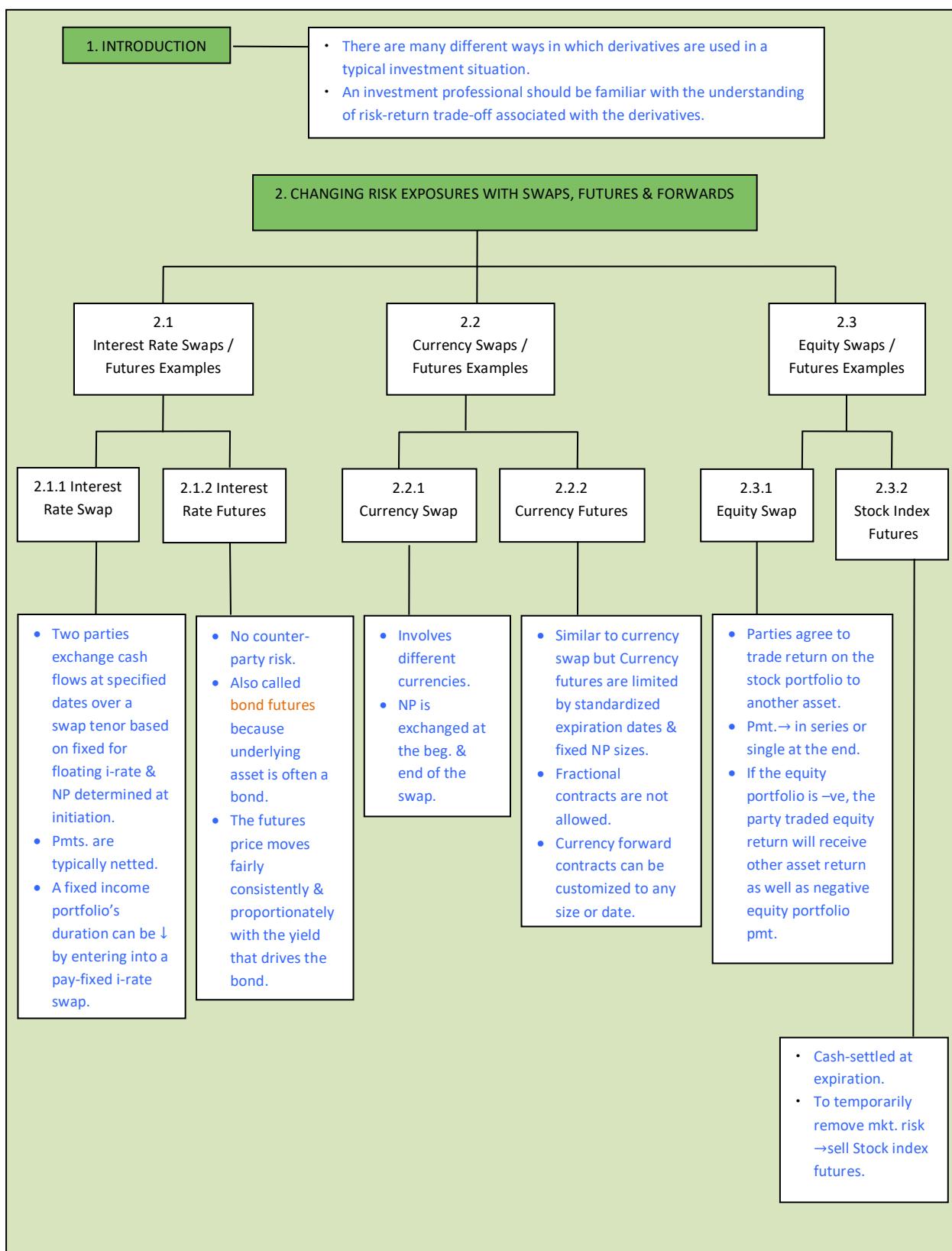
6. INVESTMENT OBJECTIVES & STRATEGY SELECTION

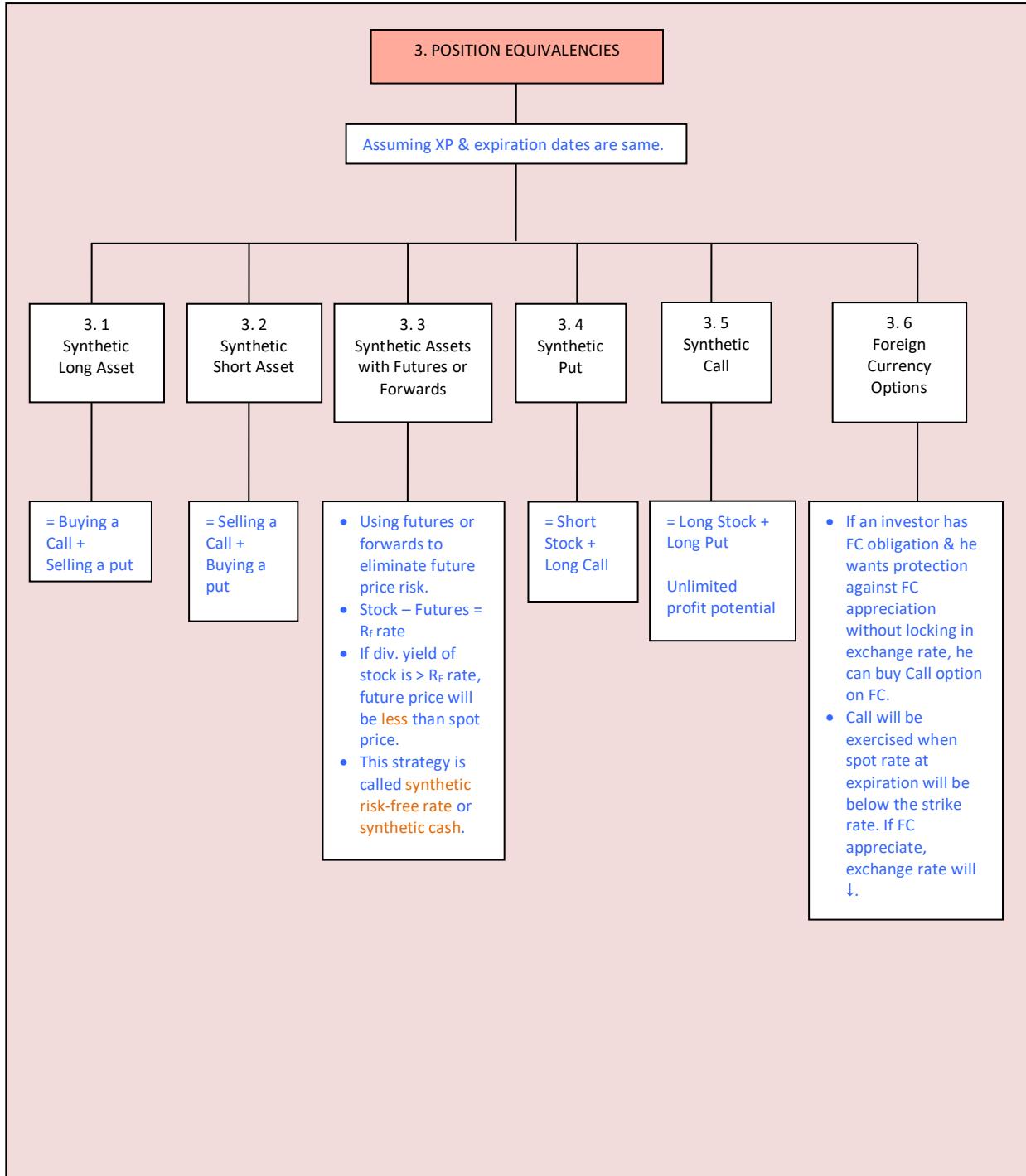
Derivatives: a helpful tool to quickly adapt to changing mkt. conditions/client needs or to create a preferred risk-return trade-off.

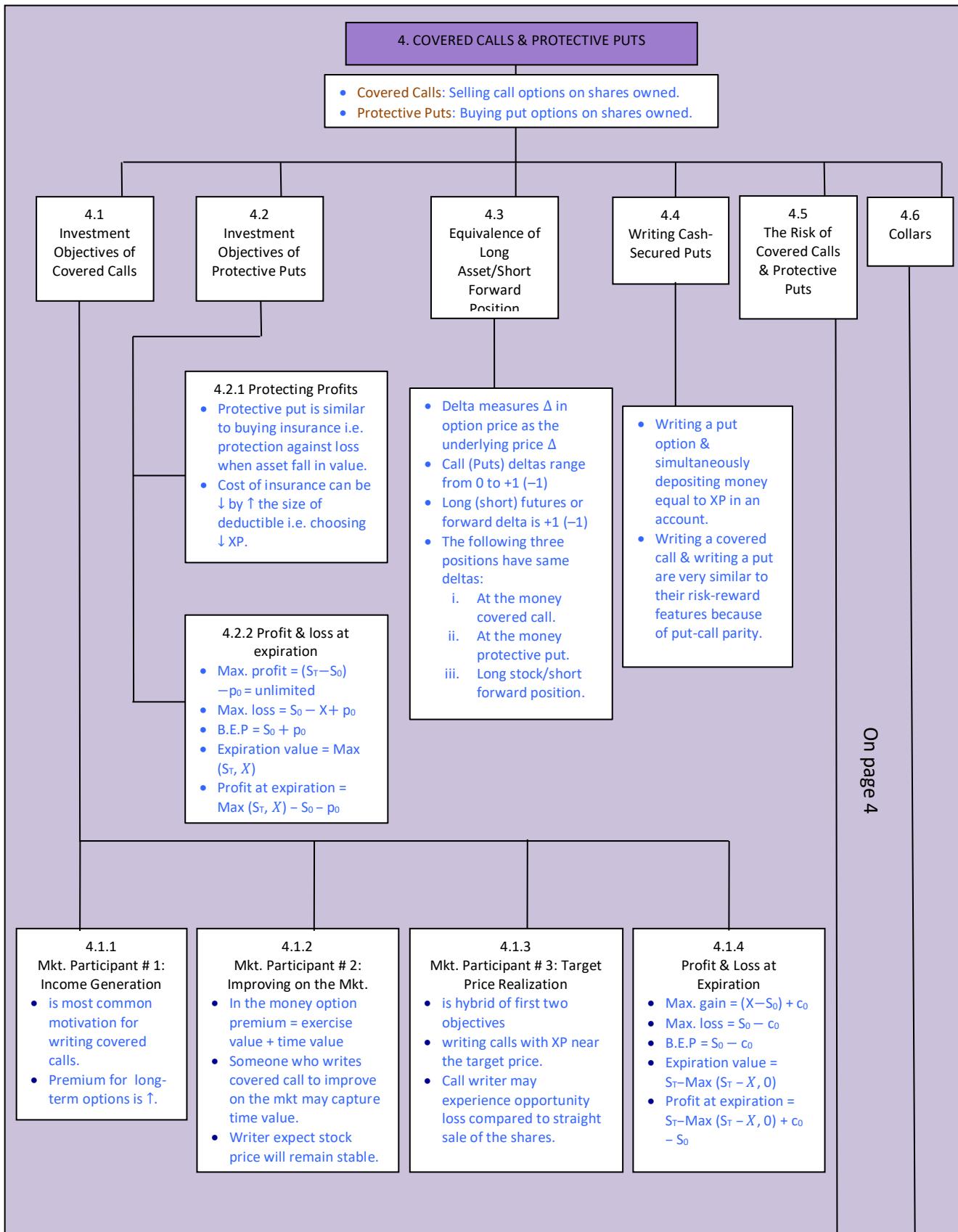


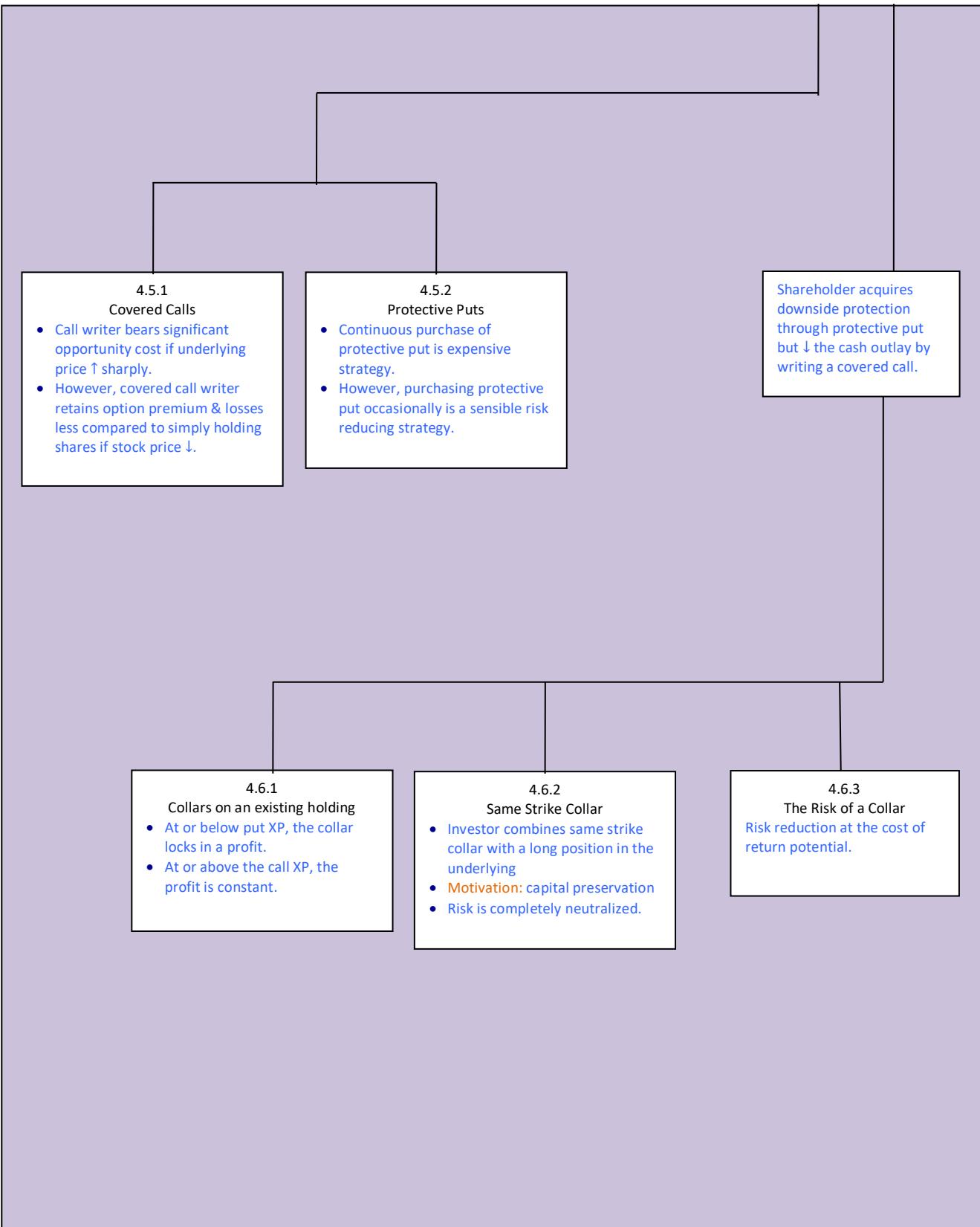
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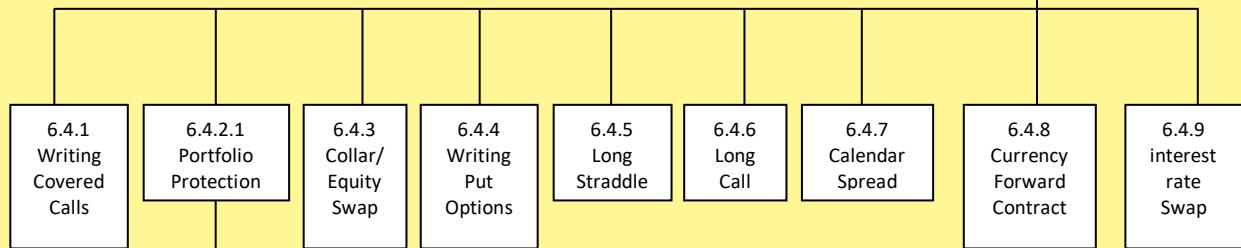
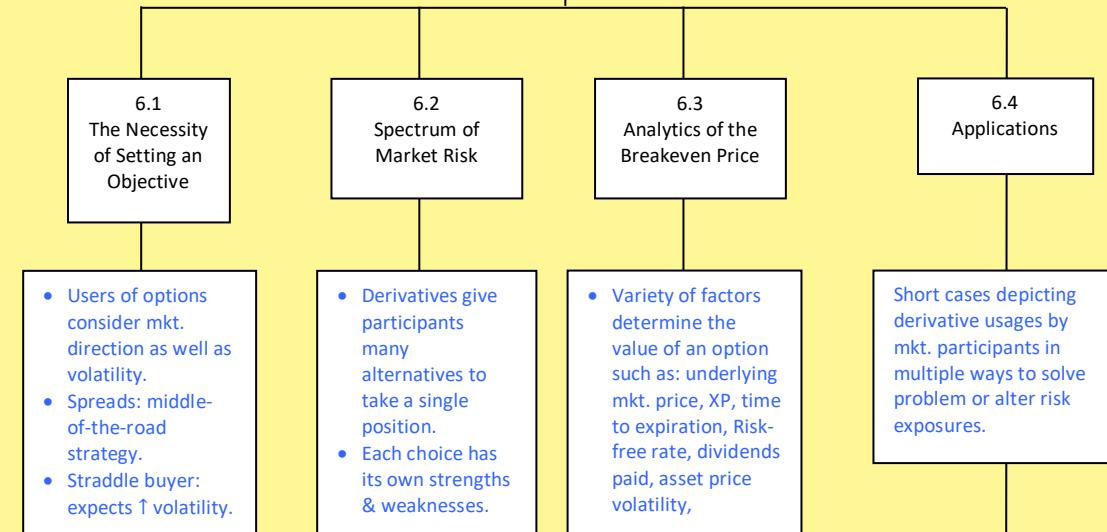
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“PRIVATE REAL ESTATE INVESTMENTS”

REITS = Real Estate Investment Trusts
 NOI = Net Operating Income
 DSCR = Debt Service Coverage Ratio

TV = Terminal Value
 RE = Real Estate
 MV = Market Value
 RC = Replacement Cost

1. INTRODUCTION

- Private equity investment in real estate \Rightarrow direct ownership.
- REITS \Rightarrow indirect investments.
- Real estate investments are usually part of the portfolios of investors with longer investment horizon & low liquidity needs.

2. REAL ESTATE INVESTMENT: BASIC FORMS

- Real estate equity investor \Rightarrow ownership interest.
- RE debt investor \Rightarrow loan funds to entity acquiring the RE property or may invest in security based on real estate lending.
- Publicly traded RE investment provides liquidity & diversification benefits.
- Expected return of RE equity investors $>$ return expected by debt investors.
- Return components of RE equity investors:
 - Income stream
 - Capital appreciation

3. REAL ESTATE: CHARACTERISTICS AND CLASSIFICATIONS

3.1 Characteristics

- Heterogeneity & fixed location \Rightarrow no two RE properties are identical.
- High unit value \Rightarrow unit value of RE property $>$ bond or stock unit value.
- Management intensive \Rightarrow active management by the property owner or manager.
- High transactions cost \Rightarrow because of many parties involved (e.g. appraisers, lawyers etc.).
- Need for debt capital \Rightarrow the ability to access funds & the cost of funds in credit markets are important (because large amount required to purchase & develop RE properties).
- Illiquidity & difficulty in price determination \Rightarrow appraised based valuation due to low volume of transactions.

3.2 Classifications

Office

- Single or multi-tenant buildings found in the central business districts.
- Often built to suit the needs of tenants.

Industrial & Warehouse Properties

- Property used for light or heavy manufacturing as well as associated warehouse space.
- Older buildings can be converted from one use to another use.

Retail Properties

Vary from large shopping centers to small stores occupied by individual tenants.

Hospitality

- Vary in size & amenities available.
- Typically located near attractions that tourists visit.
- Require day-to-day management.

Other Types

- These include parking facilities, restaurants, country clubs etc.
- Some buildings intended for one use may not easily be adapted for other uses. (e.g. university or hospital buildings).

4. PRIVATE MARKET REAL ESTATE EQUITY INVESTMENTS

- Several motivations of RE equity investors include:
 - To earn current income.
 - Capital appreciation.
 - Inflation hedge \Rightarrow both rent & RE prices rise in inflationary environment.
 - Diversifications \Rightarrow RE performance has not typically been highly correlated with other asset classes & it brings diversification benefits.
 - Tax benefits \Rightarrow RE investment may receive favorable tax treatment compared with other investments.

4.1 Risk Factors

- Changes in economic conditions will affect RE investments (both current income & RE values may be affected).
- Long lead time for new development & during this time market conditions may change dramatically.
- Cost & availability of capital \Rightarrow shortage of capital or high interest may be an issue.
- Unexpected inflation can negatively impact fixed income securities.
- Demographics (e.g. size & age distribution of population) factor.
- Lack of liquidity \Rightarrow longer time to realize cash & the risk that the market may move against the investor.
- Real estate value can be affected by environmental conditions.
- Lack of informed decision-making due to non-availability of RE information.
- Management risk reflects the ability of the property & asset managers to make the right decisions regarding the operation of the property.
- Higher leverage in RE investments also increases risk.
- Many other risks may also exist in the RE e.g. natural disasters.
- Some risks can be converted to a known \$ amount through insurance.

4.2 Real Estate Risk and Return Relative to Stocks and Bonds

- RE lease can be thought as giving equity RE investment a bond-like characteristic.
- At the end of lease term, the uncertainty regarding renewal of lease gives equity-like characteristic to RE investment.
- The risk & return profile of real estate falls b/w risk & return profile of stocks & bonds.

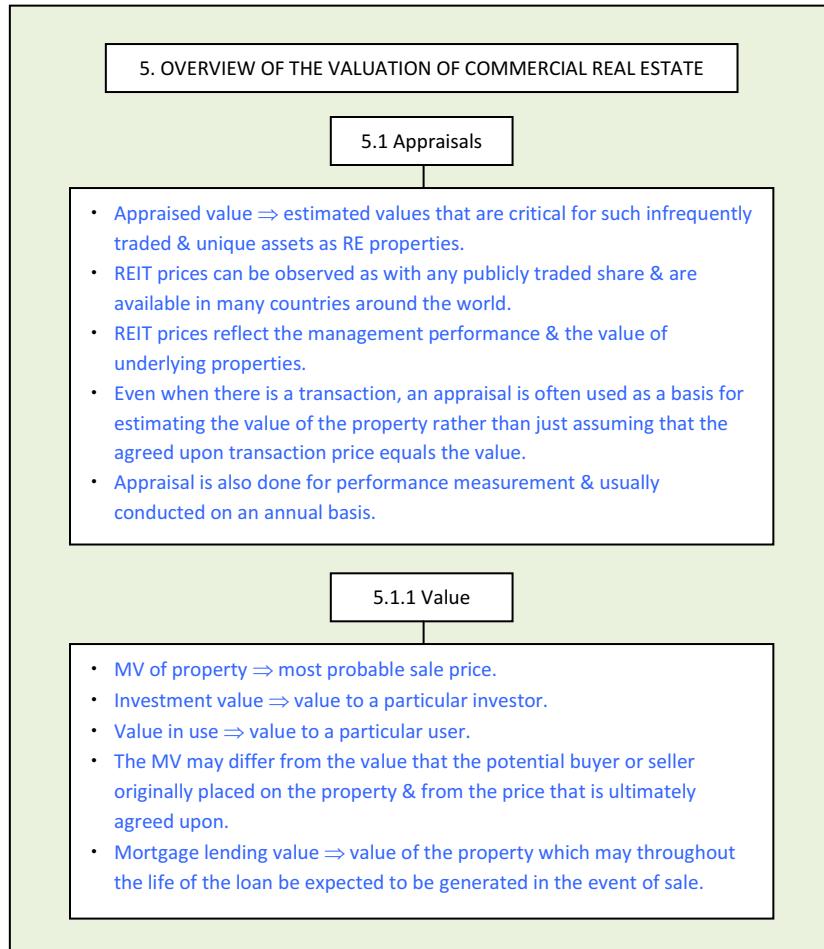
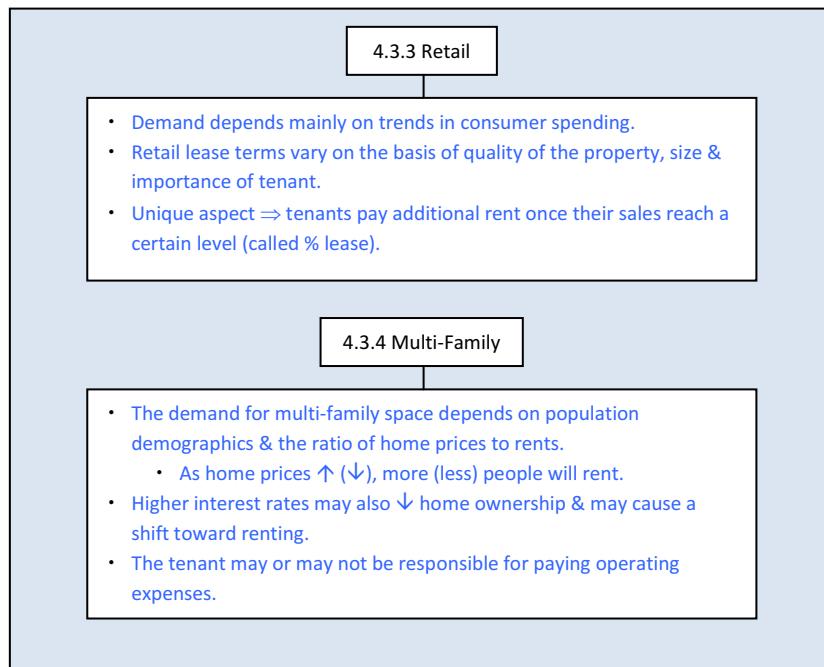
4.3 Commercial Real Estate

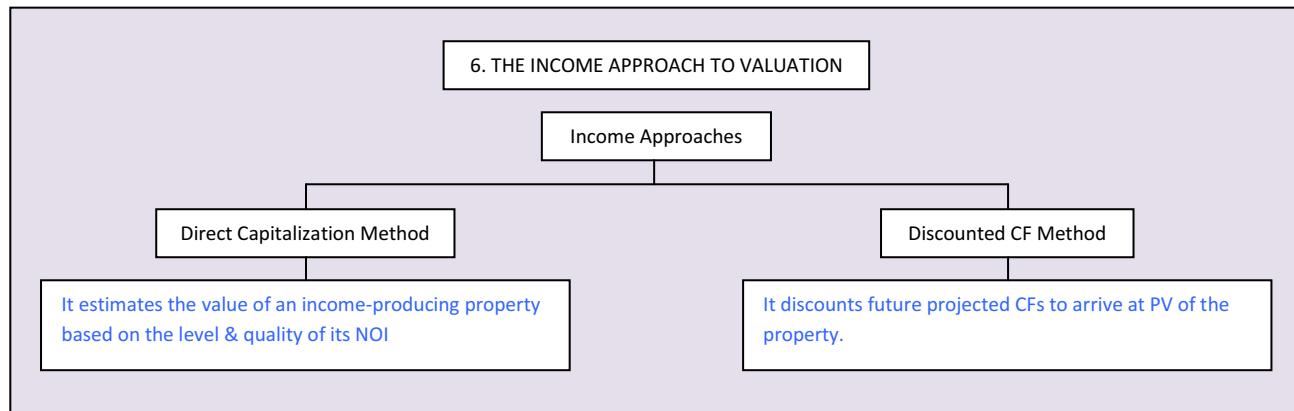
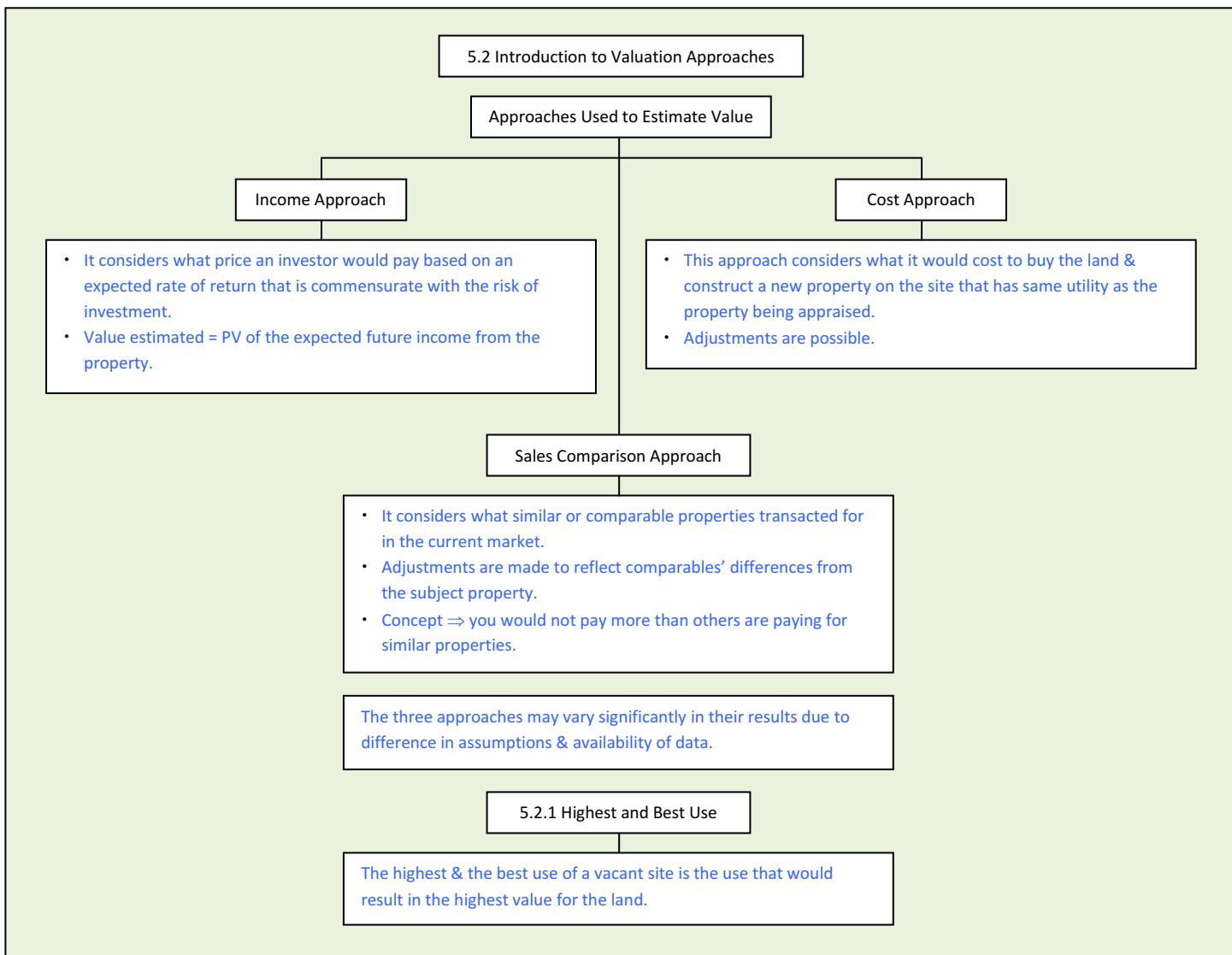
4.3.1 Office

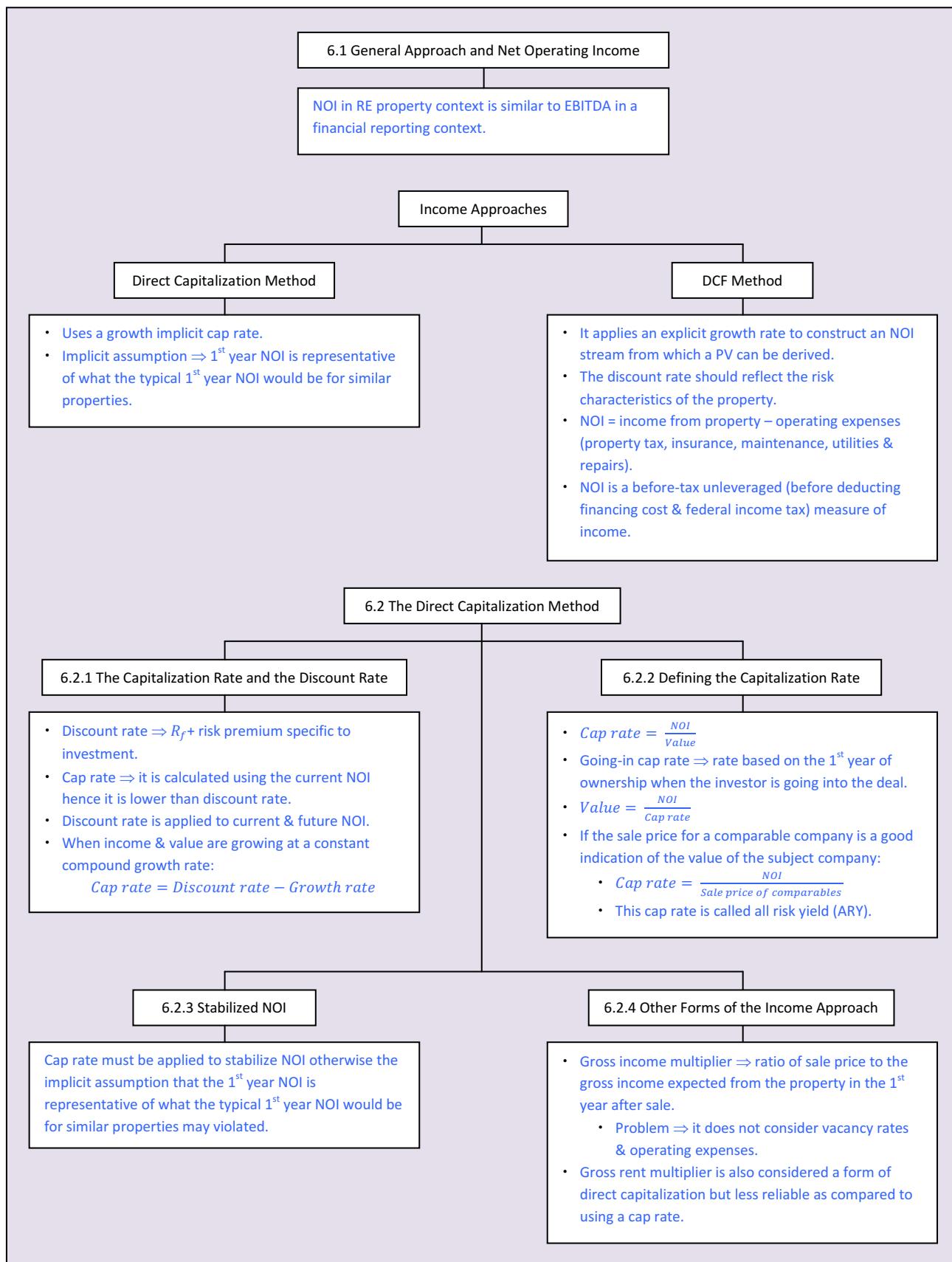
- Demand depends heavily on employment growth.
- Amount of space used per employee is important because it tends to \uparrow when economy is strong & vice versa.
- Important consideration \Rightarrow whether the owner or tenant incurs the risk of operating expenses.
 - Net (Gross) lease \Rightarrow tenant (owner) is responsible for operating expenses.
- There are differences in how leases structured over time & in different countries.
- Lease terms will affect the risk & return to the investor.

4.3.2 Industrial and Warehouse

- Demand depends heavily on strength of economy & economic growth as well as import & export activity.
- Industrial leases are often net leases.







6.3 The Discounted Cash Flow (DCF) Method

6.3.1 The Relationship between Discount Rate and Cap Rate

- Cap rate = DR – growth rate (if same change in income & value for a property).
 - When the NOI is growing, price will be ↑ & cap rate will be ↓.
 - If growth rate is constant:
- $$V = \frac{NOI}{(r - g)}$$
- If NOI growth rate is not constant, project each period NOI, & discount it back to arrive at a value for the property.

6.3.2 The Terminal Capitalization Rate

- With DCF method, estimated TV is an important input.
- Terminal cap rate ⇒ it is used to estimate the TV.
- TV ⇒ PV of income to be received by the next investor.
- Estimating the TV & selecting a terminal cap rate is challenging.
- Terminal cap rate may differ from going-in cap rate.

6.3.3 Adapting to Different lease Structures

- Lease structures have an impact on an estimated value in a specific locale.
- Term & reversion approach:
 - Term rent ⇒ fixed passing rent.
 - Reversion ⇒ estimated rental value.
 - Cap rate used for reversion is derived from sales of comparable fully let properties.
 - Discount rate of term rent < reversion discount rate.
- A variation of the term & reversion approach is layer method.
 - The only difference is that this method deals with the higher income expected from the rent review in a different way mathematically.

6.3.4 The Equivalent Yield

- Equivalent yield ⇒ single discount rate applied to two income streams that would result in the same value.
- Equivalent yield is not a simple avg.

6.4 Advanced DCF: Leases-by-Lease Analysis

- Steps to a DCF analysis include:
 - Forecast income from existing leases.
 - Assumptions about lease renewals.
 - Assumptions about operating expenses.
 - Make assumptions about capex.
 - Assumptions about absorption of any vacant space.
 - Estimate reversion (resale value).
 - Select discount rate to find PV of CFs.

6.5 Advantages and Disadvantages of the Income Approach

Advantages

- It captures the CFs that investors actually care about.
- Does not depend on current transactions from comparable sales if we are able to select an appropriate discount rate.

Disadvantages

- Detailed information is needed.
- Small variations in assumptions can have a significant impact on the value.
- Discount rate & forecasting of NOI growth rate is difficult.

6.6 Common Errors

- Common erroneous assumptions include:
 - The DR may not reflect the risk.
 - Income growth > expenses growth.
 - Illogical terminal cap rate & applied to an income that is not typical.
 - Cyclical nature of RE market is not recognized.

7. THE COST AND SALES COMPARISON APPROACHES TO VALUATION

7.1 The Cost Approach

- Estimated total value of property = estimated value of building based on replacement cost + estimated value of land based on sales comparison approach.
- The replacement cost (RC) is adjusted for different types of depreciation to arrive at a depreciated RC:
 - Physical deterioration \Rightarrow related to age of property.
 - Functional obsolescence \Rightarrow loss in value due to a design that is different from the new building constructed with an appropriate design.
 - Locational obsolescence (external) \Rightarrow when the location is not optimal for the property.
 - Economic obsolescence \Rightarrow when new construction is not feasible under current economic conditions.

7.2 The Sales Comparison Approach

- Sales comparison approach \Rightarrow value of a property depends on what other comparable properties are selling for in the current market.
- Adjustments have to be made to each of the comparable for differences from the subject property due to certain factors (e.g. size, location etc.).

7.3 Advantages and Disadvantages of the Cost and Sales Comparison Approaches

Cost Approach

Advantage

Set an upper limit on the value (investor would never pay more than the cost to buy land & develop a comparable building).

Disadvantages

- Depreciation estimate of an older property may be difficult.
- The assumption made concerning investor purchase costs may be an overstatement.

Sales Comparison Approaches

Advantage

Reliable approach in an active market

Disadvantages

- Comparable properties are difficult to find when market is weak.
- Investor may not behave rationally in certain time periods, (bubble in property prices).

8. RECONCILIATION

- It is highly unusual to get the same answer from all three valuation approaches (income, cost & sales comparison) because of different assumptions used by these approaches.
- The appraiser needs to reconcile the differences & arrive at a final conclusion about the value.
- Purpose of reconciliation \Rightarrow to decide in which approach(es) you have the most confidence.

9. DUE DILIGENCE

- Property investors usually go through a process of due diligence to verify facts & conditions that might affect the value of the property.
- To acquire commercial RE, investors often sign a contract or letter of intent.
- Conducting due diligence can be costly but lowers the risk of acquiring a property.

10. VALUATION IN AN INTERNATIONAL CONTEXT

- Difference across countries will mainly be based on which approaches are emphasized & which of the ways of applying the approach is used.
- It is important to note that the general RE concepts are the same & value is derived from an income stream that has a risk associated with it.

11. INDICES

11.1 Appraisal-Based Indices

- RE indices often rely on appraisals to estimate values (insufficient transactions of the same transactions to rely on).
- Appraisal based indices combine valuation information from individual properties & provide a measure of market movement.
- The return for all the properties is calculated as:

$$\text{Return} = \frac{\text{NOI} - \text{Capex} + (\text{ending MV} - \text{Beg. MV})}{\text{Beg. MV}}$$
 - These individual property returns are then value weighted to get the return for all properties in the index.
- Such index allows us to compare the performance of RE with other asset classes.

11.2 Transaction-Based Indices

- Such index is possible by companies that collect information on enough transactions to create an index based only on transactions.
- Problem \Rightarrow same property may not sell very frequently.
- To develop an index, some econometric technique is applied on different properties selling every quarter.
- More sales, the more reliable is the index.
- Hedonic index \Rightarrow control for differences in the characteristics of the property.
- Such indices require sufficient amount of data.

11.3 Advantages and Disadvantages of Appraisal-Based and Transaction-Based Indices

- Disadvantage of appraisal-based index.
 - Appraisals lag in case of sudden shifts in the market.
 - Index with appraisal lag is more of an issue when compared with other publicly traded asset classes.
 - Appraisal lag tends to smooth the index.
 - Two general ways of adjusting the appraisal lag.
 - Unsmooth the appraisal-based index.
 - Use a transaction-based index.
- Disadvantage of transaction-based index.
 - Can be noisy.
 - Statistical techniques are used to control the noise, can be challenging.

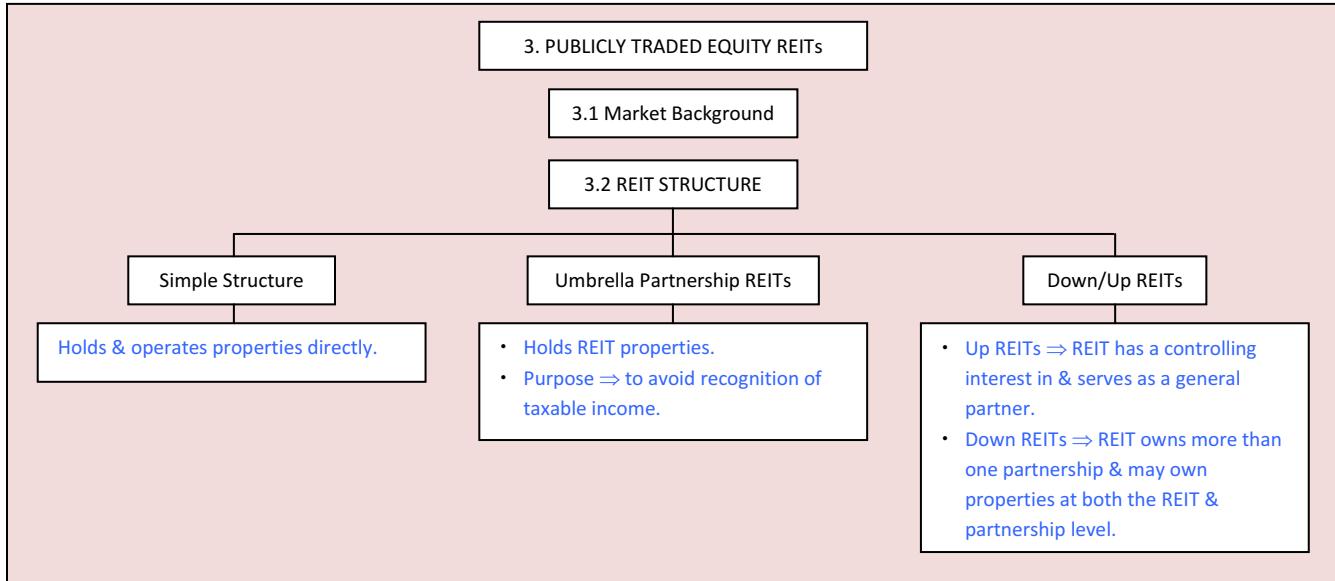
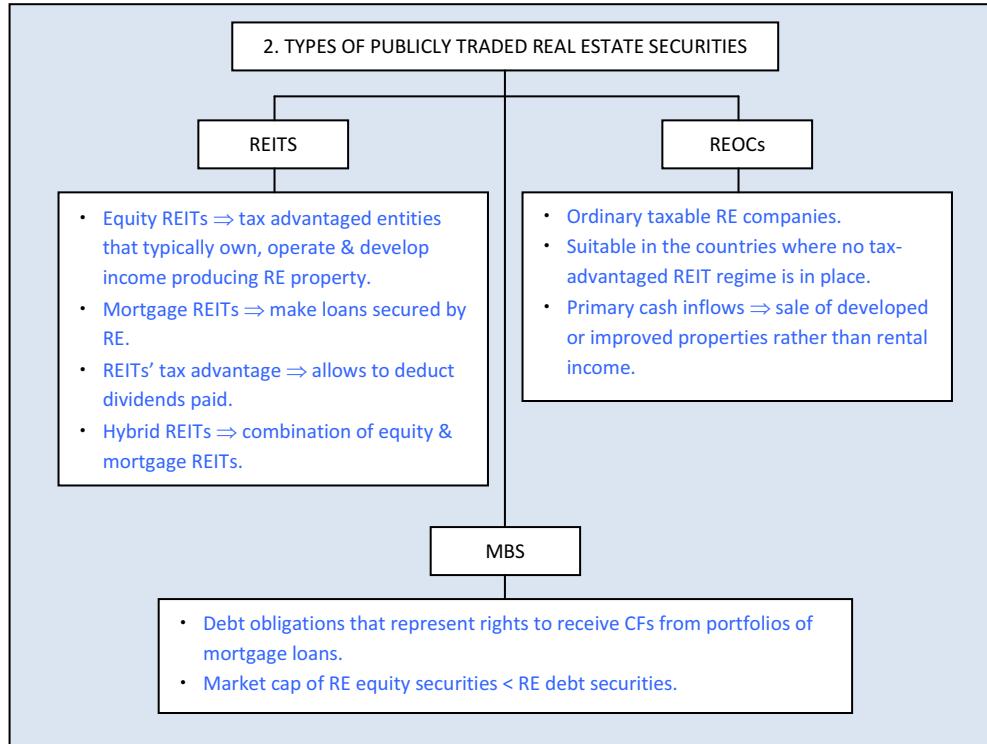
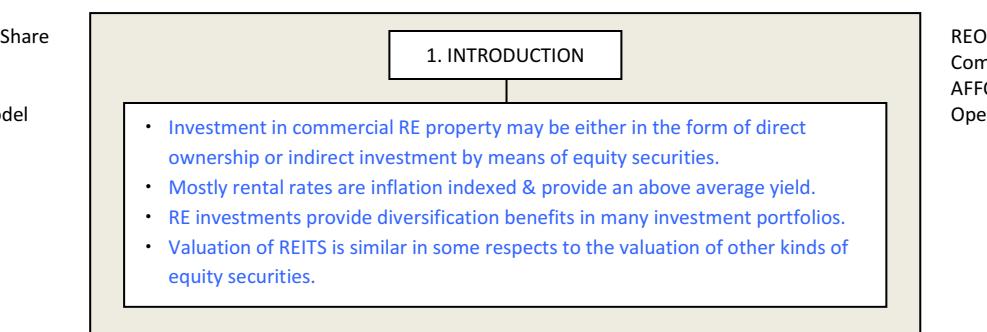
12. PRIVATE MARKET REAL ESTATE DEBT

- Investors who do use debt financing will normally expect to earn a higher rate of return on their equity investment (positive financing leverage).
- By borrowing money, the investor is taking on more risk in anticipation of higher return on equity.
- Maximum amount of debt is usually limited by either the ratio of loan to the appraised value or DSCR.
- $DSCR = \frac{NOI}{Debt\ Service}$
 - Debt service includes both interest & principal payments on mortgage.

“PUBLICLY TRADED REAL ESTATE SECURITIES”

NAVPS = Net Asset Value per Share
 P = Price
 DTL = Deferred Tax Liability
 DDM = Dividend Discount Model

REOCs = Real Estate Operating Companies
 AFFO = Adjusted Funds from Operations



3.3 Investment Characteristics

- Investment characteristics of public & private REITS include:
 - Exemption from income taxes at the corporate level.
 - High income distribution as a result of distribution requirement.
 - Low volatility of reported income due to conservative, rental-property-focused business models.
 - More frequent secondary equity offerings compared with industrial companies.
 - REITs offer much greater ease of ownership in both small & larger amounts, provide liquidity & diversification opportunities.

3.3.1 Advantages of Publicly Traded Equity Real Estate Securities

- REITs or REOCs provide the following advantages:
 - Greater liquidity due to trading on stock exchanges rather than property markets.
 - Lower investment than a single commercial property.
 - Limited liability.
 - Access to superior quality & range of properties.
 - REITs investors' property interests are actively managed on their behalf by professional managers.
 - Diversification.
- REITs offer the following advantages over REOCs:
 - Taxation benefits
 - Greater degree of earnings predictability due to contractual nature of REITS rental income.
 - High income payout ratios & yields.
- REOCs offer the following advantage compared with the REITs.

3.3.2 Disadvantages of Publicly Traded Equity Real Estate Securities

- Disadvantages of publicly traded RE securities include:
 - Taxation ⇒ REIT & REOC investing is less tax advantaged as compared to direct property investment.
 - Minority shareholders in REITS have less control over property decisions than do direct property owners.
 - Maintenance of publicly traded REITS structure is costly.
 - Stock market value of a REIT is more volatile than the appraised NAV of a REIT.
 - Structural conflicts & related costs ⇒ the use of UPREITS and DOWNREITS structures can create conflicts of interest b/w the partnership & REIT shareholders during decision making process.
 - ↑ Payout, ↓ retention, ↓ reinvestment, ↓ future growth.
 - Potential for forced equity issuance at disadvantageous prices if management, timing, and type financial leverage is flawed.

3.4 Considerations in Analysis and Due Diligence

- When conducting due diligence of equity REITS, following should be considered:
 - Remaining lease terms ⇒ short remaining lease terms are +ve consideration in an expansionary economy.
 - Inflation protection.
 - Market rent analysis.
 - Costs of re-leasing space.
 - Tenant concentration.
 - Availability of new competitive supply.
 - Leverage analysis.
 - Review of senior management.

3.5 Equity REITS: Property Subtypes

3.5.1 Shopping Center/Retail REITS

- Invest in regional shopping malls & community shopping centers.
- Tenants' leases in regional malls are usually terms of 3-10 years & typically require tenants (expect for anchor retailers).
- Analysts often analyze such factors as rental rates & sales per square foot for the rental property portfolio.

3.5.2 Office REITs

- Invest in & manage multi-tenanted office properties in central business districts of cities & suburban markets.
- Lease term typically consist of 5-25 years with contractual base rent.
- Tenants also share operating expenses, common area costs & property taxes.
- Analysts pay particular attention to new space under construction in a REIT's local market, business conditions, quality of space, location & convenience etc.

3.5.3 Industrial REITs

- Hold industrial properties that are used as warehouses, distribution centers & small office.
- Less cyclical than hotel, health care & storage.
- Stable rental income & values.
- Analyst focus ⇒ trends in tenants' requirements, strategic property locations, shifts in the composition of national & local industrial bases & trends in new supply & demand.

3.5.4 Multi-family/Residential REITs

- Rental apartments for lease to individual tenants, typically using one-year lease.
- Fluctuations in rental income can occur as a result of construction competition, regional economic strength & weakness.
- Analyst focus ⇒ local demographics & income trends, age & competitive appeal, cost & availability of ownership in local markets & the degree of Govt. control of local residential rents.

3.5.5 Storage REITs

- They own & operate self storage properties.
- Gross lease agreements usually on a monthly basis.
- Analyst focus ⇒ rate of construction of new competitive facilities, trends in housing sales activity, local demographic trends, new business start-up activity & seasonal trends in demand for storage facilities.

3.5.6 Health Care REITs

- Invest in skilled nursing facilities, hospitals, medical office buildings & rehabilitation centers.
- Analyst focus ⇒ scrutinize operating trends in facilities, in Govt. funding, in litigation settlements, insurance costs & amount of new facilities under construction.

3.5.7 Hotel REITs

- Hotel REITs typically lease all their properties to taxable REIT subsidiaries & receive passive rental income.
- A minor portion of net operating CF from hotel properties may be subject to income tax.
- The hotel sector is business cycle driven.
- Analyst focus ⇒ trends in occupancies, avg. room rates, & operating profit margins by hotel type & geographical location.

3.5.8 Diversified REITs

- Own & operate in more than one type of property.
- Diversification benefits.
- Analyst focus ⇒ analysis of management experience & degree of local market presence of each property.

3.6 Economic Drivers

- Major economic factors affecting REITS include:
 - Job creation
 - GDP growth
 - Retail sales growth
 - New space supply v/s demand
 - Population growth
- Those sectors bear the greatest risks for REITS where occupant demand for space can fluctuate most widely in short-term.

4. REAL ESTATE OPERATING COMPANIES

- REITs & REOCs face similar operating & financial risks as private RE investments.
- Despite certain advantages of REOCs (e.g. operating flexibility), the equity markets of most countries show a REIT preference (tax advantage, high income distributions).
- REOCs are usually able to elect to convert to REIT status if they meet the general requirement of REITs.

5. VALUATION: NET ASSET VALUE APPROACH

- NAVPS \Rightarrow a fundamental benchmark of the value of a REIT or REOC.
- Discount (premium) in REIT share price from NAVPS = indication of potential undervaluation (indication of +ve future events).

5.1 Accounting for Investment Properties

- Fair value based accounting valuation is relevant for asset-based valuation.
- IFRS:
 - Investments property \Rightarrow property that is owned or leased under a capital lease for the purpose of earning rentals or capital appreciation or both.
 - Companies are allowed to value investment properties using either a cost or fair value model & it appears as a separate line item on the B.S.
 - Company must make additional disclosures about how it determines fair value.
- U.S.GAAP:
 - No specific definition of investment property.
 - Most RE companies use historical cost method, which does not represent economic values of assets & liabilities.

5.2 Net Asset Value Per Share: Calculation

- NAVPS \Rightarrow diff. b/w MV of RE Company's assets & its liabilities divided by no. of shares outstanding.
- In valuing REITs' or REOCs' portfolios, analysts will use appraised value or NOI.
- Goodwill, deferred financing expenses & deferred tax assets will be excluded to arrive at a "hard" economic value for total assets.
- Liabilities adjustment \Rightarrow replace face value of debt with MV of debt & remove deferred tax liabilities.
- $$NAV = \frac{\text{Revised Net Worth}}{\text{No. of Shares Outstanding}}$$

5.3 Net Asset Value Per Share: Application

- The NAV approach is most often used by sector-focused RE investors.
- Value-oriented investors tend to focus on NAV when stocks are trading at significant discounts.
- NAV analysis is important when there is significant LBO activity.

5.3.1 Important Consideration in a NAV-Based Approach to Valuing REITs

- Important considerations:
 - Examine how NAVs are calculated.
 - Cap rate approach.
 - Applying value per square foot.
 - Using appraised values.
 - NAV reflects the value of a REIT's asset to a private market buyer, which may not be the same as value assigned by a private equity investor.
 - NAV implicitly treats a company as an individual asset or static pool of assets (not consistent with going concern assumption).
 - When property markets become illiquid & few transactions are observable, NAV estimate will be quite subjective.

5.3.2 Further Observations on NAV

- Rationale for REITs or REOCs trading at premiums to underlying NAVPs.
 - Lower required return rate (\uparrow value) in the public market than the private market for RE assets.
 - Above avg management team in public market leads to better investment decisions.

6. VALUATION: RELATIVE VALUE (PRICE MULTIPLE) APPROACH

$$P/FFO, P/AFFO, \frac{EV}{EBITDA}$$

Multiples are used for valuing shares of REITs & REOCs.

6.1 Relative Value Approach to Valuing REIT Stocks

- $P/FFO, P/AFFO$ Multiples allow investors to quickly ascertain the value of a given REITs shares compared with other REIT shares or with its historical levels.
- Main drivers behind the multiples of most REITs & REOCs:
 - Growth expectation in FFO/AFFO $\Rightarrow \uparrow$ the expected growth, \uparrow the multiple.
 - Risk of underlying RE.
 - Risk associated with company's capital structures & access to capital.

6.2 Funds from Operations and Adjusted Funds from Operations

- **FFO:**
 - Accounting NI excluding depreciation, deferred tax & gain/loss from sales of property & debt restructuring.
 - Depreciation is excluded because investors believe that RE maintains its value to a greater extent, often appreciating in value.
 - Deferred tax liability may not be paid for many years.
 - G/L & debt restructuring are excluded because they don't represent sustainable income.
 - $EBITDA = NOI - \text{general \& admin expenses}$.
 - $FFO = EBITDA - \text{interest exp.}$
- **AFFO:**
 - Also known as funds available for distribution.
 - $AFFO \Rightarrow FFO \text{ adjusted to remove any non-cash rent \& to subtract maintenance-type capex \& leasing cost.}$
 - Straight-line rent \Rightarrow avg. contractual rent over a lease term.
 - Non cash rent \Rightarrow diff. b/w straight-line rent & cash rent paid during the period.
 - Purpose of adjustment \Rightarrow to obtain more tangible, cash-focused measure of sustainable economic income.
 - AFFO is superior to FFO because it takes into account the capex.

6.3 P/FFO and P/AFFO Multiples: Advantages and Drawbacks

Benefits

- These multiples are widely accepted in evaluating shares across global stock markets & industries.
- Portfolio manager can put the valuation of REITs & REOCs into context with other investment alternatives
- Data for these multiples is readily available.
- Multiples can be used in conjunction with growth & leverage level to deepen the relative analysis.

Drawbacks

- May not capture the intrinsic value of all RE assets held by REIT or REOC.
- P/FFO does not adjust for the impact of recurring capex.
- Wide variations in estimates & assumptions are incorporated into the calculation of AFFO.
- Increased level of one-time items (e.g. gains & accounting charges) make P/FFO & P/AFFO more difficult to compute & compare b/w companies.

7. VALUATION: DISCOUNTED CASH FLOW APPROACH

REITs & REOCs tend to be high dividend paying shares thus DDM for valuation is applicable.

7.1 Considerations in Forecasting Longer-Term Growth Rates

- Four key considerations:
 - Internal growth potential that stem from rent \uparrow over time.
 - Investment activities have an impact on long-term growth \Rightarrow development-oriented companies have shown better growth.
 - Capital structure can have an impact on growth.
 - Retaining & reinvesting a portion of free CF can make a contribution to the growth rate.

7.2 Some Perspective on Long-Term Growth Rates

- Key component in DCF & DDM is required return.
- A long run growth rate can be derived by adding the components mentioned in 7.1.
- Key drawback of DCF/DDM \Rightarrow highly sensitive to growth & discount rates.

DCF = Discounted Cash Flow
 VC = Venture Capital
 GP = General Partner
 LP = Limited Partner
 MV = Market Value
 HYD = High Yield Debt

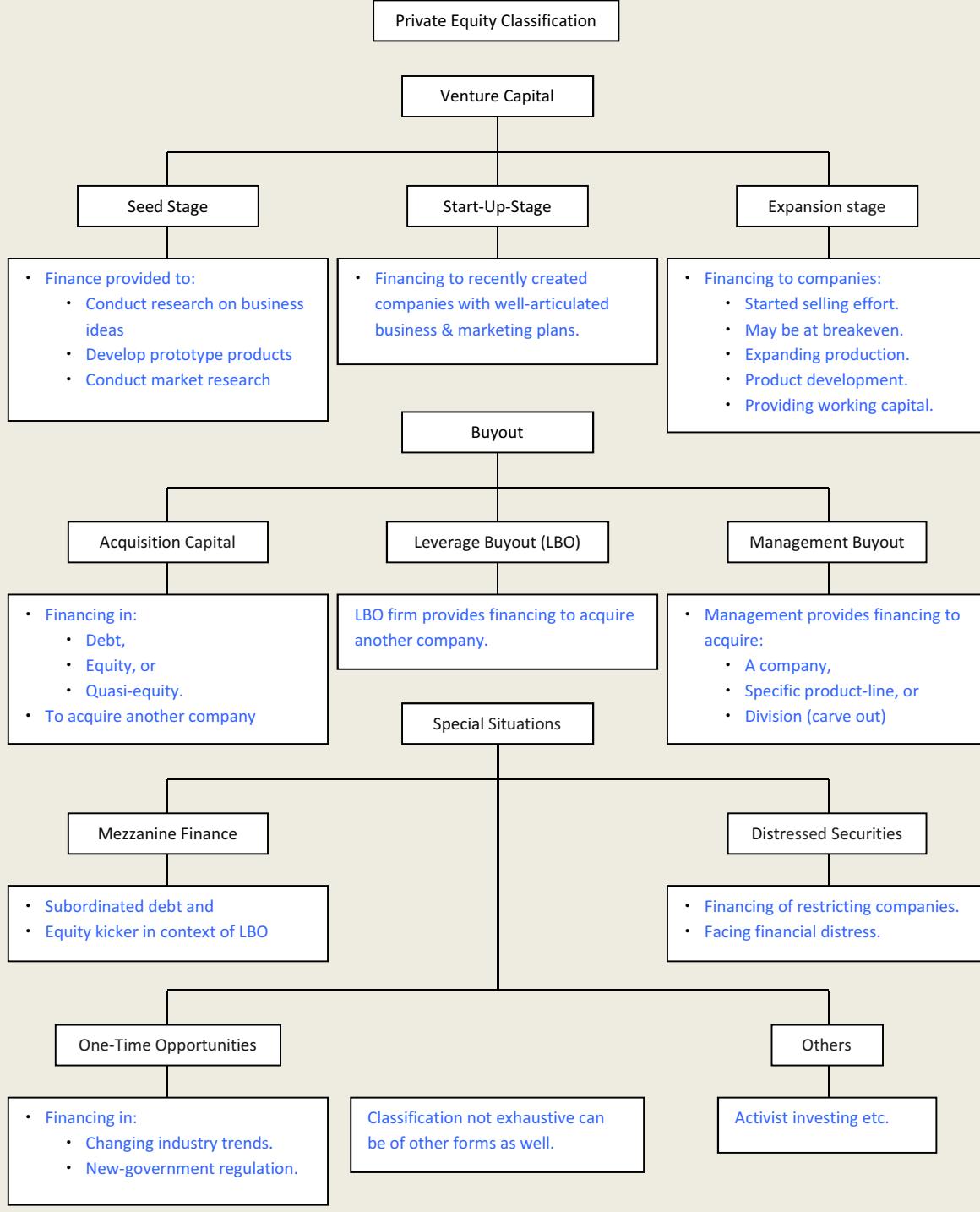
“PRIVATE EQUITY VALUATION”

EV = Enterprise Value
 PE = Private Equity
 MBO = Management Buyout
 IPO = Initial Public Offering
 P/E = Price-to-Earnings Ratio

PIC = Paid in Capital
 DPI = Distributed to Paid in
 RVPI = Residual Value to Paid in
 TVPI = Total Value to Paid in
 EBITDA = Earnings before Interest, Tax, Depreciation, Amortization

1. INTRODUCTION

Reading focuses on entire asset class of equity investments not quoted on stock market.



2. INTRODUCTION TO VALUATION TECHNIQUES IN PRIVATE EQUITY TRANSACTIONS

Income Approach: Discounted Cash Flow

- Value obtained \Rightarrow discounting expected future cash flows at an appropriate cost of capital.
- Applies across the broad spectrum to all stages.
- Most relevant results when applied to companies:
 - with sufficient operating history and
 - In the expansion-to-maturity stage.
- Emphasize on expected cash flows.

Relative Value: Earnings Multiples

- Applicable to the earnings of a Portfolio Company.
- Earnings multiple obtained from the average of a group of relevant public companies.
- Applicable to companies with significant operating history & predictable stream of cash flows.
- Can be applied with caution to expanding companies
- Rarely applied to early stage or start-up companies
- P/E, EV/EBITDA, EV/sales \Rightarrow commonly used multiples.

Real Option

- Right to take business decision \Rightarrow call & put option
- Judgment required about key option parameters
- Applicable to business with flexibility possessed by management & shareholders in decision-making
- Applicable to companies at seed or start-up phase

Replacement Cost

- Estimated cost to recreate business.
- Applies to early stage.
- Rarely applies to mature companies

Key Considerations

Value of Control

Control premium \Rightarrow incremental value associated with a block of shares \Rightarrow helps in gaining control

Liquidity Impact

- Cost associated with finding buyers & speed of converting assets into cash
- Illiquidity \uparrow with \uparrow in willingness to acquire control

Cost of Marketability

- Cost associated with right to sell the assets
- Practically, liquidity and marketability discounts are often combined.

Private Equity Valuation Uses

- Helps determine transaction price.
- Serves as a monitoring tool to identify new opportunities
- Serves as performance reporting tool to investors

2.1 How Value is Created in Private Equity

- Value is created by improving business financing, operations, management & marketing.
- In LBO value is created through restructuring.
- Terms sheet, investment terms & agreements to create a balance of rights & obligations b/w private equity firm & management.

Contractual Clauses

- Tag- along & drag-along rights: future potential acquirer to extend the offer to all shareholders including management.
- Corporate board seats: ensures private equity control in case of major corporate events.
- Noncompete clause: prevent owners from restarting same business during a predefined time period.
- Preferred dividends & liquidation preference: distribution first made to PE firms.
- Reserved matters: requires approval of PE or provides PE with veto right.
- Earn-outs: price of transaction conditional on future performance.

2.2 Using Market Data in Valuation

- Comparable public companies:
 - Value can be determined through traded company of similar scope & industry.
 - Appropriate when similar companies available.
 - Multiples are used.
- Comparable transaction.
 - Values implied by recent transaction.
- Terminal value is estimated using perpetual growth rate assumption or using trading multiples.

2.3 Contrasting Valuation in Venture Capital and Buyout Settings

Reference: Level II Curriculum, Volume 5, Reading 41.

2.4 Valuation Issues in Buyout Transactions

- Buyout = buyer acquires controlling stake from seller.
- Comprise of MBO, LBO, takeovers.
- LBO transaction structure involves negotiation b/w providers of equity capital, senior debt, high bond yields & Mezzanine finance.
- Mezzanine finance \Rightarrow hybrid finance, bridge b/w equity & debt.

2.4.1 The LBO Model

- Method of determining maximum price that can be paid to the seller, capital structure & various other parameters.
- LBO models not a separate valuation technique.
- Inputs of LBO:
 - Cash flow forecast of the target company.
 - Expected return from the finance providers.
 - Amount of financing available for the transactions.
- Exit value is determined using expected range of exit multiples of comparables.
- Value can be created through:
 - Operational improvements.
 - Improved corporate governance system.
 - Multiple expansions.
 - Debt reduction.

2.5 Valuation Issues in Venture Capital Transactions

- DCF \Rightarrow difficult to apply in VC transaction due to \uparrow uncertainty in future cash flows.
- Ownership diluted by additional financing rounds.
- Due to unique features of start-up companies applying comparables is difficult.
- Real option method or VC approach \Rightarrow recommended in valuing private equity.

2.6 Exit Routes: Returning Cash to Investors

IPO

- Result in \uparrow valuation multiples.
- \uparrow liquidity
- Provide access to \uparrow amount of capital.
- Can attract \uparrow caliber managers
- Cumbersome process.
- \downarrow Flexible
- \uparrow Costly
- Appropriate exit route for private companies with established operating history and excellent growth prospects.
- IPO timing \Rightarrow important factor

Secondary Market

- Very common.
- Represent significant proportion of exits.
- Absence of IPO \Rightarrow highest valuation multiple.
- Involves selling of equity stake to another financial investor or private equity firm.

MBO

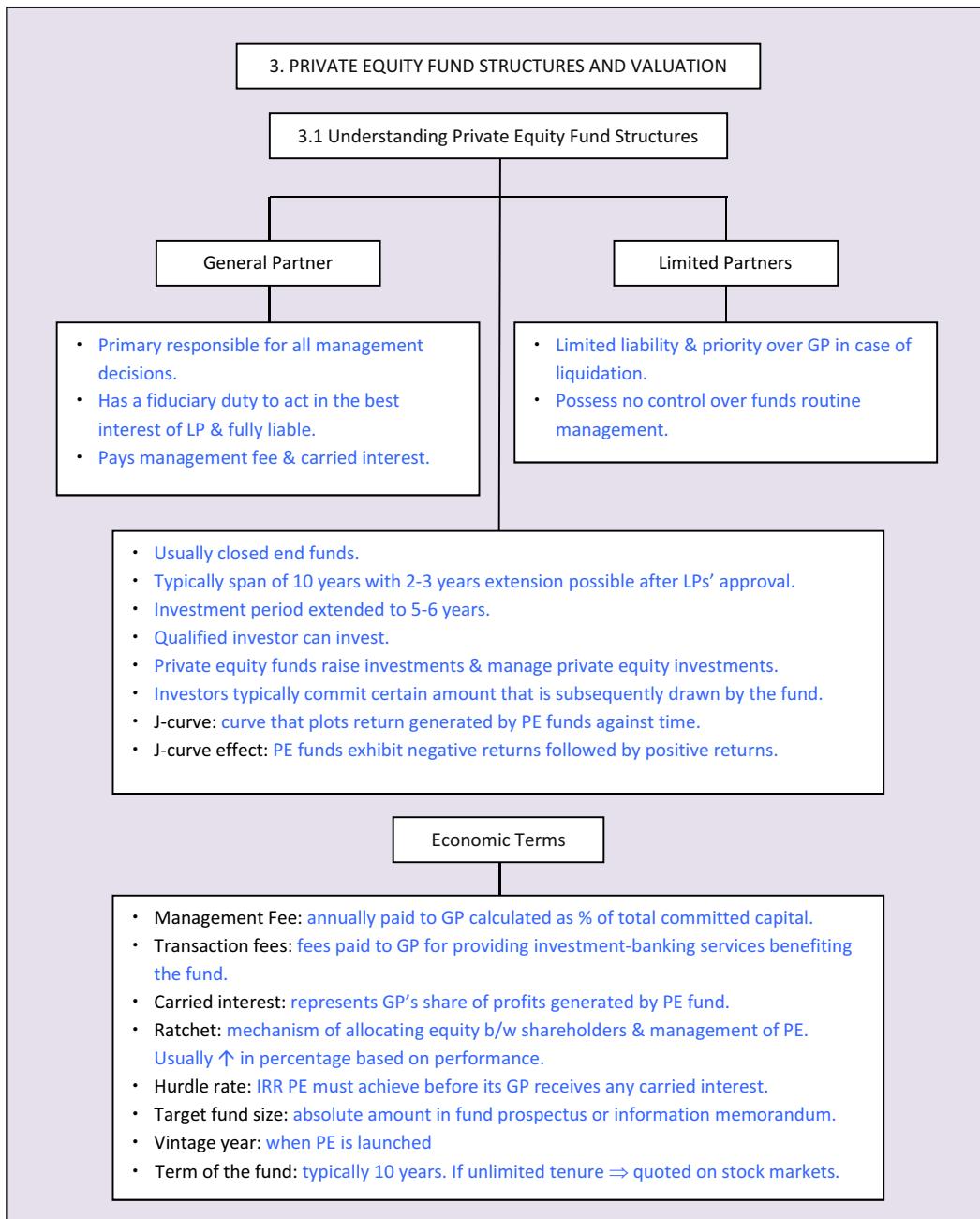
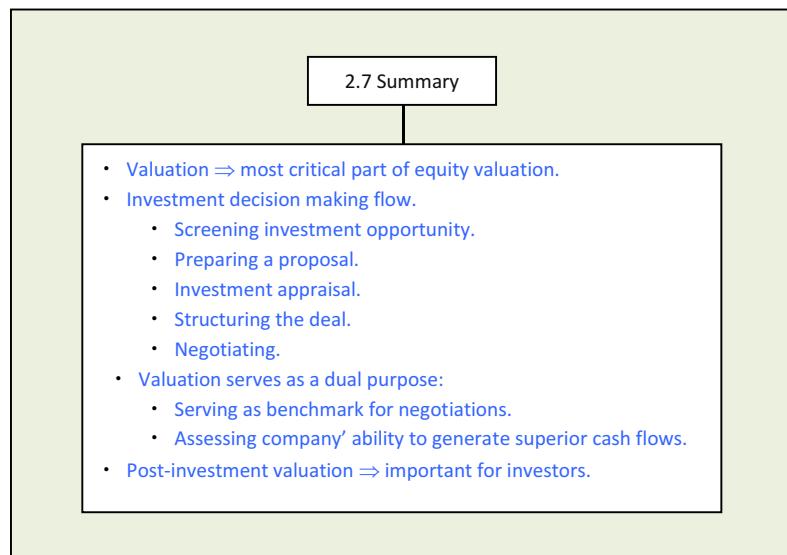
- Takeover by the management with significant leverage.
- Helps in alignment of interests
- Excessive leverage \downarrow company's flexibility.

Liquidation

- Liquidation of the company by controlling shareholder \Rightarrow when company is no longer viable.
- Results in lowest value.
- May result in negative perception for private equity firm.

Important Decisions

- Timing of exit.
- Determining optimal exit route.



Corporate Governance Terms

- Key man clause: If a key executive leaves or devotes insufficient time, this clause prohibits the GP from making new investments until a new key executive is named.
- Disclosure & confidentiality: PE firms not required to disclose financial performance. Disclosure limited to financial performance of the fund.
- Claw back provision: requires GP to return capital to LPs in excess of agreed profit split b/w GP & LPs.
- Distribution to LPs waterfall: mechanism providing orderly distribution & specifies their priority of waterfalls.
- Tag-along, drag-along rights: future acquirer of the company not allowed to acquire without extending acquisition offer to all shareholders.
- No-fault divorce: GP can be removed by super approval majority of LPs without cause.
- Removal for cause: either removal of GP or an earlier liquidation for a cause.
- Investment restriction: minimum level of diversification of funds investments, geographic or sector focus, or limits on borrowing.
- Co-investment: LPs having first right of co-investing along the GP.

3.2 What Are the Risks and Costs of Investing in Private Equity?

Equity Risk Factors

- Not traded on security markets \Rightarrow illiquid investments.
- More risky than securities quoted on exchange.
- \uparrow Competition exists for finding attractive investment opportunities.
- Uncertainty that management will run the company in best interest of PE firm \Rightarrow agency risk.
- \uparrow Business & \uparrow financial risk \Rightarrow loss of capital can occur.
- Δ in government regulation \Rightarrow \uparrow risk.
- Δ in tax treatment \Rightarrow \uparrow risk
- Valuation is subjective \Rightarrow \uparrow risk.
- Problems in raising further investment capital if required.
- Negatively affected by market conditions \Rightarrow \uparrow market risk.
- \uparrow Concentrated investment portfolios \Rightarrow lack of diversification.

Cost of investing in Private Equity

- Transaction fees: due diligence, bank financing, legal fees and sale transactions in investee companies.
- Investment vehicle setup cost: comprises legal costs, subject to amortization.
- Administrative cost: custodian fee, transfer agent, accounting cost etc.
- Audit cost.
- Management & performance fee.
- Dilution: associated with dilution of ownership.
- Placement fee.

3.3 Due Diligence Investigations by Potential Investors

Due diligence required because:

- Top performing funds continue to outperform while poorly performing continue to underperform or disappear.
- Performance range b/w funds \Rightarrow extremely large.
- Liquidity \Rightarrow typically very limited.
- Duration of investment typically shorter than maximum life of fund.
- Gross IRR: measured without adjusting fee paid to GP.
- Net IRR: received by LPs adjusted for fees paid.

Multiples

- Measures total return to investor relative to total sum invested.
- Easy to calculate.
- Ignore time value of money.
- Able to differentiate b/w actual proceeds & divestments as well as unrealized portfolio subject to GP valuation.

Performance Measures

- $PIC\ Multiple = \frac{PIC}{Committed\ capital}$
- $DPI = \frac{Cumulative\ distributions}{PIC}$
Also called cash-on-cash return.
- $RVPI = \frac{NAV\ after\ distribution}{PIC}$
presented net of management fee
- $TVPI = DPI + RVPI$

3.4 Private Equity Fund Valuations

- Valuation generally associated with NAV
NAV = fund asset – fund liabilities.
- NAV can be estimated.
 - At cost with subsequent adjustments (financing/deterioration)
 - Lower of cost or MV.
 - By a revaluation of the portfolio company whenever a new financing round involving new investors takes place.
 - At cost without interim adjustments.
 - With discount (for restricted securities).
 - Marked to market by reference to peer group of public comparables and applying liquidity discounts.
- Insures with NAV:
 - NAV values based on subjective judgments.
 - Undrawn commitments not included in NAV.
 - Different valuation techniques used for different strategies.
 - May subject to upward bias.
 - May provide stale valuation \Rightarrow if adjusted infrequently.

3.5 Evaluating Fund Performance

- IRR \Rightarrow annual return generated by investment.
 - Assumes investment is liquid, not true for significant portion of PE funds.
 - Greatly affected by time.

Issues for Analysts

Apart from quantitative measures:

- Analyze realized investments since inception including failures.
- Analyze unrealized investments, red flags, exit time.
- Cash flow forecast at portfolio company level and at aggregate portfolio.
- Analysis of portfolio valuation, audited financial statements & NAV.

4. CONCEPT IN ACTION: EVALUATING A PRIVATE EQUITY FUND

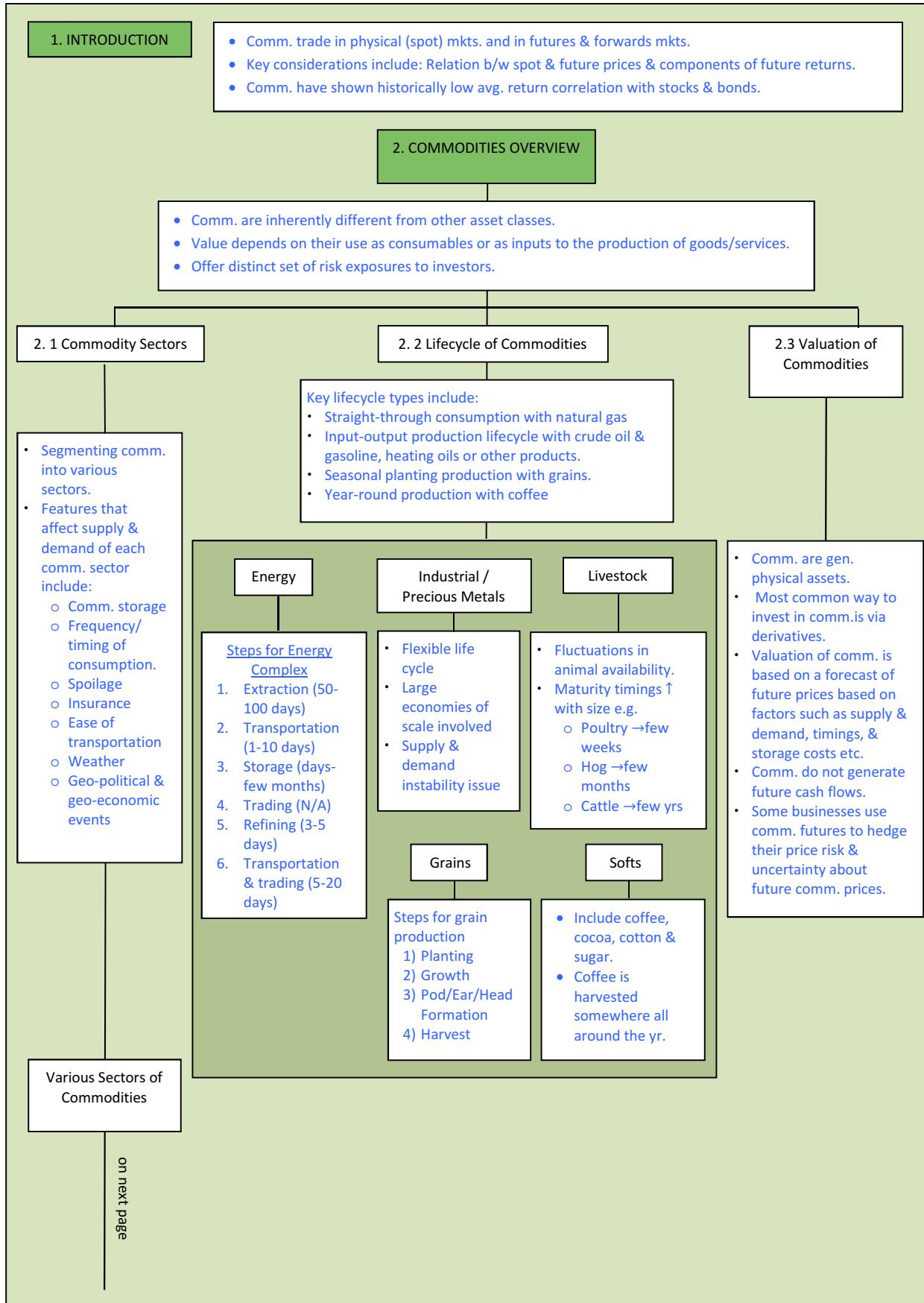
Reference: Level II Curriculum, Volume 5, Reading 41.

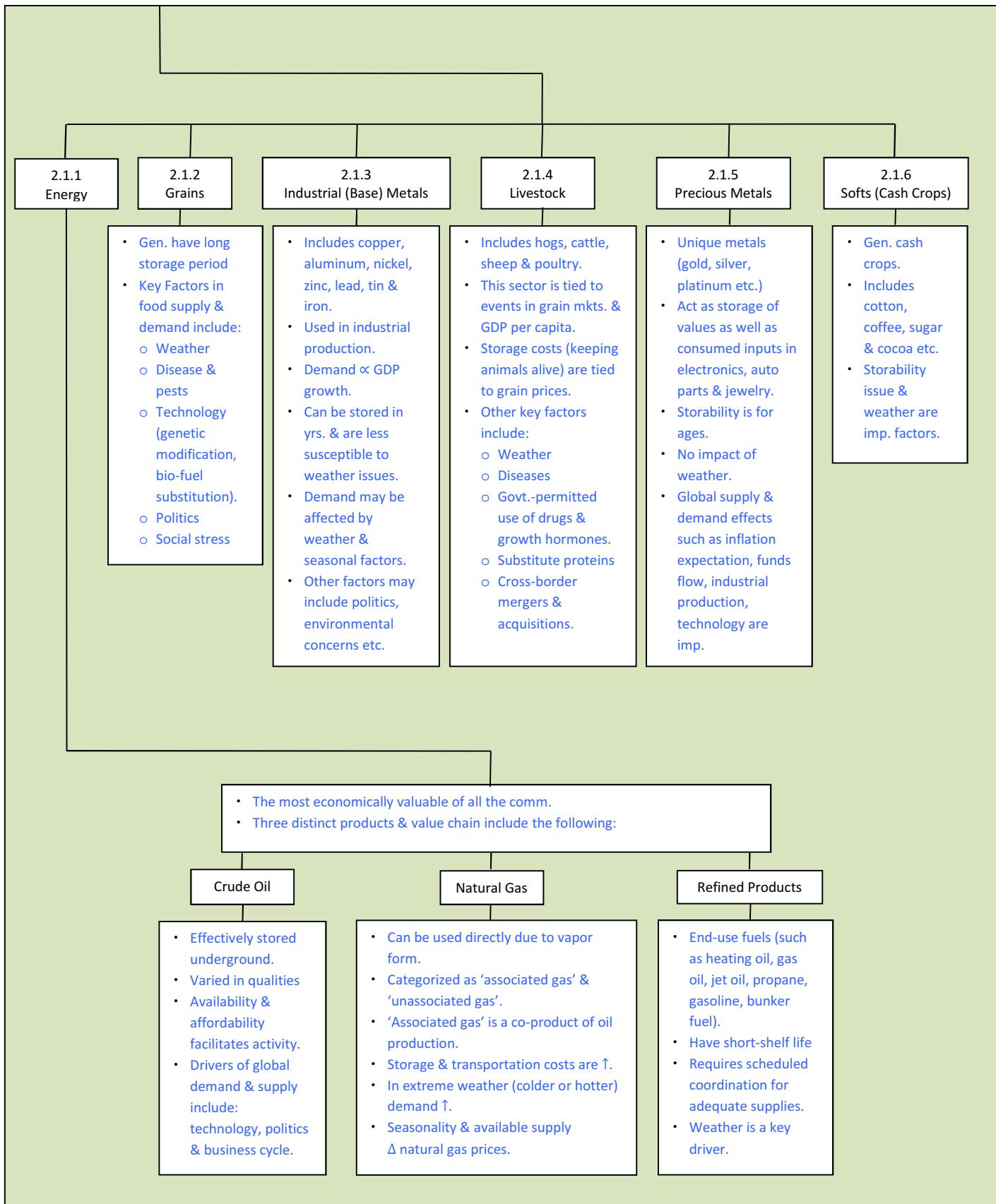
A NOTE ON VALUATION OF VENTURE CAPITAL DEALS

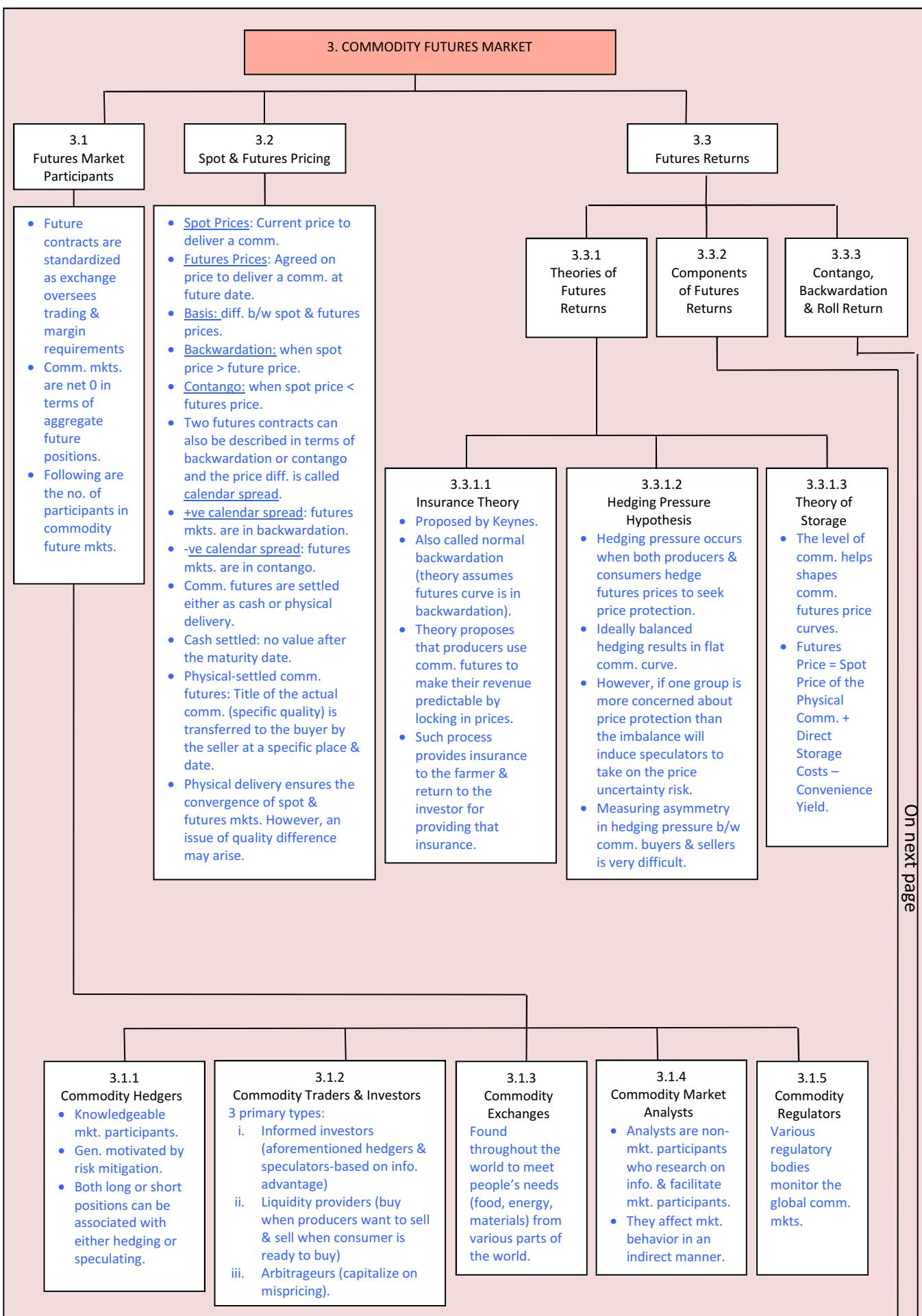
See Appendix. Reference: Level II Curriculum, Volume 5, Reading 41.

“COMMODITIES & COMMODITY DERIVATIVES: AN INTRODUCTION”

Mkt. = Market
 Gen. = Generally
 Imp. = important
 Comm. = commodities
 Pmts. = payments







3.3.2

Components of Futures Returns

3 components of total return

- i. Price return
- ii. Roll Return
- iii. Collateral Return
- Price Return = $\frac{\text{current price} - \text{previous price}}{\text{Previous price}}$
- Roll Return = $\frac{(\text{Near-term futures contract closing price} - \text{Farther-term futures contract closing price}) / \text{Near-term futures contract closing price}}{\text{Near-term futures contract closing price}} \times \% \text{ of the position in the futures contract being rolled.}$
- Roll return is sector dependent.
- Collateral Return is the yield (e.g. interest rate) for bonds or cash used to maintain investor's future position.
- On indexed investments cash is equal to the notional value of futures and total return also includes rebalance return (return from rebalancing the component weights of the index) in addition to above three returns.

3.3.3

Contango, Backwardation & the Roll Return

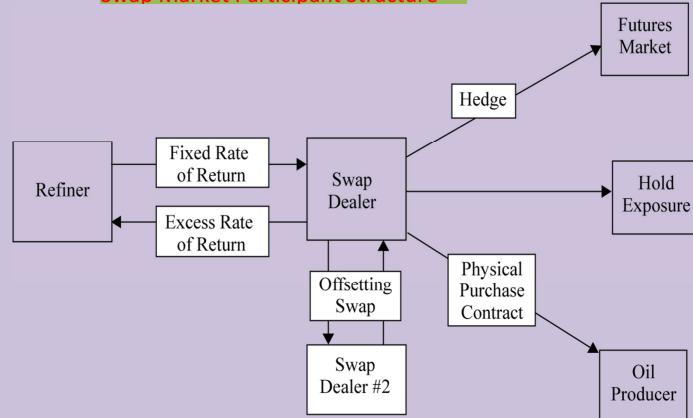
- Contango & backwardation and the resulting roll return reflect underlying supply and demand expectations and are accounting mechanism for commodity term structure.
- Industrial metals, agriculture, livestock, precious metals & softs has statistically strong -ve mean roll returns e.g. gold's perpetual storage as an alternative to currency.
- Only Energy have statistical possibility of +ve mean roll return as energy is consumed in real time basis.

4. COMMODITY SWAPS

- A legal contract involving exchange of pmts over multiple periods of specified reference price/index of comm.

- Provides risk management, risk transfer and degree of customization.
- Many types of swaps available because they are not standardized e.g.
 - Excess return swap-pmts. are made or received by either party based on a return calculated by Δ in the level of index relative to the benchmark or fixed level.
 - Total return swap-one party receives pmt. based on the Δ in the level of the index multiplied by the notional amount of the swap.
 - Basis swap-periodic-pmts. are exchanged based on the values of two related comm. reference prices that are not perfectly related.
 - Variance swaps-two parties agree to periodically exchange pmts. based on the proportional diff. b/w agreed or proposed variance in the comm. price levels & some fixed variance amount established at the outset of the contract.
 - Volatility commodity swaps-very similar to variance swaps with the exception that the direction & amount of pmts. are determined relative to the observed vs. expected volatility for a reference price comm.

Swap Market Participant Structure



Reference: CFA Institute Level II Volume 6, Reading 45, Exhibit 15.

5. COMMODITY INDEXES

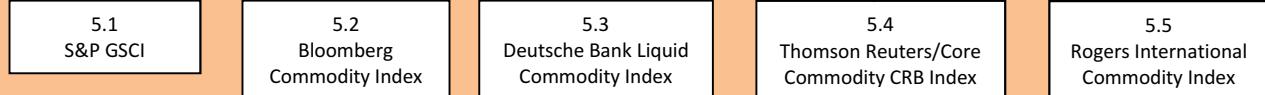
Three primary roles in comm. investments:

- i. As a benchmark to evaluate broader moves in comm. pricing.
- ii. As an indicator to examine relation b/w comm. prices & other macroeconomic variables.
- iii. Act as basis to monitor Δ that can affect contract value.

Key characteristics that differentiate indexes from each other are as follows:

- Breadth of coverage
- Relative weightings assigned and how the weights are determined.
- Rolling methodology (how contracts will roll over).
- Methodology & frequency for rebalancing the weights of the individual comm., sectors & contracts in the index.
- Governance of indexes.

Five Commercially Imp. Commodity Indexes are:



5.6 Re-balancing Frequency

- Rebalancing is imp. if mkt is frequently mean reverting & for indexes that rebalance more frequently.
- In a trending mkt. frequent rebalancing can lead to underperformance.

5.7 Commodity Index Summary

- There is no dominant index on a particular methodology.
- Comm. indexes (like equity indexes) act in parallel even when their returns frequently differ dramatically over time.

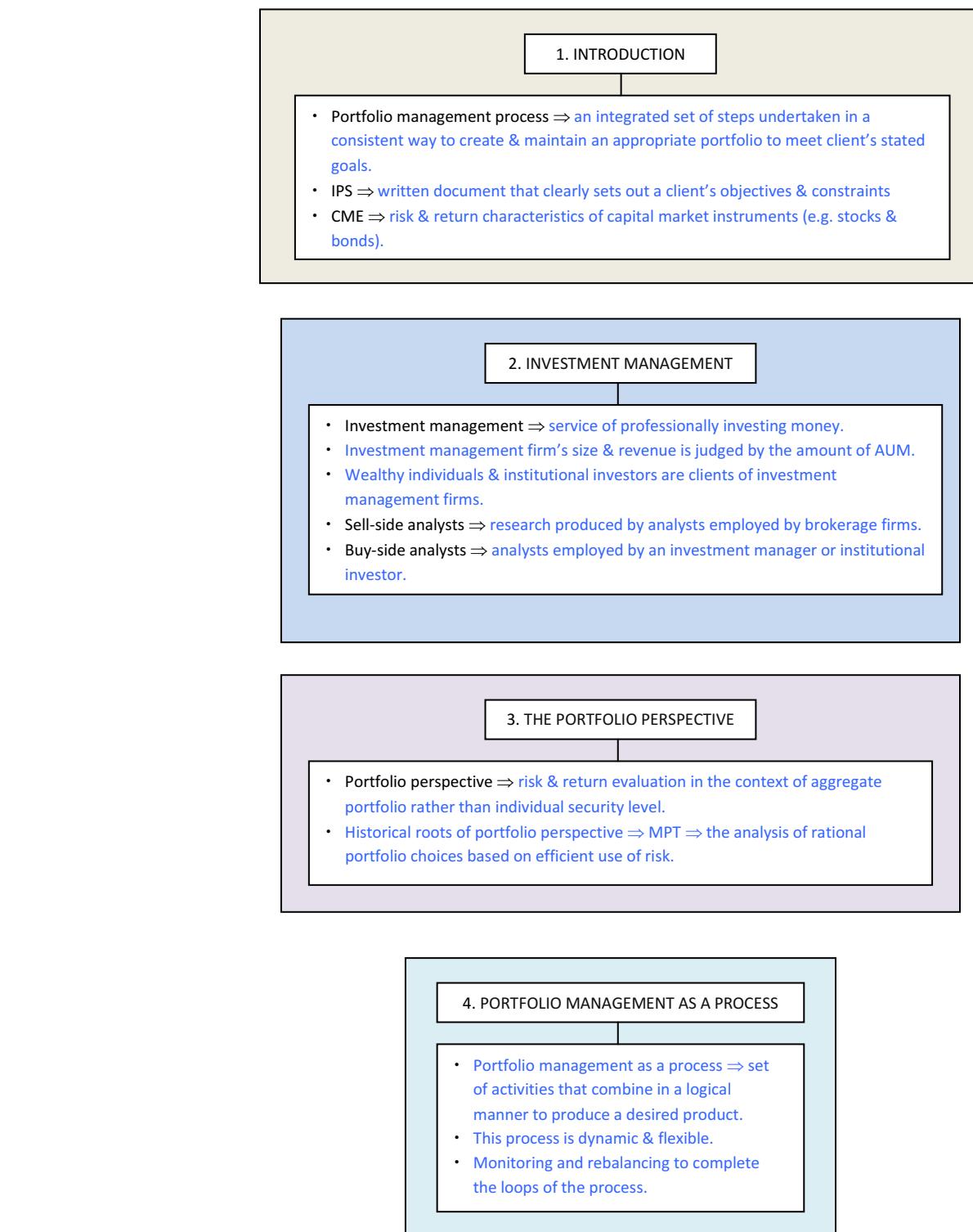
“THE PORTFOLIO MANAGEMENT PROCESS AND THE INVESTMENT POLICY STATEMENT”

AUM = Assets under Management

MPT = Modern Portfolio Theory

SAA = Strategic Asset Allocation

CME = Capital Market Expectations



5. THE PORTFOLIO MANAGEMENT PROCESS LOGIC

5.1 The Planning Step

5.1.1 Identifying & Specifying the Investor's Objectives & Constraints

- Investment objectives \Rightarrow desired investment outcomes (pertain to return & risk).
- Constraints \Rightarrow limitations on investor's ability to take full or partial advantage of particular investments.

5.1.2 Creating the Investment Policy Statement

- Once the client has specified objectives & constraints then next task is to formulate IPS.
- IPS covers objectives & constraints as well as variety of other issues (e.g. manager fees, investment strategy etc.).
- Investment strategy can be indexing, active or semi active.

5.1.3 Forming Capital Market Expectations

Forming long-run CME that can effect risk & return characteristics of various asset classes.

5.1.4 Creating the Strategic Asset Allocation

- SAA combines the IPS & capital market expectations to determine target asset class weights.
- Single period (simplicity is the benefit) & multi period (address liquidity and tax considerations) portfolio perspective.

The Portfolio Construction Monitoring & Revision Process

Specification and quantification of investor's objectives, constraints, and preferences

Portfolio policies and strategies

Capital market expectations

Relevant economic, social, political and sector considerations

5.2 The Execution Step

- Portfolio selection / composition decision.
- Execution step interact constantly with feedback step (portfolio is revised as investor's circumstances or CME Δ).
- Tactical asset allocation \Rightarrow responds to Δ in short-term CME rather than to investor's circumstances.
- Portfolio implementation decision is equally important to portfolio selection decision.

5.3 The Feedback Step

5.3.1 Monitoring and Rebalancing

- Use of feedback to manage ongoing exposure so that the client's objectives & constraints continue to be satisfied.
- Investor, economic & market-related factors are monitored.

5.3.2 Performance Evaluation

- Performance appraisal \Rightarrow evaluation of whether or not the manager is doing the good job.
- Market timing \Rightarrow return attributable to short-term tactical deviations from the SAA.

5.4 A Definition of Portfolio Management

- Portfolio management is an ongoing process in which:
 - Objective & constraints are identified & strategies are developed.
 - Portfolio composition is decided & portfolio decisions are initiated.
 - Portfolio performance measurement.
 - Investors & market conditions are monitored.
 - Rebalancing.

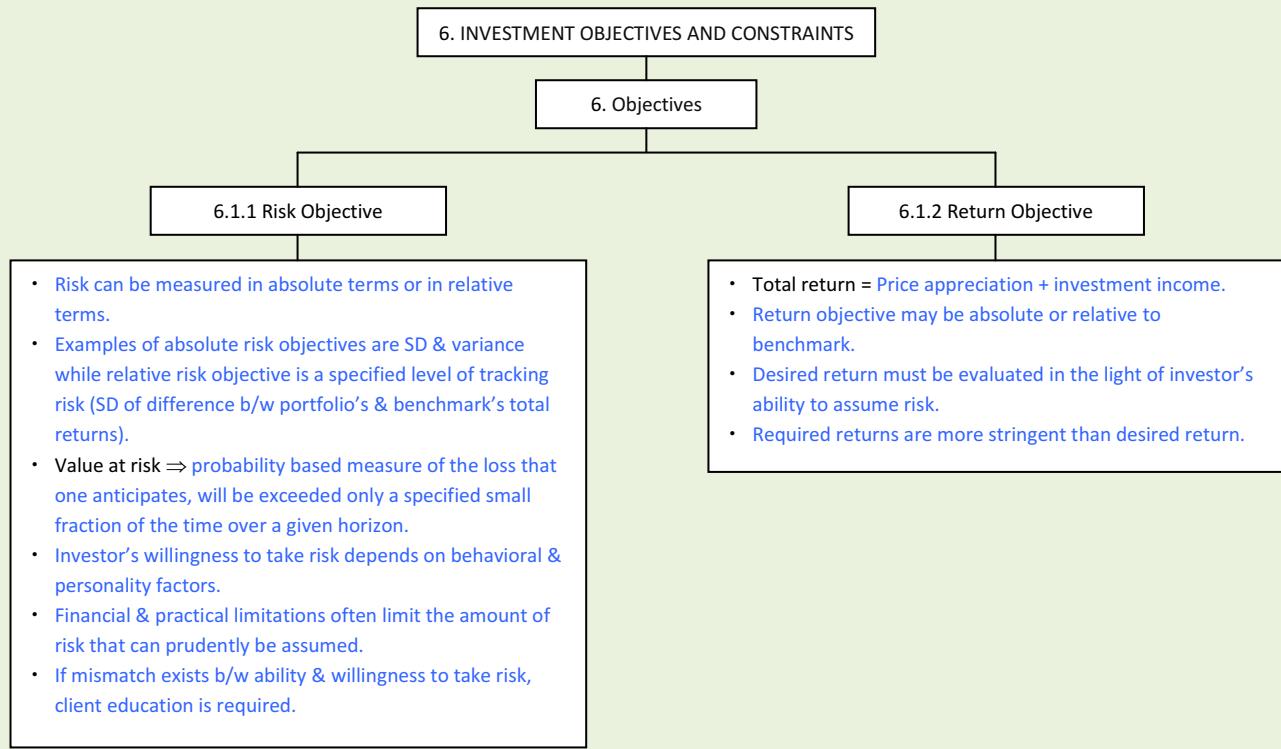
Monitoring investor-related input factors

Portfolio construction and revision
Asset allocation, portfolio optimization, security selection, implementation, and execution

Attainment of investor objectives

Performance measurement

Monitoring economic and market input factors

**TABLE 1 Risk Tolerance**

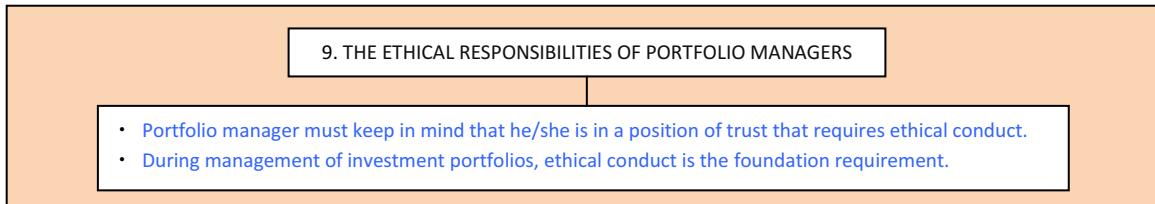
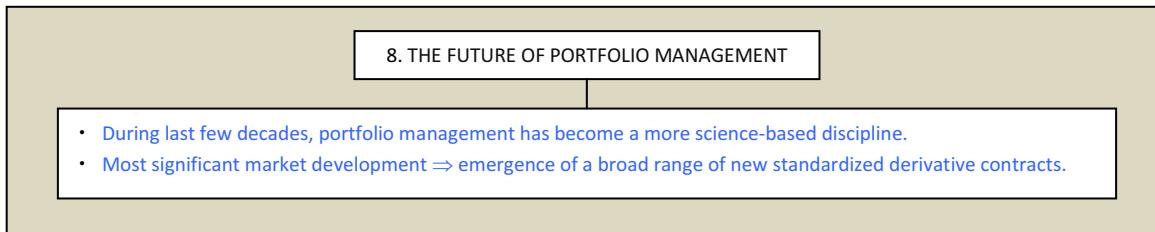
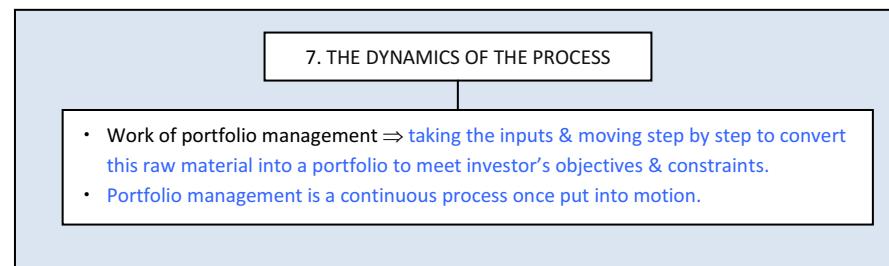
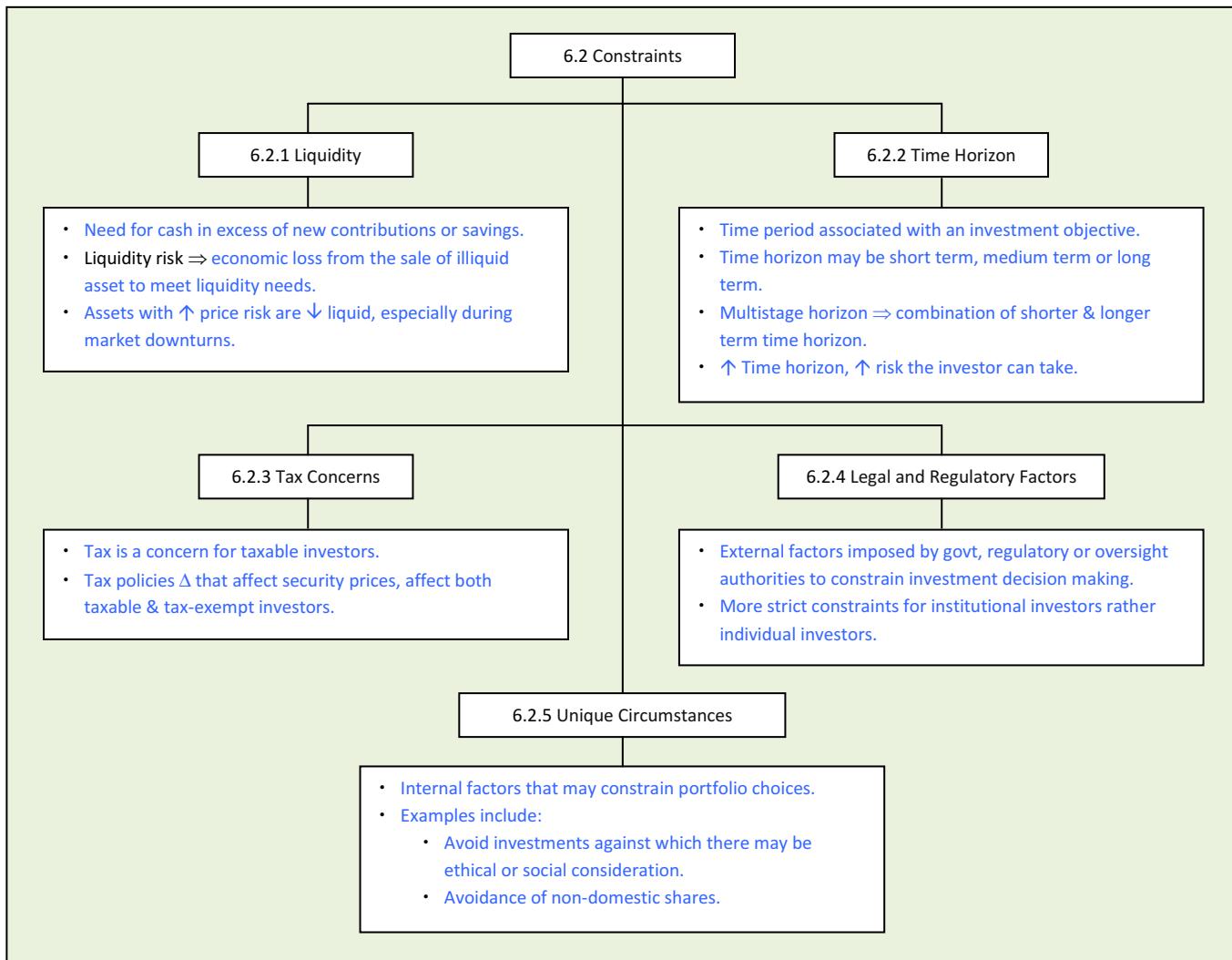
Willingness to Take Risk	Ability to Take Risk	
	Below Average	Above Average
	Below Average	Resolution needed
Above Average	Resolution needed	Above-average risk tolerance

Reference: Level II Curriculum, Volume 6, Reading 47.

TABLE 2 Return Requirements and Risk Tolerances of Various Investors

Type of Investor	Return Requirement	Risk Tolerance
Individual	Depends on stage of life, circumstances, and obligations	Varies
Pension Plans (Defined Benefit)	The return that will adequately fund liabilities on an inflation adjusted basis	Depends on plan and sponsor characteristics, plan features, funding status, and workforce characteristics
Pension Plans (Defined Contribution)	Depends on stage of life of individual participants	Varies with the risk tolerance of individual participants
Foundations and Endowments	The return that will cover annual spending, investment expenses, and expected inflation	Determined by amount of assets relative to needs, but generally above average or average
Life Insurance Companies	Determined by rates used to determine policyholder reserves	Below average due to factors such as regulatory constraints
Non-Life Insurance Companies	Determined by the need to price policies competitively and by financial needs	Below average due to factors such as regulatory constraints
Banks	Determined by cost of funds	Varies

Reference: Level II Curriculum, Volume 6, Reading 47.



“AN INTRODUCTION TO MULTIFACTOR MODELS”

1. INTRODUCTION

- Factor \Rightarrow variable or characteristic with which individual asset returns are correlated.
- Multifactor models offer increased explanatory power & flexibility when compared with single factor model.
- Comparative strength of multifactor models:
 - Build portfolios that replicate or modify in a desired way.
 - Establish desired exposures to one or more risk factors.
 - Perform granular risk & return attribution on actively managed portfolio.
 - Identify active decision relative to benchmark.

2. MULTIFACTOR MODELS AND MODERN PORTFOLIO THEORY

- Modern portfolio theory (MPT) \Rightarrow it considers each investment in context of portfolio rather than in isolation. (Mean return, mean variance & correlations).
 - Key insight \Rightarrow correlation of $\langle 1 \rangle$ offers the potential for risk reduction by means of diversification.
- Capital asset pricing model (CAPM) \Rightarrow model for the expected return of assets in equilibrium based on a mean-variance foundation.
 - Investor would expect compensation for bearing an asset's non-diversifiable risk/systematic risk.

3. ARBITRAGE PRICING THEORY

- Arbitrage pricing theory (APT) \Rightarrow a framework that explains the expected return of an asset (portfolio) in equilibrium as a linear function of the risk of the asset (portfolio) with respect to a set of factors capturing systematic risk.
- $R_i = a_i + b_{i1}I_1 + b_{i2}I_2 + \dots + b_{ik}I_k + E_i$
where
 R_i = return of asset i
 a_i = an intercept term
 I_k = return of factor K
 b_{ik} = sensitivity of the return i to the return of factor k .
 E = error term
- APT makes less strong assumptions than CAPM as under:
 - A factor model describes asset returns.
 - Investor can eliminate unsystematic risk through diversification.
 - No arbitrage opportunities.
- Carhart four factor model \Rightarrow also include “momentum factor” in addition to three factors of Fama & French as under:

$$R_p - R_F = a_p + b_{p1}RMRF + b_{p2}SMB + b_{p3}HML + b_{p4}WML + \epsilon_p$$

Where

$$R_p - R_F = \text{Return of portfolio} - \text{risk free return.}$$

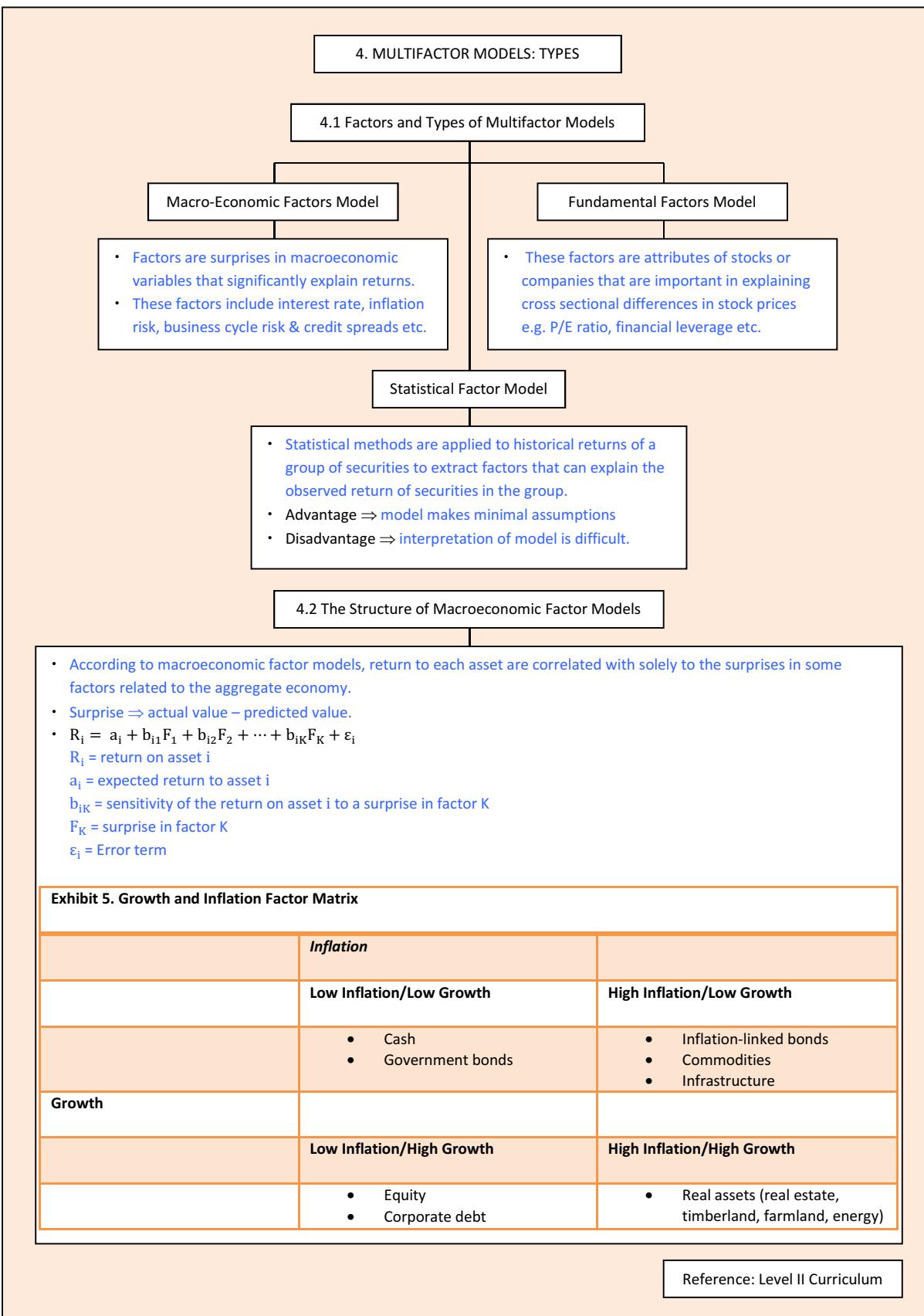
$$a_p = \text{Alpha}$$

$$\text{RMRF} = \text{return on a value weighted index in excess of the one month T-bill rate.}$$

$$\text{SMB} = \text{Small minus big (size factor).}$$

$$\text{HML} = \text{High minus low book to market portfolios.}$$

$$\text{WML} = \text{winner minus losers (momentum factor).}$$



4.3 The Structure of Fundamental Factor Models

- In fundamental factor model, factors are stated as “returns” rather than return “surprises” in relation to predicted values (expected value $\neq 0$).
- Factor sensitivities \Rightarrow these are attributes of the security which are expressed using a standardized beta.
- Standardized beta =
$$\frac{\text{Value of attribute K for asset } i - \text{Avg. value of K}}{\sigma(\text{Values of attribute K})}$$
- Analyst use fundamental factor models for a variety of purposes including portfolio performance attribution & risk analysis.
- Factors of model can divide into these groups.
 - Company fundamental factors \Rightarrow related to company's internal performance.
 - Company share-related factors \Rightarrow these include valuation measure & other factors related to share price or other trading characteristic of shares.
 - Macroeconomic factor \Rightarrow these include sector or industry membership factors.

5. MULTIFACTOR MODELS: SELECTED APPLICATIONS

5.1 Factor Models in Return Attribution

- Multifactor models explain the source of a manager's active return.
- Active return = $R_p - R_B$
 - Component of active return
 - Factors tilt \Rightarrow over or underweight weights relatives to the benchmark factor sensitivities.
 - Security selection \Rightarrow ability to overweight securities that outperform the benchmark or that underperform the benchmark.
 - Active return = $\Sigma[(\text{Portfolio sensitivity})_K - (\text{Benchmark sensitivity})_K] \times (\text{factor return}) + \text{security selection.}$

5.2 Factor Models in Risk Attribution

- Active risk \Rightarrow standard deviation of active returns (tracking error) stated as $s(R_p - R_B)$
- Information ratio = $IR = \frac{\bar{R}_p - \bar{R}_B}{s(R_p - R_B)}$
- In addition to focusing on active risk, these models can also be used for sourcing of total risk.
- Fundamental factor models can be used to relate active risk exposures to a manager's portfolio decisions in a fairly direct & intuitive way
- Active risk squared = $s^2(R_p - R_B)$ or active factor risk + active specific risk.
 - Two components
 - Active factors risk \Rightarrow contribution to active risk resulting from the portfolio's different-from-benchmark exposures relative to factors specified in the risk model.
 - Active specific or security selection risk \Rightarrow risk arises due to security selection (non-factor or residual risk).

5.3 Factor Models in Portfolio Construction

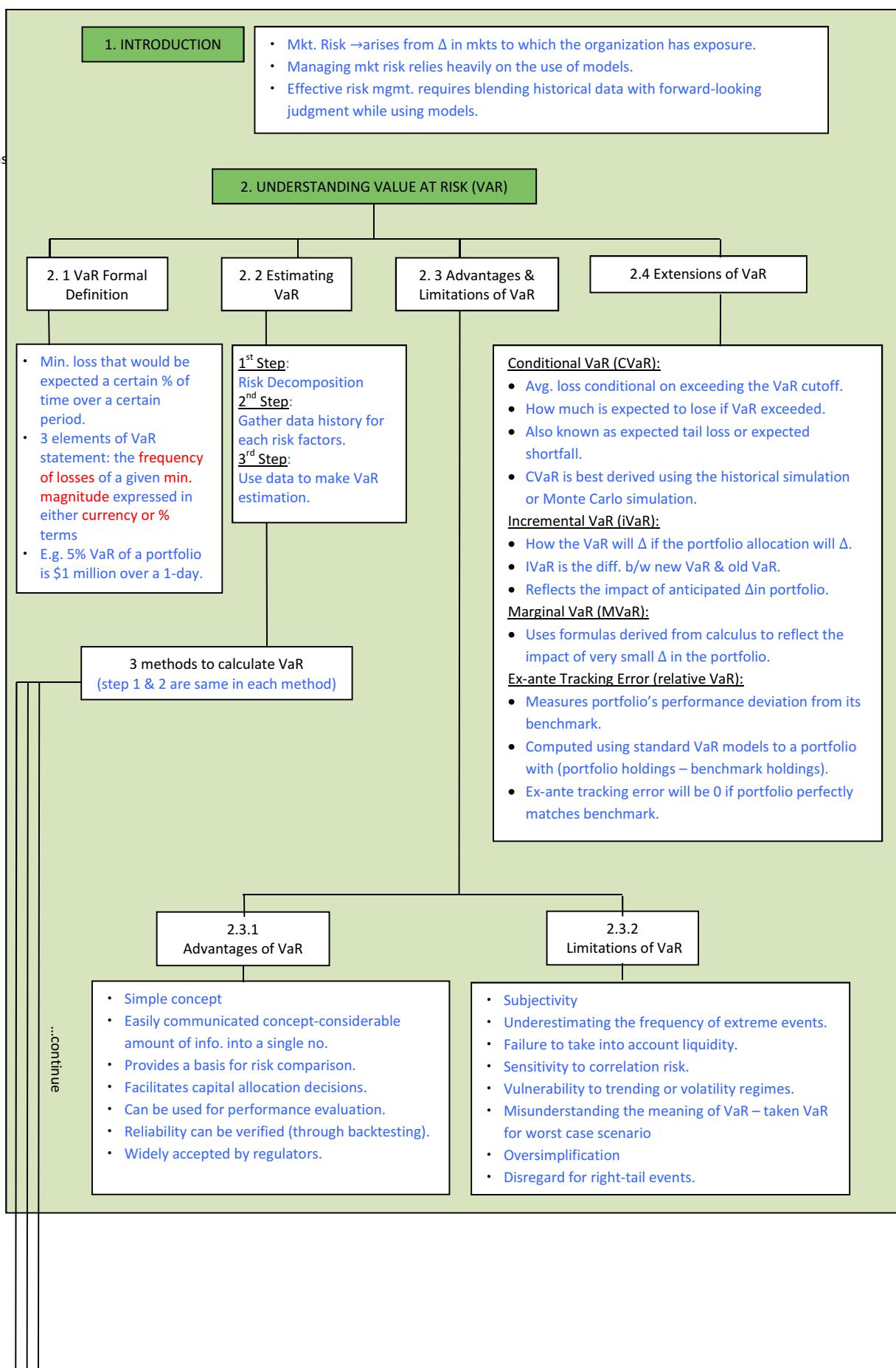
- Multi factor models permit the portfolio manager to make focused bets or control portfolio risk relative to benchmark risk.
- Passive management \Rightarrow analysts can use multifactor models to replicate an index fund's factor exposures, mirroring those of the index tracked.
- Active management \Rightarrow many investment managers rely on multifactor models in predicting alpha as part of a variety of active investment strategies (also used to establish desired risk profiles).
- Rule-based active management \Rightarrow these strategies rely heavily on factor models to introduce international factors & style biases v/s cap-weighted indexes (factors include size, value, quality or momentum etc.)
- Factor replication portfolio can be built based either on an existing target portfolio or on a set of desired exposures.

5.4 How Factor Considerations Can Be Useful in Strategic Portfolio Decisions

- Investors should be aware of which priced risks they face & analyze the extent of their exposure.
- Multi factor approach can help investors achieve better diversified & possibly more efficient portfolios.

“MEASURING & MANAGING MARKET RISK”

Mkt = Market
 Gen. = Generally
 Std. = Standard
 Dev. = Deviation
 Expc. = Expected
 Dist. = Distribution
 Obs. = Observations
 FI = Fixed income
 D = Duration
 C = Convexity



2.2.1 The Parametric Method of VaR Estimation

- Gen. assumes normal return distribution (requires only 2 parameters expc. return & std. dev.)
- For non-normal distribution additional parameters can be used.
- Std. Normal Dist. (z-dist.) = $\frac{R-\mu}{\sigma}$

Below the expected value:

- 1% VaR is 2.33 std. dev. away
- 5% VaR is 1.65 std. dev. away.
- 16% VaR is 1 std. dev. away

How a 5% VaR is obtained?

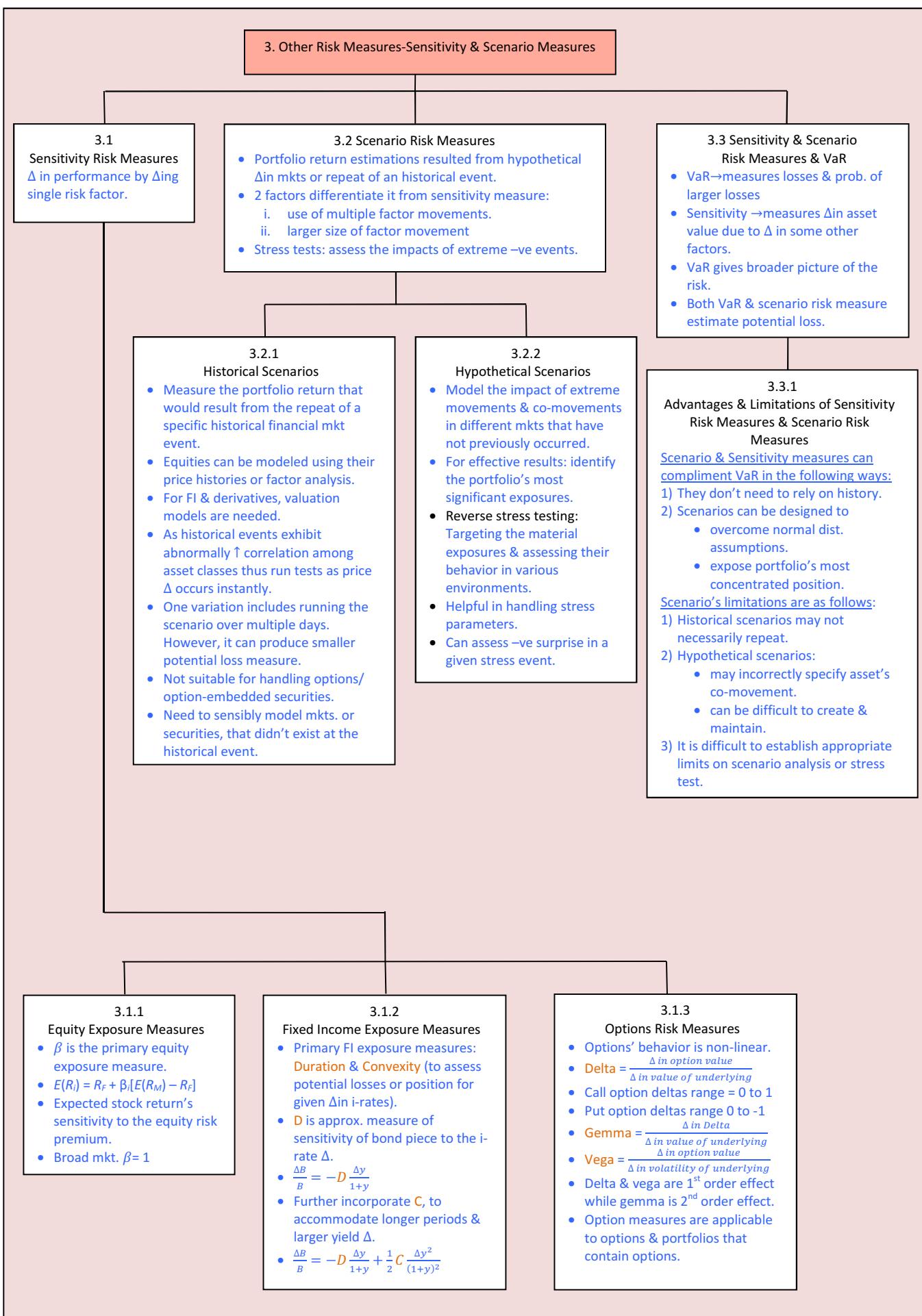
- $[(E_{(RP)} - 1.65\sigma_P)(-1)]$ Portfolio Value
- Simple & straightforward method
- Easy to use historical data due to normal dist. assumption.
- VaR is very sensitive to parameter estimates
- Suitable when normal dist. can be applied & parameters are reliable.
- Difficult to use when portfolio contain options.
- Limitation: All obs. are wghtd. equally.

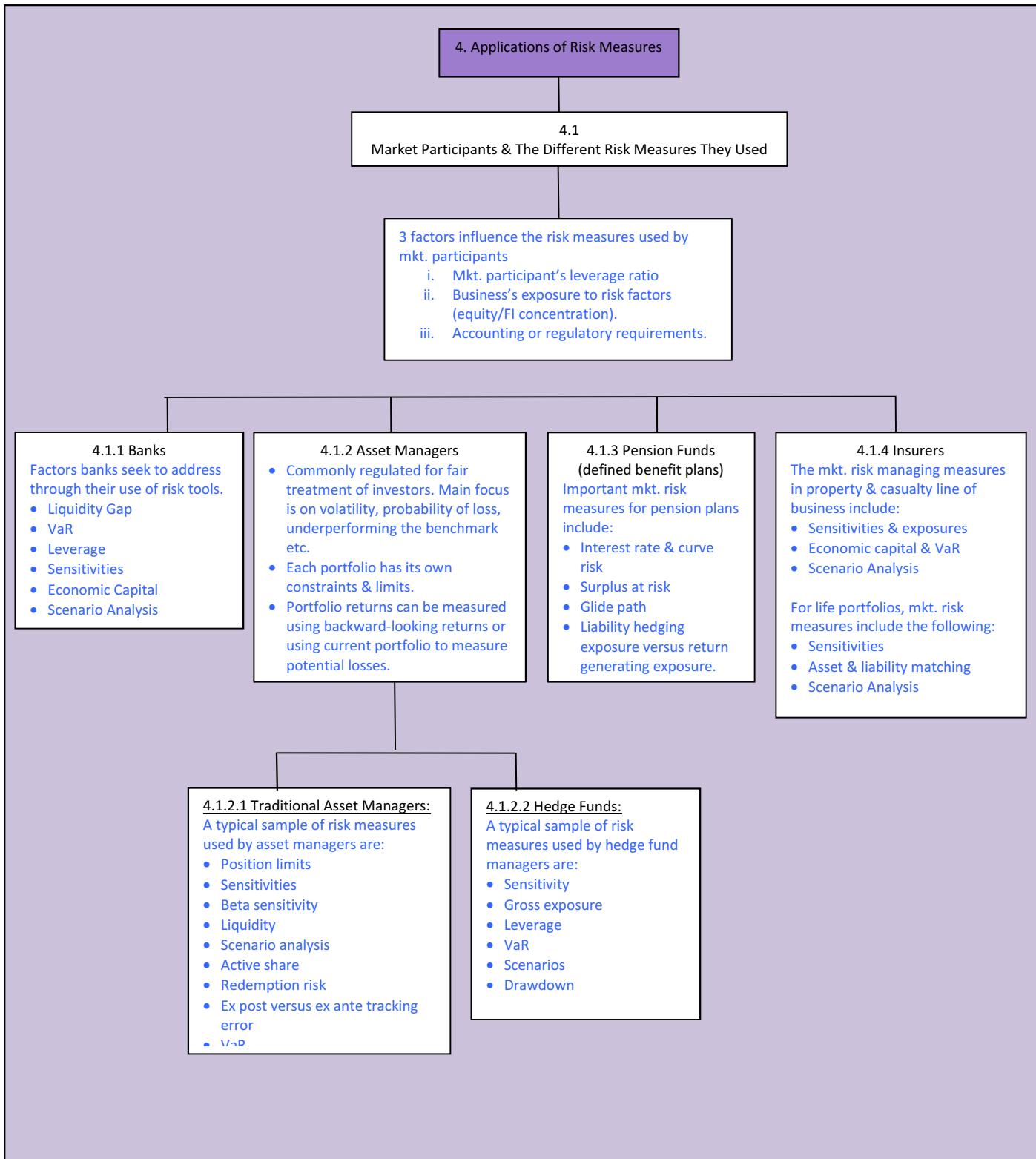
2.2.2 The Historical Simulation Method of VaR Estimation

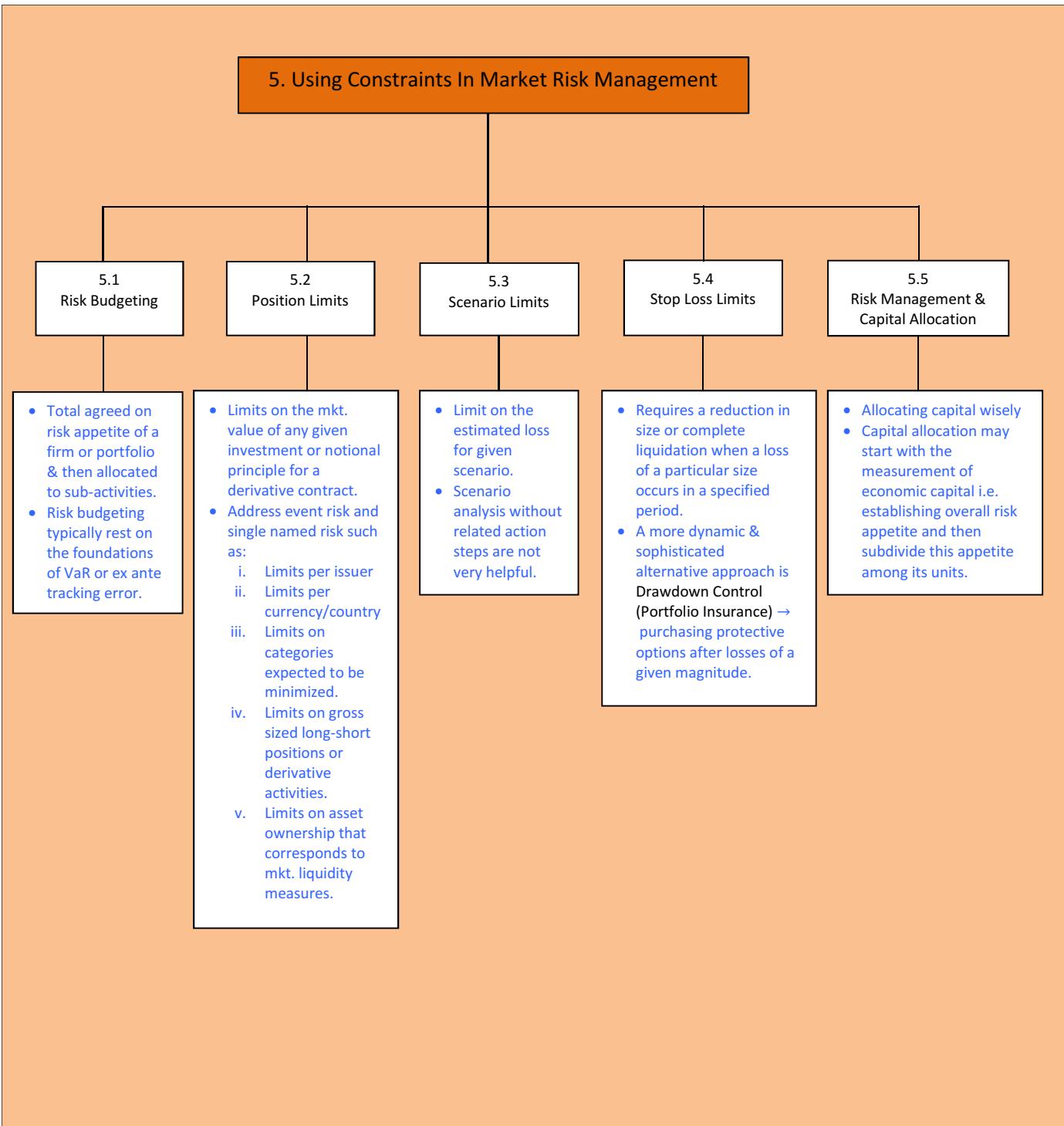
- Reprices the current portfolio using actual historical Δ during the lookback period.
- Portfolio returns are arrayed lowest to highest.
- Limitation: All obs. are wghtd. equally & can be resolved by using weighting methodology (\uparrow wght. to recent obs. & \downarrow weight. to distant obs.)
- Calculated VaR is based on actual values e.g. 5% VaR will be the 5th percentile of the historical values.
- Weakness: Past may not repeat.
- Suitable when lookback period returns are expected to be representative of future.
- Capable of handling the adj. of time horizon (extrapolate daily data to annual data to calculate annual VaR).
- Can be used when portfolio contain options.

2.2.3 The Monte Carlo Simulation Method of VaR Estimation

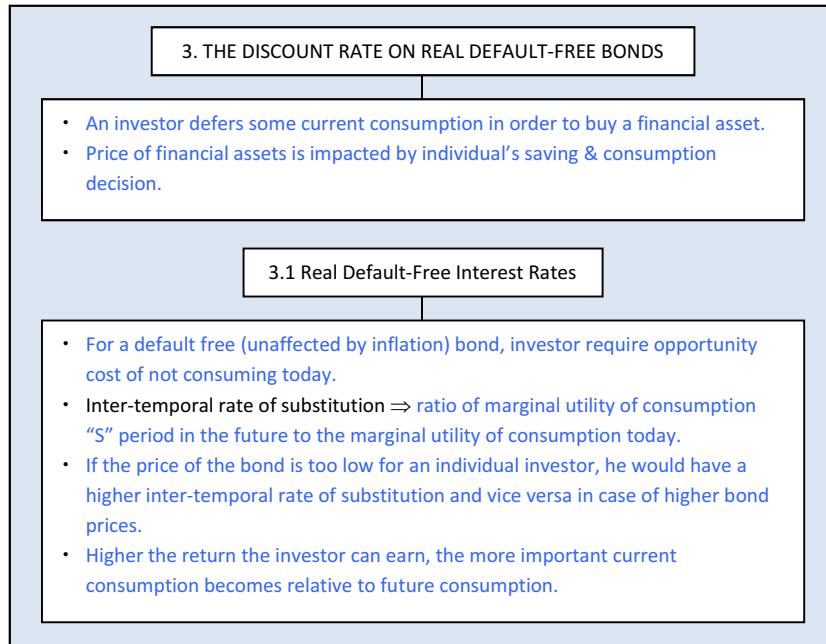
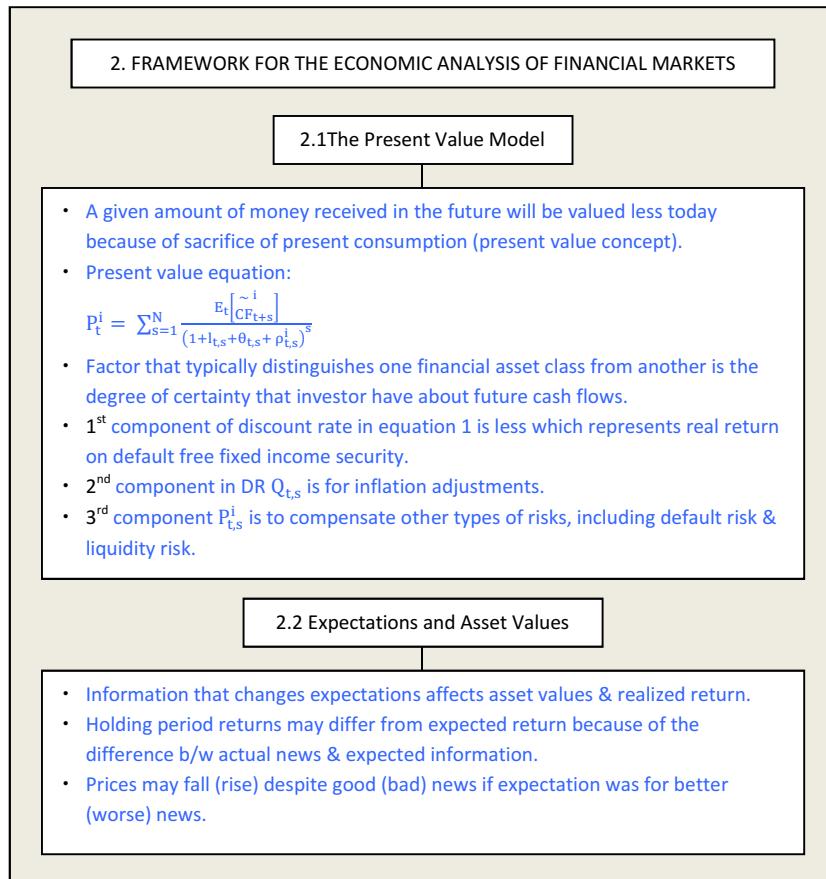
- Requires the specification of statistical dist. of return & the generation of random outcomes from that dist.
- Extremely flexible but can be complex & time consuming.
- E.g. a 5% VaR will be the 5th percentile of simulated values.
- Can accommodate virtually any dist.
- Capable of handling the adj. of time horizon (extrapolate daily data to annual data to calculate annual VaR).
- Can be used when portfolio contain options.







“ECONOMICS AND INVESTMENT MARKETS”



3.1.1 Uncertainty and Risk Premiums

- As an investor's income or wealth increases, his absolute risk aversion is assumed to fall.
- Wealthier & poorer investors would have the same willingness to invest in risky assets when financial markets are in equilibrium.

3.1.2 Risk Premiums on Risky Assets

- Price of risky bond is established relative to the price of default-free bond.
- Future price uncertainty creates a discount for risk.
- During bad economic times inter-temporal rate of substitution is high (smaller income higher marginal utility of future consumption).
- Most risky assets have returns that tend to be high (low) during good (bad) times when the marginal value of consumption is low (high).
- If an asset has high return with high marginal utility of consumption \Rightarrow asset would provide a hedge against bad times.

3.2 Default-Free Interest Rates and Economic Growth

- An increase in real GDP growth should lead to an increase in the real default free rate of interest (more goods & services will be available in the future relative to today).
- Process \Rightarrow higher real GDP \Rightarrow lower willingness to substitute \Rightarrow less savings \Rightarrow more borrowings \Rightarrow higher real rates.
 - Other things being equal, an economy with higher real GDP growth should have higher real risk free rates.
 - Real interest rates are higher in an economy with more volatile GDP growth (other things being equal).

3.3 Real Default-Free Interest Rates and the Business Cycle

- GDP growth is not perfectly predictable.
- Willingness of investor to substitute future wealth for current consumption is inversely related to changes in real GDP growth.

3.3.1 Economic Growth and Real Yields

- Inflation-linked bonds \Rightarrow bonds that pay real return plus a return that is linked directly to an index of consumer prices.
- Real yields on inflation indexed bonds to be higher for those countries with high growth.
- Imperial study unveils very unclear pattern b/w historical economic growth, the volatility in that growth & short term real yields.

3.3.2 Real Default-Free Interest Rate

- Real risk free rate has a close connection with the business cycle which has a related connection with the savings.

4. THE YIELD CURVE AND THE BUSINESS CYCLE

4.1 Short-Term Nominal Interest Rates and the Business Cycle

- T-bills are very short dated govt. securities to help smooth the cash flow needs of the govt.
- T-bills yields are very closely related to the central bank's policy rate.

4.2 Treasury Bill Rates and the Business Cycle

- Nominal interest rate = real interest rate + inflation.
- Nominal interest rates are positively related to real interest rate, inflation & growth volatility.
- Taylor rule is used for setting policy rate;

$$pr_t = l_t + l_t 0.5(l_t + l_t^*) + 0.5(Y_t - Y_t^*)$$

where pr_t = policy rate l_t = level of short term real interest rate l_t^* = rate of inflation l_t^* target rate of inflation Y_t & Y_t^* = actual and potential real GDP respectively.
- Difference b/w Y_t & Y_t^* is "output gap". If this gap is positive it indicates that economy is producing beyond its sustainable capacity.
- Neutral policy rate is when actual inflation is equal to targeted & output gap is zero.

4.3 Short-Term Interest Rate Summary

- Short term risk free rate \Rightarrow influenced by inflation \Rightarrow by real economic activity \Rightarrow by policy rate.

4.4 Conventional Government Bonds

4.4.1 Break-even Inflation Rates

- Investment in T-bill is a good hedge against possible bad consumption outcomes.
- Break-even inflation rate \Rightarrow yield difference b/w risk-free nominal bond (zero coupons) & zero coupon risk free real bond of same maturity.
- Break-even inflation rates provide an independent view about future inflation & include a risk premium of future inflation uncertainty.

4.5 The Default-Free Yield Curve and the Business Cycle

- Maturities of bond have an impact on the way that investors price it.
- Historical analysis reveals that there are no risk premium embedded in investor's return expectation & risk premium regarding inflation is constant over time.

4.5.1 The Slope of the Yield Curve and Investor Expectations

- Govt. yield curve \Rightarrow expected $\uparrow\downarrow$ in short term interest rates might be connected to expect future inflation & maturity structure of inflation risk premium.
- Variation in central bank's policy rate can influence the shape of yield curve.

4.5.2 The Term Spread and the Business Cycle

- Recession is often preceded by a flattening, or even an inversion in the yield curve.
- Later stage of business expansion is often characterized by peak in inflation & higher short term interest rates.

4.5.3 Evidence on Risk Premiums for Default-Free Bonds

- Investors prefer investment that paid off more in bad times as compared to those that paid less in these times. Resultantly, during bad times their expected return goes down & prices goes up.
- Historical studies imply that bond risk premium vary over time.

4.5.4 Other Factors

- Yield curves can also influenced by:
 - Trade balances of the countries.
 - Regulatory factors.
 - Demand & supply considerations.

5. CREDIT PREMIUMS AND THE BUSINESS CYCLE

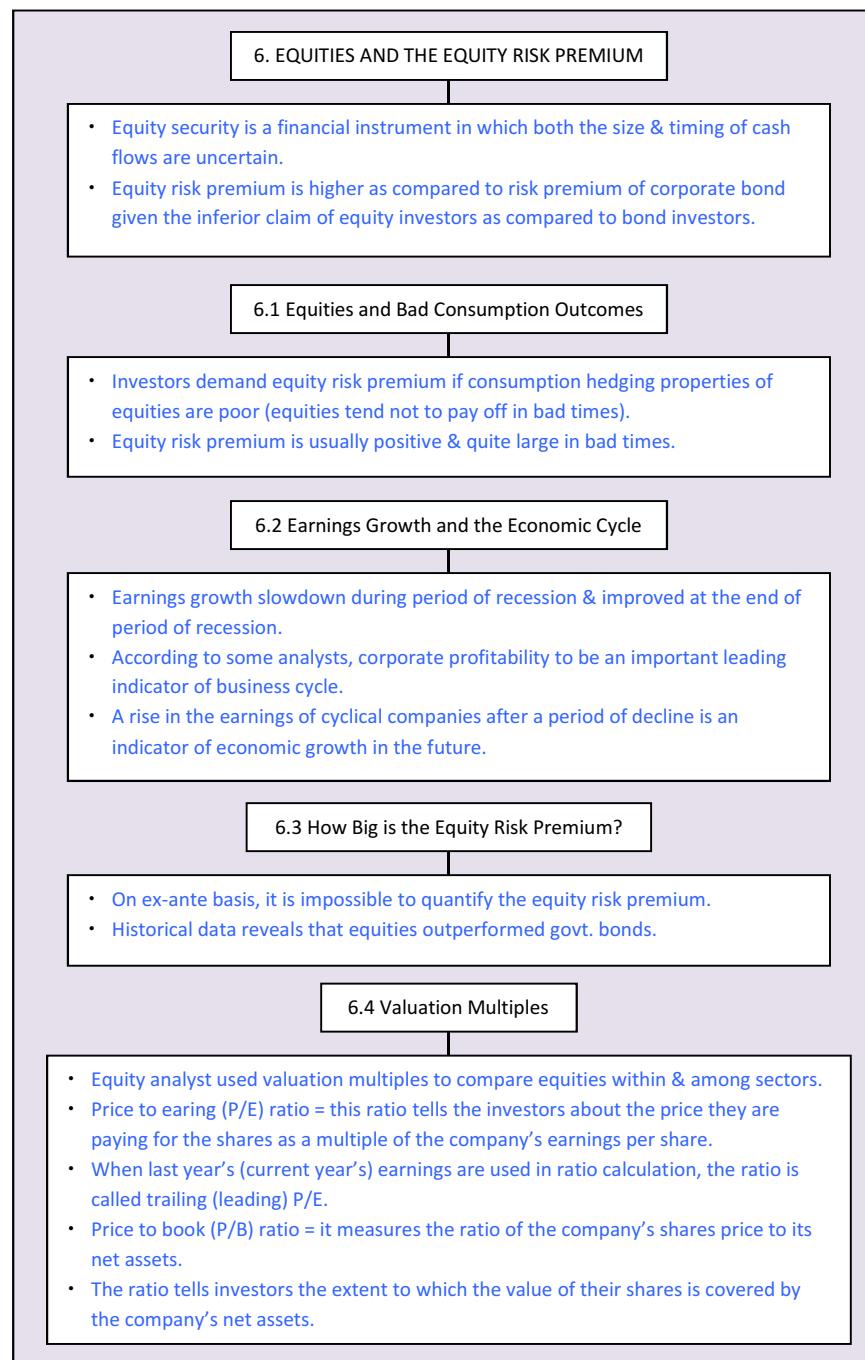
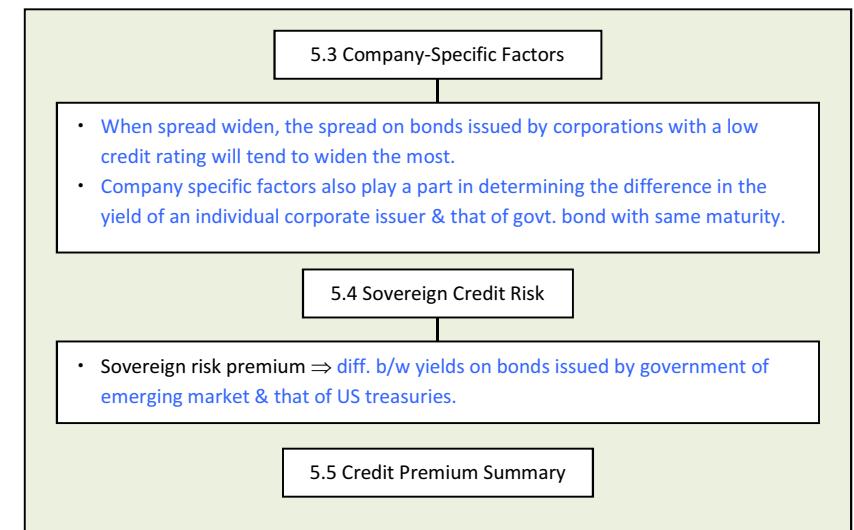
- Credit premium \Rightarrow premium demanded by bondholders given the non-zero probability that the issuer may default on its obligation.
- Recovery rate \Rightarrow the amount that the bondholders will receive in the event of default.

5.1 Credit Spreads and the Credit Risk Premium

- Credit spread \Rightarrow diff. b/w yield on a corporate bond & that on a govt. bond (same currency, same maturity).
- Credit premium tend to rise in times of economic weakness.
- Expected loss = probability of default \times (1-Recovery rate).
- Even in a well-diversified portfolio, investor's continue to be exposed to considerable market risk because defaults tend to cluster around downturns in the business cycle.
- Three types of corporate bonds.
 - Senior secured (secured by lien or claim against assets).
 - Senior unsecured (no claim on company's assets).
 - Subordinated debt (inferior claim on company's assets as compared to senior debt holders).

5.2 Industrial Sectors and Credit Quality

- Spreads b/w corporate bond sectors with different ratings vary and have very different sensitivities to the business cycle.
- Lower rated corporate bonds will tend to outperform higher rated bonds when spreads corporate bonds are narrowing relative to corporate bonds & vice versa in case of spread widens.



6.5 Investment Strategy

- Growth stock tends to trade at very high P/E & at very low dividend yield.
- Value stocks trade in more mature markets with low prospects of substantial earnings growth (low P/E higher D/Y).
- Company size (small cap, mid cap, large cap) is another consideration for equity investors.
 - Usually small cap stocks contains high equity premium relative to large-cap.

7. COMMERCIAL REAL ESTATE

7.1 Regular Cash Flow from Commercial Real Estate Investments

- Investment in commercial real estate generates cash flows in the form of rents.
- Rental growth is usually associated with CPI growth.
- Credit quality of a commercial property portfolio will be determined by the credit quality of the underlying tenants.

7.1.1 The Equity Component of an Investment in Commercial Real Estate

- Value of property will arguably determined by two factors:
 - Property's location.
 - State of the underlying economy.
- Cash flows from a commercial real estate portfolio have features of bond as well as equity investment.

7.1.2. Illiquidity and Investment in Commercial Real Estate

- Investment in commercial real estate is usually considered as "illiquid" due to difficulty in selling the same.

7.2 The Pricing Formula for Commercial Real Estate

- $$P_t^i = \sum_{s=1}^N \frac{E_t \left[\overset{\sim}{CF}_{t+s}^i \right]}{(1 + l_{t,s} + \theta_{t,s} + \pi_{t,s} + \gamma_{t,s}^i + k_{t,s}^i + \phi l_{t,s}^i)^s}$$

$E_t \left[\overset{\sim}{CF}_{t+s}^i \right]$ = Expected CFs from commercial real estate.

$1 + l_{t,s}$ = inflation indexation (govt. tenant).

$(1 + l_{t,s} + \theta_{t,s} + \pi_{t,s})$ = fixed nominal rental income (govt. tenant).

$(1 + l_{t,s} + \theta_{t,s} + \pi_{t,s} + \gamma_{t,s}^i)$ = nominal rental income (corporate tenant).

• Further, risk premium for terminal value uncertainty & illiquidity is also added.

7.3 Commercial Real Estate and the Business Cycle

- Nominal rental income appears to be relatively stable & immune to business cycle while property capital values are much more sensitive to the economic cycle.
- Investor generally demands a high risk premium due to pro-cyclical nature of commercial property prices.
- Property risk premium vary over time with economic conditions & positively correlated with risk premiums on corporate bonds & equities.

“ANALYSIS OF ACTIVE PORTFOLIO MANAGEMENT”

2. ACTIVE MANAGEMENT AND VALUE ADDED

- Objective of active management \Rightarrow to add value in the investment process by doing better than a benchmark portfolio.
- If the investor outperforms (underperforms) the benchmarks, the value added is positive (negative).

2.1 Choice of Benchmark

- Qualities of a good benchmark:
 - Benchmark should be representative of the assets from which investor will make selection.
 - Benchmark portfolio can actually be replicated at low cost.
 - Benchmark weights are verifiable ex-ante, & return data are timely ex-post.
- Most common market indices are capitalization based with features of self-rebalancing & simultaneously held by many investors.
- Float adjusted market cap weights \Rightarrow improved from of market weight index as it only consider securities available for general public investing.
- Return on benchmark portfolio, R_B , return to the individual securities, R_i , & the weight of each security in the portfolio $W_{B,i}$ as under

$$R_B = \sum_{i=1}^n W_{B,i} R_i$$

2.2 Measuring Value Added

- Value added return = Return of portfolio – return on benchmark.
- Risk adjusted return \Rightarrow return of portfolio after incorporating portfolio's risk relative to benchmark.

2.3 Decomposition of Value Added

- Decomposition include:
 - \Rightarrow Value addition through asset allocation (different weights to asset classes).
 - \Rightarrow Value addition through security selection (security weights differ while overall asset class weight will remain same).

3. COMPARING RISK AND RETURN

- Risk – return trade-off can be represented in either absolute or relative terms.
- Sharpe ratio (SR) provides an absolute reward to risk measure.
- Information ratio (IR) provides a benchmark relative reward to risk measure.

3.1 The Sharpe Ratio

- SR \Rightarrow A measure of how much the investor is receiving in excess of a risk less rate for assuming the risk of the portfolio:
- $$SR_p = \frac{R_p - R_f}{STD(R_p)}$$
- SR can be used as ex-ante measure or ex-post measure of risk & return.
 - SR ratio is unaffected by the addition of cash or leverage in a portfolio.

3.2 The Information Ratio

- IR \Rightarrow it compares the active return from a portfolio relative to a benchmark with the volatility of active return (active risk).
- IR measures the consistency of active return.
- IR =
$$IR = \frac{R_p - R_B}{STD(R_p - R_B)}$$
- IR can be used as ex-post or ex-ante measure.
- Distinction b/w SR & IR:
 - For a “closed-end index fund” SR is close to the benchmark while the IR of the same fund will be closest to zero.
 - Unlike SR, the IR is affected by addition of cash or the use of leverage.

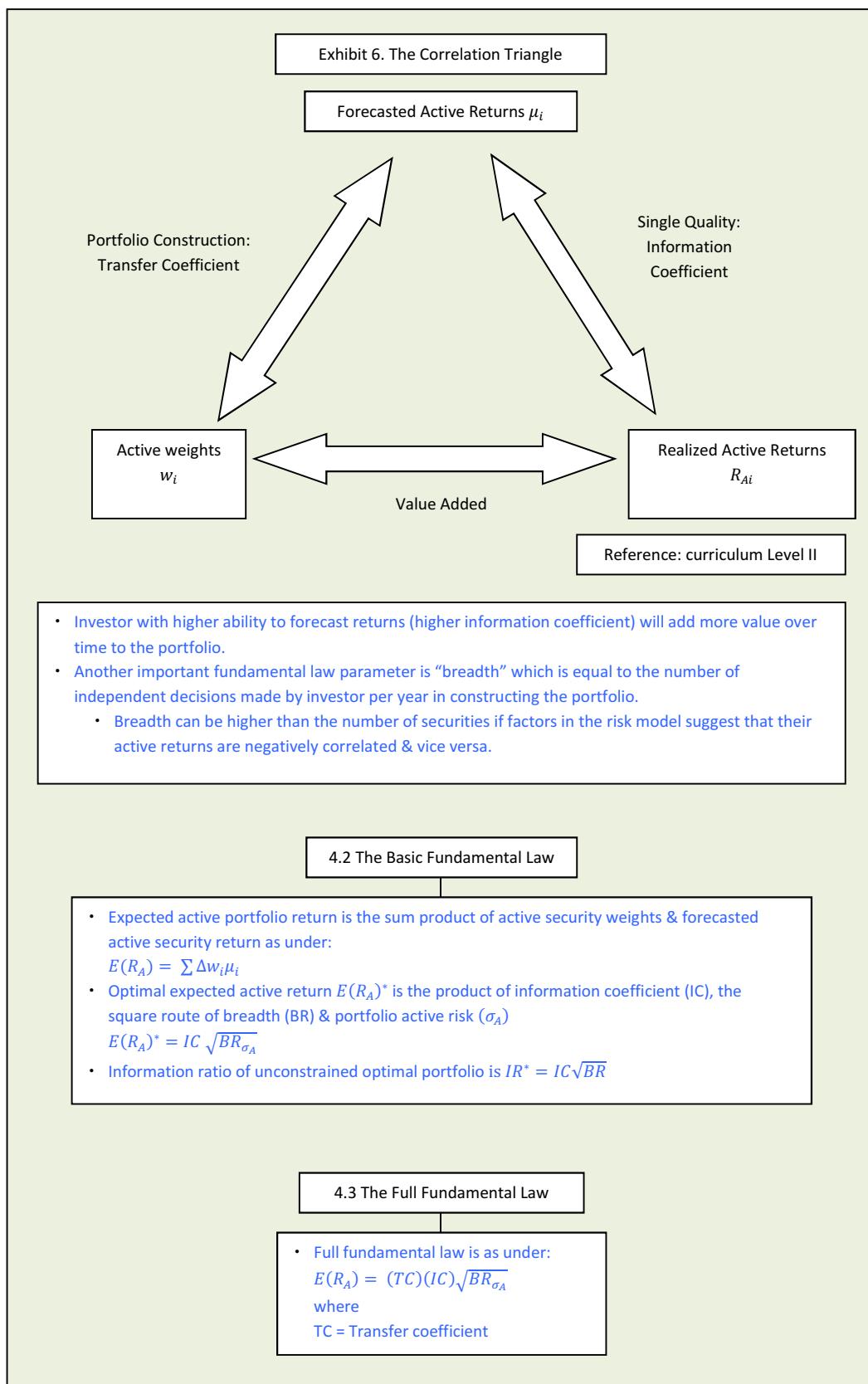
3.3 Constructing Optimal Portfolios

- The potential improvement in an active portfolio’s expected SR compared with the benchmark’s SR is a function of the squared IR.
- Ex-ante IR is the single best criterion for constructing an actively managed portfolio.
- Ex-post IR is the best criterion for evaluating the past performance of actively managed funds.

4. THE FUNDAMENTAL LAW OF ACTIVE MANAGEMENT

4.1 Active Security Returns

- $R_{Ai} = R_i - R_B$
- R_i = Return on asset i
- R_B = Return on benchmark
- R_{Ai} = Active return on asset A



4.4 Ex Post Performance Measurement

- Actual performance is measured by the relationship b/w relative weights & relative returns.
- $E(R_A|IC_R) = (TC)(IC_R) \sqrt{BR_{\sigma_A}}$
- Any difference b/w the actual active return of the portfolio & the conditional expected active return can be represented with a noise term as:

$$R_A = E(R_A|IC_R) + \text{Noise}$$
 - First part \Rightarrow expected value added given the realized skill of the investor.
 - 2nd part \Rightarrow it represents any noise that results from constraints that impinge on optimal portfolio structure.

5. APPLICATIONS OF THE FUNDAMENTAL LAW

EXAMPLE

6. PRACTICAL LIMITATIONS

- Limitation of the fundamental law.
 - Practical consideration \Rightarrow e.g. transaction costs & taxes.
 - Conceptual issues \Rightarrow e.g. dynamic implementation over time.

6.1 Ex Ante Measurement of Skill

- Core element of fundamental law \Rightarrow information coefficient \Rightarrow correlation b/w portfolio investor's forecasts & actual outcomes.
- Forecasting ability probably differs among different asset segments & varies over time.
- The higher the uncertainty about forecasting ability, the smaller the expected value added is likely to be.

6.2 Independence of Investment Decisions

- Breadth can increase well beyond the number of securities when fundamental law concepts are applied to hedging strategies using derivative or other forms of arbitrage.
- When the decisions are not completely independent breadth is lower than number of assets.

“Algorithmic Trading & High-Frequency Trading”

Algos. = Algorithms
HF = high frequency

1. INTRODUCTION

- Algorithms can process millions of pieces of data per second, make sub millisecond decisions & take autonomous actions.
- About 75% of the U.S. stocks are placed by computer algos.
- Algos. are used in different asset classes such as equities, bonds, futures, FX etc.

2. THE BASICS OF ALGORITHMIC TRADING

- Algorithmic Trading → Using a computer to automate a trading strategy.
- There are following two types of trading algorithms.

2. 1 Execution Algorithms

Execution Algos: break down large orders & execute them over a period of time and to achieve the benchmarked price.

- Goal is to minimize the impact of large orders.
- Examples include:
 - i. Volume weighted average price (VWAP)
 - ii. Implementation shortfall
 - iii. Market participation algos.
- Parent order: All the info. provided by the participant (instrument, order, quantity, algo. etc.).
- Child Order: A subset of total order.
- Execution algos are about automating 'How to trade'.

2.2 High Frequency Trading Algorithms (HFT)

- Constantly monitor real time market data & look for patterns to trade on.
- HFTs are about profit.
- HFT track streams of data directly from trading venues.
- Streams may be in the form of **Quote** events, **Trade** events or **News** events
- HFT algos. are about 'How to trade and when to trade and even sometimes what to trade'.
- Statistical Arbitrage (stat arb) algos: Detect breaks in statistically correlated instruments for trading opportunities.
- Types of HFT algos for stat arb trading:
 - i. Pairs trading
 - ii. Index arbitrage.
 - iii. Basket trading
 - iv. Spread trading
 - v. Mean reversion
 - vi. Delta neutral strategies
- In HFT strategies, **low latency** (time diff. b/w stimulus & response) is important.
- **Multi-legged trade**: placing multiple trade as part of stat arb. strategy.
- HFT algos. are typically used in bank proprietary trading groups, hedge funds & proprietary trading funds.
- Other areas in which HFT algo. techniques are used include:
 - i. Liquidity aggregation & small order routing
 - ii. Real time pricing of instruments
 - iii. Trading on news
 - iv. Genetic tuning
 - v. Money-machine-(ultimate goal)

3. THE EVALUATION OF ALGORITHMIC & HIGH-FREQUENCY TRADING

- Key drivers in the evolution of algo trading & HFT.
- I. Market fragmentation
 - II. Opportunities in new asset classes
 - III. Opportunities in Cross-asset class trading
 - IV. Opportunities in new geographies
 - V. Opportunities in cross-border trading

4. ALGORITHMIC & HIGH-FREQUENCY TRADING PLATFORMS & TECHNOLOGIES

Key technologies integral to algo trading are:

1. Execution management systems (EMS):
 - Front-end trading systems
 - Broker algo access & custom algo access are integrated with EMS
2. Complex event processing
 - For complex analysis & response for HF data.
 - Widely used for algo trading, HFT, liquidity aggregation, small order routing, pre-trade risk analysis, market surveillance.
3. Tick database
 - Real-time time series database
 - Capture & store HF market data for analysis & backtesting

