Topic 1 STANDARDS OF PROFESSIONAL CONDUCT I-VII

- A heightened level of fiduciary duty arises if the fiduciary has "custody" or effective control of the client's assets.
- Governing documents (e.g., investment management agreements) are primary determinants of a fiduciary's powers and duties.

Fiduciary standards apply in varying capacities, depending on the nature of the relationship with the client or the type of account under which the assets are managed:

- When managing personal assets of an individual, loyalty is to that individual.
- When managing portfolios of a pension plan or trust, loyalty is to beneficiaries of the plan or trust, not the person who hires the manager.
- When managing funds, loyalty to mandates/defined strategy

The fiduciary should thoroughly consider the risk of loss, potential gains, diversification, liquidity and returns.

B. Soft dollars

The broker may provide research services that provide a broad benefit to the manager, to attract managers direct clients' trades to the broker. The manager has thus used <u>"soft dollars"</u> to purchase beneficial services through brokerage, which is an asset to the manager's clients. Since the manager would expect to purchase research services anyway, the soft dollar arrangement is not necessarily inappropriate. The manager must seek the best price and execution, and disclose any soft dollar arrangements.

C. Proxy Voting

Voting proxy has economic value to a client; investment managers, proxies must be voted in the best interest of the beneficiaries.

Cost-benefit analysis may show that voting all proxies may not benefit clients; need to disclose their proxy voting policies

Example

- hard dollar is a violation i.e. cash from broker to investment managers for directing trades
- manager is for large cap, broker's research is for small cap > violation; as it does not be efit investors directly
 even clients direct managers to a broker, the manager is still responsible in the best ex / price, unless
- obtaining written consent.
- if firm A and B have AGM on the same day, topic in tion () have valuable, it's reasonable to skip firm B's AGM

Standard III (B) Fair Dealing

Members and Candidates must be a tarly and objectively wingall stants when providing investment analysis, making investment recommer tarlines, taking investment a function of the professional activities.

<u>A. Fair</u>

"Fairly" implies not discriminating against or favoring any clients. Fairness is not equality, as it would be physically impossible to reach all customers at the same exact instant, and not all recommendations or investment actions are suitable for all clients.

- Members shall not trade ahead of the dissemination of research reports or recommendations to clients.
- simultaneous dissemination of recommendations; all clients must be informed at approximately the same time, so all clients have a fair opportunity to act on every recommendation
- material changes in prior recommendations should be communicated to all current clients simultaneously, with particular care taken to those clients who acted on the earlier advice.
- Shorten time frame between decision and dissemination / limit number of people who are aware in advance that a recommendation is to be disseminated.

B. Premium level service

Members and candidates are NOT required to give the same level of services to all clients. e.g. you can give more information and research to discretionary clients than to transaction-only clients; need to disclose to all clients Selection process by which customers receive information should be based on suitability and known interest, not on any preferred or favored status.

C. Oversubscription

If an issue is oversubscribed, members should forgo any sales to themselves or their immediate families(夫妻). Issues should be prorated on order size, not account size, with a round-lot basis.

Disclosure should be made to clients/ prospects on the allocation procedures, and how they are affected.

Topic 1 STANDARDS OF PROFESSIONAL CONDUCT I–VII

Example

- difference in allocation due to rounding is acceptable
- if family member is also a fee-paying client, treat them fairly as ordinary client •
- if manager is the beneficiary of family member's account, take that as personal account ٠
- immediate family is taken as manager's personal account

Procedures for compliance

Maintain a list of clients and their holdings.

Develop and disclose written trade allocation procedures, block trades and new issuance procedures.

- Obtain advance indications of client interest for new issues
- Allocate new issues by client rather than by portfolio manager.
- Adopt a pro rata or similar objective method or formula for allocating trades.

Keep accurate records of trades and client accounts, establish systematic account review to ensure fair treatment.

Standard III (C) Suitability

When Members and Candidates are in an advisory relationship with a client, they must:

- 1. Make a reasonable inquiry into a client's or prospective client's investment experience, risk and return objectives, and financial constraints prior to making any investment recommendation or taking investment action and must reassess and update this information regularly.
- 2. Determine that an investment is suitable to the client's financial situation and consistent with the client's written objectives, mandates, and constraints before making an investment recommendation or taking investment action.
- Judge the suitability of investments in the context of the client's total portfolio.

When Members and Candidates are responsible for managing a portfolio to a specific mandate, strategy or style, they must make only investment recommendations or take only investment actions that are consistent with tated objectives and constraints of the portfolio.

For a new client or existing client mandates mature, the member need not immediate potan client information if starting with re-investing funds in cash equivalent.

- ints, and the existence of separate beneficiaries. J. Client identification: type and nature of •
- Investor objectives:

ectives (income grewt in wincipal, maintenance of purchase power). Return on Risk tolerance (suitability and subury of values).

- Investor constraints: Liquidity needs, expected cash flows (patterns of additions and/or withdrawals), investable . funds (A&L, other commitments), time horizon, tax considerations, regulatory and legal circumstances, investor preferences, unique needs, and proxy voting responsibilities and guidance.
- Performance measurement benchmarks

Information should be incorporated into a written IPS, which should be updated at least annually and prior to material changes.

B. Unsolicited Trade Requests

When unsolicited trade requests are not suitable for clients, if minimal impact, accept; if material(e.g. >10%), update IPS; If client does not want to change IPS:

- 1. isolate to execute trade in a new unmanaged account
- 2. drop the client

Standard III (D) Performance Presentation

When communicating investment performance information, Members and Candidates must make reasonable efforts to ensure that it is fair, accurate, and complete.

Do not state or imply to obtain what was achieved in the past.

Include terminated funds in performance information

Present return in weighted composite of similar portfolios, not single representative accounts.

When presentation to clients is brief, the detailed supporting information needs to be provided on request.

A firm cannot claim that they are/were in compliance with CFA Institute's standards unless they comply in all material respects with CFA Institute's standards.

Topic 1 STANDARDS OF PROFESSIONAL CONDUCT I–VII

C. Referencing candidacy in the CFA Program

CFA candidates may reference their participation in the CFA Program, but the reference must clearly state that an individual is a CFA candidate and cannot imply that the candidate has achieved any type of partial designation.

- application should have been accepted,enrolled to sit for a specified exam
- Placing "CFA Level II Candidate" after a candidate's name implies that this is a partial designation, which is a violation.
- Candidates may indicate that they have completed Level I, II or III of the CFA program in sentence.

D. About the CFA mark

- It is registered in many countries (along with Chartered Financial Analyst).
- It does not serve as an acronym, cannot be used as a noun, and should never be used in the plural.
- Only CFA or Chartered Financial Analyst should appear after the charterholder's name. "John Smith, CFA," or "John Smith, Chartered Financial Analyst," is correct.
- The designation "CFA" cannot be listed in a typeset larger than that used for the charterholder's name.

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Topic 2 Quantitative Methods

- Receiver Operating Characteristic
 - > false positive rate = FP / (TN +FP)
 - > true positive rate = TP / (TP+FN) = sensitivity
 - > Area under curve close to 1.0 indicates near perfect prediction
 - > with random guess:
 - P(predicted D|actual D) = P(predicted D|actual No D) TP / (TP + FN) = FP / (FP +TN) true positive rate = false positive rate
- Root Mean Squared Error= $\sqrt{\sum_{i=1}^{n} \frac{\left(Predicted_{i}-Actual_{i}\right)^{2}}{n}}$



False Positive Rate (FPR)



Topic 3 Economics

LOS 12 Economics and Regulation

- a. describe the economic rationale for regulatory intervention;
- information friction, public good, externalities, weak competition, social objectives
- b. explain the purposes of regulating commerce and financial markets;
- financial markets: protection of consumers & investors, > through disclosure
 - safety & soundness of financial institutions, > through prudential supervision
 - the smooth operation of payment systems, access to credit.

financial contagion: financial shock spreads to other sectors/economies

- commerce: facilitate business environment(protection, privacy, safety of products) labour market: e.g. workplace safety, employees/employers' rights
- c. describe anti-competitive behaviors targeted by antitrust laws, evaluate antitrust risk associated with business strategy;
- price collusion or exchange certain information
- dominant firm: exclusive dealings and refusal to deal / price discrimination / predatory pricing
- d. describe classifications of regulations and regulators;
- state-backed regulations: 1.statutes laws enacted by legislative bodies
 - 2. admin regulations/ admin laws rules issued by gov agencies/regulators
 - 3. judicial law interpretations of courts
- Government-backed regulator: have legal authority to enact & enforce regulations within mandate • 1. governmental departments and agencies
 - 2. independent regulators: do not rely on government funding, with some autonomy in decision making Industry self-regulatory bodies: private org that represent and regulate their members
 - derive authority from members, who agree to comply with organization rules, standards & enforcement 1. self-regulating organisations: been given recognition & authority by gov. body/agency for enforcement

- are funded independently 2. Non-SRO outside bodies e.g. IASB, FASB, credit-rating *Substantive law* focuses on the rights/responsibilities depit fe and relationship among entities *Procedural law* focuses on the protection and a substantial for the relationship among entities
- Procedural law focuses on the protection and this mement of the substantive law. Regulators have responsibility for both substantive and procedural hispeous of their regulations. •
- e. describe uses of self-regulation in inancial markets:

f. describe regre av Gerdependencies ad the Of

- regulatory capture theory: regulation car sometimes enhance benefits/interests of the regulated - regulators may have worked in the industry > reinforce regulatory capture
- regulatory competition: compete to provide a regulatory environment designed to attract certain entities ٠
- regulatory arbitrage(from perspective of those being regulated): identify and use some aspect of regulations that . allows them to exploit differences in economic substance or in foreign and domestic regulatory regimes

g. describe tools of regulatory intervention in markets;

- price mechanisms create appropriate marginal incentives
- restricting short-selling
- mandating activities capital requirement
- providing public goods, financing private projects
 - # bail-in: > shareholders of a failing institution being divested of their shares
 - > creditors of institutions having their claims cancelled/reduced to the extent necessary to restore the institution to financial viability.
 - > shareholders and creditors pay costs of failure, rather than taxpayers

h. describe benefits and costs of regulation;

- net regulatory burden: private costs of regulation private benefits of regulation
- indirect cost: 1. unanticipated implementation costs e.g. hiring more lawyers •
 - 2. unintended consequences when behaviors are altered & market allocations are changed
- cost-benefit analysis can be piloted through natural experiments and trial phase-ins
- actual costs/benefits may be available during retrospective analysis, allow more informed assessment of regulation.

LOS 19 Capital Budgeting

a. calculate yearly CFs of expansion & replacement capital projects, how depreciation method affects CFs;

- initial investment outlays = FC Inv + WC Inv (cash proceeds from selling old FC tax * gain from sale)
- after-tax operating cash flow = $(\triangle \text{Sales} \triangle \text{cost} \triangle \text{dep})^* (1-t) + \triangle \text{dep}$
- terminal year after-tax non-operating CF = sale of machine tax * gain from sale + NWC Inv
- convention: double declining with half-year convention
 - depreciation = (1/estimated life) * 2 * residual value
 - assuming assets is in service for only 6m in first year bought in the middle of the year
 - accelerated depreciation improves NPV as net effect is to reduce tax outflows in early years
- b. explain how inflation affects capital budgeting analysis;
- decrease profitability of investment
- inflation reduces value of depreciation tax savings > increase in corporation's real taxes
- reduces value of fixed payments to bondholders

c. evaluate capital projects in situations of 1) mutually exclusive projects with unequal lives, using either the least common multiple of lives approach or the equivalent annual annuity approach, and 2) capital rationing;

- mutually exclusive projects are those competing directly with each other; one or the other
- project sequencing: investing in a project creates the option to invest in a future project
- unlimited funds: company can raise any funds it wants for all profitable projects
- capital rationing: company has a fixed amount of funds to invest
- least common multiple: extent time horizon so lives of both projects will divide exactly into horizon
- equivalent annual annuity

d. explain how sensitivity analysis, scenario analysis, Monte Carlo simulation can assess stand-alone risk of a capital project;

- sensitivity analysis calculates the effect on the NPV of changes in one variable at a time.
- scenario analysis takes scenarios that consist of changes in several of the input variage - often pessimistic, most likely and optimistic
- e. explain and calculate the discount rate, based on market risk methods and valuing a capital project;
- using market risk method, discount rate is the required new of etam by a diversified investor risk premium should reflect factors priced in blin alket CAPM / a bitrate priced theory optimating bota by pure play.
- estimating beta by pure play use buta or peer companies to proxy project beta
- f. describe types of real options and valuate a capital proj A ng real options;
- timing op op the win esting
- sizing option: after investing, abancon the project -> abandonment option additional investments -> growth option
- flexibility option: once investment is made, other operational flexibilities may be available • - e.g. demand > capacity: price-setting option, e.g. ↑ price / production-flexibility option: work overtime
- fundamental option: e.g. whole investment is an option if payoff is contingent on an underlying asset
- evaluate projects with real options: 1. if DCF without option is +ve, with real option adds more value
 - 2. NPV = DCF without option cost of option + value of options
 - 3. decisions trees / option pricing models

g. describe common capital budgeting pitfalls;

- Not incorporating economic responses into the investment analysis
- e.g. in response to successful investment, competitors can enter & reduce investment profitability
- Misusing capital budgeting templates
- Pet projects: projects that influential managers want overly optimistic projections
- Basing investment decisions on EPS, net income, or ROE may not be in LR economic interests
- Basing investment decisions on IRR
- Bad accounting for cash flows / Handling sunk costs and opportunity costs incorrectly
- Company beta and project beta can be different, should use project-specific rate
- Estimation Error: Not using the appropriate risk-adjusted discount rate / Overhead costs
- Spending all of the investment budget just because it is available
- Failure to consider investment alternatives

h. calculate and interpret accounting income and economic income in the context of capital budgeting;

LOS 21 Dividends and Share Repurchase

a. describe the expected effect of regular cash dividends, extra dividends, liquidating dividends, stock dividends, stock splits, and reverse stock splits on shareholders' wealth and a company's financial ratios;

- regular dividends dividend reinvestment plan (DRP):
 - 1. open market DRP: buy share in open market to get extra shares credited to plan participants
 - 2. new-issue DRP: issue additional shares to plan participants
 - 3. plan that permits to obtain shares through either open market / new issuance
 - ✓ encourage diverse shareholder base by providing small shareholders way to accumulate share
 - ✓ stimulate long-term investment
 - ✓ allows accumulation of shares using cost averaging
 - ✓ new-issue DRP raises new E without flotation cost via banks; shareholders avoid transaction cost
 - if DRP participants buy share at discount, dilute holdings of non-participants
 - extra record-keeping involved in jurisdictions where capital gains are taxed
 - cash dividends are fully taxed before reinvestment
- extra/special dividends often brought by special circumstances
- often used by companies in cyclical industries dividends only during strong earnings
- liquidating dividends: 1) stop operating, distribute net assets to shareholders
 - 2) sell a portion for cash and proceeds are distributed
 - 3) pay a dividends that exceeds accumulated retained earnings
 - liquidating dividends is a return of capital, rather than a distribution from earnings/RE
- cash dividends reduce A&E, no effect on shareholder wealth; liquidity ratios decrease; D/E increases
- stock dividends non cash dividends through distribute additional shares
 - share price & EPS decreases while total market value of firm & P/E stays same
 - no economic impact as reduce in RE is offset by stock dividends issued_
- stock split: no economic effect & no effect on shareholder equity accounts entries:
 - e.g. two-for-one, one additional share for each one owned
 - #reverse stock split increases price and reduces to spines outstanding

b. compare theories of dividend policy and explain implications of each for share vacuity given a description of a corporate dividend action;

- theory 1: dividend policy does not make Miler & Modicilieni the r
 - transaction cost in issuing in we have
 - transaction of the unital gain tax in selling shares for homemade dividend
- theory 2: dividend policy matters and in methand argument
- dividends are perceived as less risky than reinvesting earnings / capital gains
- theory 3: dividend policy matters tax argument
 - dividend income has a higher tax rate than capital gains
 - selling shares before ex-dividend date: $CF = P (P P_{buy}) * t_{capital gain}$

- selling after:
$$CF = P_{lower} - (P_{lower} - P_{buy}) * t_{capital gain} + D * (1 - t_{dividend})$$

- indifference when
$$(P - P_{lower}) * (1 - t_{capital gain}) = D * (1 - t_{dividend})$$

- only when dividend tax and capital gain tax equal, price drop equals dividend paid
- clientele effect: groups of investors(clienteles) are attracted to companies with specific div policies
 - e.g. retired investors may prefer higher current income, thus firms with high div payout
 - if demands of clienteles are satisfied by respective companies, change in dividend policy will result only
 - in a switch in clientele, not affecting equity value
- c. describe types of information (signals) that dividend initiations, increases, decreases, omissions may convey;
- dividend policy convey more credible information as a signal when it is costly to mimic by other entities without similar attributes
- dividend initiation/ increase positive information, are associated with future earnings growth
- omission/reduction negative information
- d. explain how clientele effects and agency costs may affect a company's payout policy;
- paying out all FCF as dividend limits managers' ability to overinvest and take on -ve NPV projects
- when firm is financed by debt and equity, paying large dividends to transfer wealth to shareholders, may lead to

underinvestment in profitable projects, increasing default risk of debt

- this can be mitigated by covenants on maximum allowable distributions

e. explain factors that affect dividend policy in practice;

1. investment opportunities: firms with more profitable opportunities tend to pay out less

- 2. expected volatility of future earnings: more volatile> higher risk that dividend ↑ may not be covered by earnings in future time period, more cautious in size and frequency of dividend
- 3.financial flexibility: substantial cash holdings help meet unforeseen operating needs and exploit investment opportunities with minimum delay
- 4. tax consideration: taxation method
 - > double taxation system: corporate tax and income tax on dividend
 - > split rate tax system: profits distributed are taxed at lower rate than retained earnings, then dividends are taxed as ordinary income
 - > dividend imputation tax system: corporate profits distributed as dividends are taxed just once at the shareholders' marginal tax rate; after earnings are taxed at corporate level, shareholders receive tax credit, known as # franking credit
 - > though capital gain tax may be higher, it will only be paid until shares are sold
 - > tax-exempt institutions are indifferent, e.g. pension funds, endowment funds
- 5. flotation cost: companies try to avoid establishing a dividend level such they need to raise new equity
- 6. contractual/legal restrictions: > e.g. covenants
 - > e.g. dividend payment may be limited by impairment of capital rule, which requires net remaining assets to reach a benchmark

f. calculate and interpret the effective tax rate on a given currency unit of corporate earnings under double taxation, dividend imputation, and split-rate tax systems;

Jate the g. compare stable dividend, constant dividend payout ratio, and residual dividend payout policies, and dividend under each policy;

- stable dividend: regular dividends are paid, generally do not reflect short-torn watility in earnings
 - > most common, dividends are based on a long run to pass of sustainable earnings
 - > expected \uparrow in div = (E[earnings] * tally a parout ratio previous dividend) * adjustment > adjustment factor: e.g. 0.2. adjust next is to occur over 5 years
- constant: pay out a constant % of net income > dividend juctual, with earnings in the short term
- residual: pay out residual fan, internally generated unde after financing positive NPV projects and used in practice store but Strikinghly volatile dividend payments

h. compare share repurchase methods;

- repurchase generally does not distribute cash in a proportionate manner, compared to cash div e.g. if repurchase is done via buy orders in open market, cash is only received by shareholders with concurrent sell orders
- method 1 buy in open market: most common
 - > gives company maximum flexibility as no legal obligation to undertake/complete
 - > if repurchase is competently timed to exploit perceived undervaluation, cost effective
 - > when huge repurchase, share price increases increase costs
- method 2 buy back a fixed number of shares at a fixed price through fixed price tender offer
 - > usually price is at a premium to current market price, can be accomplished quickly
- method 3 dutch auction: tender offer to existing shareholders, with a range of acceptable prices > can be accomplished in a short time period
- method 4 repurchase by direct negotiation at a premium price
 - > may to prevent an activist shareholder from gaining representation on the board

i. calculate and compare the effect of a share repurchase on earnings per share when 1) the repurchase is financed with the company's surplus cash and 2) the company uses debt to finance the repurchase;

	Via surplus cash	Via debt
B/S	A & E decreases; D/E increases	A constant, E decreases; D/E increases
I/S	$EPS \uparrow only$ when funds used to repurchase would	EPS ↑ if earnings yield(E/P) exceeds

LOS 23 Mergers and Acquisitions

- a. classify M&A activities based on forms of integration & relatedness of business activities;
- acquisition: purchase of some portion of one company by another
- merger: absorption of one company by another; often known as takeovers; hostile vs friendly
 - > statutory merger: one company ceases to exist A+B = A
 - > subsidiary merger: company being purchased becomes a subsidiary A+B = A+B
 - > consolidation: both companies terminate previous legal existence A+B = C
- merger: 1. horizontal merging companies are in same business, e.g. competitors
 - for EOS or gain market power
 - 2. vertical in the same production chain, e.g. supplier or distributor
 - cost saving, greater control over production process
 - backward integration: purchase a supplier
 - 3. conglomerate purchase another company that is unrelated to core business diversify

b. explain common motivations behind M&A activity;

- synergy e.g. revenue synergies through cross-selling products, expanded market share
- growth external (through M&A) mitigate risk as less risk in merging with existing company
- market power vertical merger to lock in sources of critical suppliers
- acquiring unique capabilities and resource
- diversification
- bootstrapping earnings: earnings ↑ as a result of merger transaction, rather than economic benefits
- manager's personal incentives: executive compensation is highly correlated with size, thus managers are motivated to max. size, rather than shareholder value.
- tax: merger with a target that has accumulated significant tax losses
- hidden value: acquire underperforming target & unlock hidden value by better management or when assets can be purchased below replacement cost
- e.g. acquire another oil company's assets is cheaper than develop adding a reserves of its own
 - cross-border: 1. exploiting market imperfections: e.g. advantage in Plane cost of labour
 - 2. overcome adverse gov policy: e.g. circum v r. thrin, quotas
 - technology transfer: a target with new/superior technology
 product differentiation, open new market

 - 5. follow and school to domestic clients more effectively

c. explain boo m poil got armings per charge EP, and calculate a company's post merger EPS;

d. explain, based on industry life cycles, ne Gatier between merger motivations and types of mergers;

1. pioneering development: substantial development costs, low but increasing sales growth	 smaller companies may sell to larger ones in mature/declining industries young firms merge to pool management and capital resources 	- conglomerate - horizontal
2. rapidly growing: high profit margin	 require large capital requirement to expand capacity 	 conglomerate horizontal
3. mature: drop in new entrants growth potential remains	- merger for EOS, operational efficiency	- horizontal - vertical
4. stabilisation: increasing competition production constraints	 merge for EOS in R&D, marketing to match low cost and performance buy smaller ones to improve management 	- horizontal
5. deceleration: overcapacity eroding profit margin	 horizontal to ensure survival vertical to increase efficiency & profit margin conglomerate to buy firms in young industry 	all 3 types

e. contrast merger transaction characteristics by form of acquisition, method of payment, and attitude of target management;

form of acquisition:

Stock purchase	Asset Purchase	
- approved by at least 50%, legal implications	- shareholder approval might not be required	
 target shareholders receive compensation in 	- payment is made to the selling company directly;	

Topic 6 Equity Investments

LOS 25 Return Concepts

a. distinguish among realized holding period return, expected holding period return, required return, return from convergence of price to intrinsic value, discount rate, and internal rate of return;

- holding period return = dividend yield + price appreciation return
- expected alpha(return from convergence of price to intrinsic value) = expected return required return
- realised alpha = actual holding period return contemporaneous required return
- in efficient market, required rate of return = IRR

b. calculate and interpret an equity risk premium using historical and forward-looking estimation approaches;

historical estimate:

unbiased and objective data

× problem with stationary assumptions

- × empirically countercyclical expected equity risk premium
- 1) use equity index to represent market returns: broad-based, market-value weighted
- sample period: dividing into subperiods does not ↑ precision, only extend periods improves

assumption of stationarity is harder to maintain for longer periods

- 3) type of mean: geometric/arithmetic
- 4) risk-free return: long-term/short-term gov debt instrument return
- 5) survivorship bias: inflate historical estimates
- forward-looking/ex ante estimate
- easily available parameters

× subject to potential errors related to model and behavioral biases

1) Gordon Growth Model: market wide

$$r_{M} = \frac{D_{1}}{P_{0}} + g$$

>Capi

- D1 = dividend yield on index based on year-ahead aggregate forecasted dividenders taket
- g = consensus long-term earning growth rate
- > assume stable growth rate for earnings; constant div payout @
- > multiple stage: index price = pv(fastgrow) + pv(transition)+ R > IRR - gov # Ibbetstin Onen-earnings model
- 2) Macro/Supply-side model:

 $r_{M} = Dividend + CapitalGain_{M}$

- > Dividend _ =_ Flictor - dividend viel + e estment return
 - $D_{i} = \frac{1}{2} + E[inflow P_{i}] + E[real EPS growth]) * (1 + E[P/E growth]) 1$
 - E[inflation] = (1+Y1M on 20y T-bond) / (1+YTM on 20y treasury inflation protected securities(TIPS))
 - E[real EPS growth] ≈ real GDP growth = labour productivity growth + labour supply growth - E[P/E growth]: baseline is 0 as efficient market
- > more reliable when public equities represent a relatively large % of economy, as in developed mkt

3) survey estimate

c. estimate the required return on an equity investment using CAPM, FF model, the Pastor-Stambaugh model, macroeconomic multifactor models, and the build-up method (e.g., bond yield plus risk premium);

CAPM: assumptions: risk-averse, mean-variance of total portfolio investors; .

- only for portfolio where idiosyncratic risks are diversified
- FFM: Rmkt-Rf: return on market-value weighted equity index in excess of risk-free SMB: market cap
 - HML: book-to-market: high BTM reflects value bias; growth is riskier
 - PS:FFM + liquidity risk premium
- Macro: 1) confidence: corporate bond vs gov bond with 20y maturity;
 - higher confidence > lower reward for bearing risk

2) time-horizon: 20 year government bond vs 30 day treasury bill;

growth stock tends to have more positive exposure

- inflation: unexpected change negative exposure for most stocks; returns ↓ with positive surprises
- 4) business cycle: positive surprise > expect higher growth rate for economy
- 5) market timing risk: portion of total return unexplained; positive exposure for most
- build-up: for private business

Topic 6 Equity Investments

LOS 30 Residual Income Model

a. calculate and interpret residual income, economic value added, and market value added;

- residual income = net income Re*Equity
 - = NOPAT capital charge(Re* E+after-tax Rd *D)
- economic value added = NOPAT cost of capital * capital
- adjustments: R&D expenses are capitalized and amortised
 - capital charge of strategic investments without immediate returns is suspended
 - deferred tax is eliminated; LIFO reserve is added back to capital
 - operating leases are taken as capital lease; nonrecurring items are adjusted
 - market value added = market value of firm total capital = PV of all future residual income
- firm with positive economic profit will have MV > BV

b. describe the uses of residual income models; - RI model did not make assumption about future earnings being positive c. calculate the intrinsic value of a common stock using residual income model and compare value recognition in residual income and other present value models;

d. explain fundamental determinants of residual income;

•
$$P/B = 1 + \frac{ROE - r}{r - q}$$

e. explain relation between residual income valuation and justified P/B ratio based on forecasted fundamentals;

Tobin's q = MV of D+E / replacement cost of total assets > equilibrium is when q ratio is 1

f. calculate and interpret the intrinsic value of a common stock using single-stage (constant-growth) & multistage residual income models;

- $V_0 = B_0 + \frac{(ROE-r)^*B_0}{r-g}$ implies RI will grow indefinitely, not realistic
- multistage 1: often assumes ROE reverts to required return of equity

$$V_0 = B_0 + \sum_{t=1}^{T} \frac{RI_{t-1}}{(1+r)^t} + \frac{RI_{T+1}}{(r-(w-1))^*(1+r)^T}$$

 $V_0 = B_0 + \sum_{t=1}^{T} \frac{RI_{t-1}}{(1+r)^t} + \frac{RI_{T+1}}{(r-(w-1))^*(1+r)^T};$ **persistence factor w:** 1 - RI will not fade; e.g. low dividend payout how resolved persistence in the industry 0 - no RI after forecast horizon film control KOE is extremely high

- multistage 2: often assumes ROE reverts to some mean to $PV_T = P_T - B_T$; where P_T is from **Fibratio B** is from clean success equation
- g. calculate implied growth rate Pre Isual income, given marker P/B ratio and an estimate of Re;
- h. explain continuing 12-in justify estimated continuor RI at the forecast horizon, given company & industry prospects;
 continuing residual income = residuar income after the forecast horizon;
- e.g. premium over book value should be discounted to PV
- TV may not be a large component, as BV captures it.

i. compare residual income models to dividend discount and free cash flow models;

In RI model, most of the total value of the stock is attributed to the earlier periods.

j. explain strengths/weaknesses of RI models and justify use of a RI model to value a company's common stock;

- Terminal values do not make up a large portion of total present accounting data that can be subject to 1 × value, relative to other models. manipulation by management. V RI models use readily available accounting data × require adjustment and clean surplus Readily applied to firms that do not pay dividends or without V relation to hold positive expected near-term FCF, or unpredictable CFs × assumes cost of debt capital is reflected focus on economic profitability. appropriately by interest expense
- k. describe accounting issues in applying residual income models;
 - violations of clean surplus relationship charges directly to stockholders via OCI 1) unrealised FVOCI 2) FX translation for current rate method 3) pension adjustment 4) PnL on CF hedging IFRS only - 5) revaluation reserve for PPE 6) Δ liabilities' FV attributable to change in liabilities credit risk
- balance sheet adjustments for fair value:
 - > operating lease, LIFO, deferred tax, allowances
 - > intangible assets e.g. goodwill, license assets(amortised after M&A)
 - nonrecurring items; aggressive accounting practices; and international considerations.
- I. evaluate whether a stock is overvalued, fairly valued, or undervalued based on a residual income model.

Topic 7 Fixed Income

- > mean reversion to long-run value of short-term i/r b; if current is smaller than LR, +ve change
- > a reflects the speed of mean reversion
- > 'stochastic' term scaled by $\sigma\sqrt{r}$ > avoids non-positive interest rate
- Vasicek model:
 - $dr = a(b r)dt + \sigma dz_{t}$
 - > assuming stochastic term(volatility) is independent of the level of short-term i/r
 - > possibility of negative i/r
- Arbitrage-free model Ho-Lee model: $dr_t = \theta_t dt + \sigma dz_t$
 - use observed market price of a reference set of financial instruments to infer time-dependent drift terms, thus determine current term structure, such that valuation generates the observed market price
 - match observed yield curve
 - partial equilibrium model: model takes yield curve as given, do not explain observed yield curve
 - produces a normal distribution of future rates
 - more parameters to be estimate than equilibrium models
- I. explain how a bond's exposure to each of the factors driving the yield curve can be measured and how these exposures can be used to manage yield curve risks;
- level: parallel upward/downward shift in the yield curve
- steepness: non-parallel shift; e.g. long term rise and short term fall
- curvature: short & long term rise while medium term falls, or vice versa
- Principal Component Analysis: synthetic factors which are statistically independent
- long-term rates are mainly affected by real economy and inflation; while short-term rate is mainly affected by monetary policy

m. explain the maturity structure of yield volatilities and their effect on price volatility.

 $\sigma(t, T)$ is the volatility of rate for a security with maturity T at time t

short term volatility of i/r is higher rate duration: each with the solution of the properties of of the prope

e.g. = <u>monthly s.d.</u>

> short term volatility of i/r is higher

penchmark yield solve at specific maturity segment key rate duration: sensitivity to small

portfolio va

e.g. key rate duration to

sum of kernetiens = effective

Topic 7 Fixed Income

LOS 35 Credit Analysis Models

a. explain expected exposure, loss given default, probability of default, and credit valuation adjustment;

- expected exposure projected amount of money could lose, before factoring in recovery
 - discounted with government YTM
- probability of default:
 - actual
 - risk-neutral expected value to be discounted by risk-free rate
 - if both probability of default decreases, and recovery rate decreases > POD effect dominates
- credit valuation adjustment = sum of PV of expected loss
- value of corporate bond = value of gov bond CVA implied YTM for corporate bond - YTM for gov bond = credit spread
- b. explain credit scores and credit ratings;
- credit score: mainly for retail lending market for small business and individuals
 - payment history
 - debt burden e.g. debt-to-limit ratio .
 - length of credit history e.g. average age of accounts on credit file .
 - type of credit used
 - recent searches for credit hard credit enquiries, e.g. apply for new loans
 - credit rating: wholesale market for bonds issued by corporations and government entities
 - investment grade: Baa3 / BBB- and above
 - The credit rating is relatively stable over time, and is lagging the business cycle.

c. calculate the expected return on a bond given transition in its credit rating;

- sum of (respective transaction probability * (duration * change in spread))
- 1. probability of change are not symmetrically distributed, with a skew toward downgrade 2. increase in credit spread is much larger for downgrade there do
- d. structural & reduced-form models of corporate credit risk assuming a structural & reduced-form models of corporate credit risk assuming a structural with the structural with the structural structure as the structure of t
- structural: default is an endogenous variable based on structure of BS
 - \checkmark provide insights into the nature of great its & rationale for default
 - ✓ require inside knowledge of management
 - use option priging models to value risky debt
 - 2 ✓ a sin of or
 - value of assets has a ognormal distribution
 - assets are traded in the market, with constant risk-free rate
 - simple BS: cannot model off BS debt/complex BS
 - D(T) = A(T) Max[A(T) K, 0]
 - debt holder write a put option to shareholder
 - premium is priority of claim if asset value falls below K
- reduced-form: default is exogenous variable that occurs randomly
 - based on Poisson stochastics process and default intensity, which is estimated by regression on company-specific and macro variables
 - inputs are observable variables
 - do not explain reason for default, assuming default as a random surprise
- e. calculate the value of a bond and its credit spread, given assumptions about credit risk parameters;
- floater: exposure = avg of expected bond value + weighted avg of coupon based on
- pre-set i/r
- f. interpret changes in a credit spread;
- start with benchmark rate, derived from overnight indexed swap
 - comparable to value assuming no default value
 - then adjusted with XVA: CVA, liquidity VA, funding VA, tax VA
- g. explain determinants of term structure of credit spreads & interpret a term structure of credit spreads;
- credit quality:
 - investment grade with highest rating only moves down in credit spread migration as



Yield

Probability

Distribution for the et Value at Tir

Default

Time

Probability of Default

Т

Asset Value

Topic 9 Derivatives

 $C_0 = Notional * (AP)e^{-r(t_{j-1}+t_m)}[FRA(0, t_{j-1}, t_m)N(d_1) - R_XN(d_2)]$

where FRA (0, t_{i-1} , t_m) is FRA expiring at t_{i-1} , where underlying matures at $t_{i-1} + t_m$

- AP = accrued period based on actual number of days (ACT) / $365 = t_m / 365$ > used to adjust annual payment rate to relevant period
- > with i/r exercise rate = current FRA rate:
- long call + short put = enter a receive-floating, pay fixed FRA
- > for binomial model, i/r for node 0 is current spot rate
- > interest rate cap is a portfolio of interest rate call options

swaptions:

- > underlying is swap rate when swaption expires
- 1. payer swaption: option to pay fixed, receive floating

= Notional * (AP) * PVA
$$[R_{\mu\nu}N(d1) - R_{\nu}N(d2)]$$

$$d_{1} = \frac{\ln(R_{FIX}/R_{X}) + (\sigma^{2}/2)T}{\sigma\sqrt{T}} PVA = \sum_{j=1}^{n} PV_{0,t_{j}}(l)$$

- > $R_{_{FIV}}$ is the forward 'swap rate' when the swap starts/ when swaption expires
- > PVA(PV of annuity) is to discount payment at different periods
- > AP = 1/# of settlements per year
- > when swap rate > exercise rate at expiration, payer swaption exercises option and unwind
- > profit when i/r rises \approx a call option on floating rate
 - \approx a put option on a coupon bond (bet one decrease in bond price/ rise in i/r)
- > payer swaption is swap bond component
- 2. receiver swaption: option to receive fixed, pay floating

k. interpret each of the option Greeks;

- delta: as stock price increase, call option goes deeper ITM, value of N(d1) moves roval to 1
 delta of call delta of put = 1
 gamma: gamma of call = gamma of put > non-negative
 gamma is the largest when option is ATM content of the store of the st
- - gamma is the largest when option is ATAL rost ostly for dynamic hedging
- change in call value = delta *change n underlying + gamme/2* (change in underlying)^2 theta: change in portfolio for a given small change in call mar time, holding everything else constant > the rate at whick control time value declines
 - > yr icall cregative 02
 - > exception of deep ITM European pat
- vega: vega of call = vega of put, from put-call parity, always positive
- rho: change in value for a given small change in the risk-free rate
 - > positive for call as call avoids financing cost involved with purchasing the stock;
 - > negative for put as selling proceeds are delayed

I. describe how a delta hedge is executed;

- m. describe the role of gamma risk in options trading;
- n. define implied volatility and explain how it is used in options trading.
- implied volatility can be different for exercise prices, time to expiration.
- time to expiration > term structure of volatility (volatility smile)
- out of money put (low strike price) is more expensive than out of money call(high strike price)

Topic 9 Alternative Investments

LOS 42 Commodities and Commodity Derivatives: An Introduction

a. compare characteristics of commodity sectors;

• benchmark of segments: Reuters / Core Commodity CRB Index developed by Commodities Research Bureau

	-	
energy	Crude oil ~50% of traded volume	 quality: depending on its source, e.g. North Sea, Nigeria weather: only a temporary impact technology geopolitics business cycle
	Natural gas	 classification: associated gas - from oil well; unassociated gas - from gas field or shale rock supply: driven by oil demand demand: weather is a key driver - e.g. cold weather drives up demand seasonality and available supplies can radically change natural gas prices cost-effective as it can be used directly, but has high storage and transportation costs
	Refined products: end-use fuels, jet fuel	 short shelf life: refineries must run continuously location of refineries: often located on major coastlines weather: typhoon / hurricanes environmental impact increasing processing costs
grains - direct consumption; - fuel / animal feed		- storage period - weather, disease, pests - technology and politics
softs(cash crops) e.g. coffee, cotton		 storage: freshness determines the quality and price of commodity weather
livestock		 tied to grain markets and GDP per capita low cost inputs storage weather, disease regulation on permuted use of drugs and crowth hormones substitute process, consumer preminer set
industri	al(base)r cta	 direction of industrial production and GDP growth politics - end by relate environment - e.g. pollution weather and seasonal factors: low impact due to long stored-period
preciou	s metals	 gold, silver, platinum > act as stores of value, hedge for paper currency technology industry needs jewelry production

b. compare the life cycle of commodity sectors from production through trading or consumption;

- ls: extraction > grinding(to powder) > concentrating(froth flotation, remove impurities) > roasting & smelting (heated, remove impurities)> > converting > electro-refining > storage
- c. contrast the valuation of commodities with the valuation of equities and bonds;
- tangible assets with intrinsic value; have no cash flow; may incur storage and transportation costs
- valuation discounted forecast of future possible prices; use future prices to obtain current price
- d. describe types of participants in commodity futures markets;
- hedger, speculator, arbitrageur, commodity exchanges providing platform of trading
- e. analyze relationship between spot prices & expected future prices in markets in contango / backwardation;
- calendar spread = near-term futures contracts longer term future contracts
- basis spread = spot price future price

backwardation		contango	
•	term structure has downward sloping trend	•	term structure has upward trend
•	spot price > future price, positive basis spread	•	spot price < future price, negative basis spread

Topic 10 Portfolio Management

- + market maker
- discount related to the likelihood of receiving an offsetting ETF order in a short timeframe

e. describe sources of ETF premiums and discounts to NAV;

- end of day premium/discount = (price of ETF share NAV) / NAV
- intraday = (ETF price iNAV) / iNAV
- NAV accurate assessment of ETF fair value
- iNAV fair value estimates of an ETF share based on its creation basket composition for that day
- sources: 1) timing difference: differences in exchange closing times between the underlyings

2) stale pricing: ETF trades infrequently may have higher premium/discount

f. describe costs of owning an ETF;

	explicit	implicit
one-off	commission	bid-ask spread, premium/discount to NAV
ongoing	management fee, taxable gain/loss to investors	tracking error, security lending gains, portfolio turnover

mutual fund does not have bid-ask spread & premium/discount to NAV

g. describe types of ETF risk;

counterparty risk:

a. settlement risk; e.g. exchange-traded notes(ETN) - unsecured as ETN do not hold underlying securities b.security lending - often over-collateralised, default risk is low

- fund closure:
 - a. regulation
 - b. competition
 - c. corporate action e.g. M&A between ETF providers

 - investor related risk: leveraged or inverse ETF; investor may not understand the product **O**, **U**K entify and describe portfolio uses of ETFs. ETFs are used for both top-down and bottom-up. portfolio efficiency
- h. identify and describe portfolio uses of ETFs.
- •
- asset class exposure management: main corerex or sure to key asset class im riket segment active and factor investing: use ETF to tirget specific active factor ox losure

Topic 10 Portfolio Management

LOS 44 Using Multifactor Models

a. describe APT, including its underlying assumptions and its relation to multifactor models;

- assumptions: it's for return on a portfolio
 - a. a factor model describes asset returns
 - b. well-diversified portfolio that eliminate asset-specific risk
 - c. no arbitrage opportunities

b. define arbitrage opportunity and determine whether an arbitrage opportunity exists;

c. calculate expected return on an asset given an asset's factor sensitivities and the factor risk premiums;

pure factor portfolio for factor i - when factor sensitivity is 1 to factor i, and 0 for other factors

d. describe & compare macroeconomic factor models, fundamental factor models, statistical factor models;

multifactor model explain asset returns better than market model, as they do not assume perfect market

- macroeconomic:
 - assumes factors are surprise in economic variables, surprise = actual expected value of a variable

$$R_{i} = b_{0} + b_{1}F_{GDP} + b_{2}F_{credit quality spread} + \epsilon_{i}$$

- when no surprise, expected return is b₀
- to estimate betas, use surprises for a period of time time series data
- fundamental:

 $-R_i = b_0 + b_1 F_{P/E} + b_2 F_{size} + \epsilon_i$

- standardised $b_{ii} = \frac{asset \, i's \, attribute - average \, attribute}{\sigma(attribute)}$

- use regression to find out $F_{P/E}$ the change in return per standard deviation from mean
- scaling permits all factor sensitivities to be interpreted similarly, despite differences in units of measure esale.co.uk
- if factor is binary: use dummy variable
- statistical: factors may not have meaning

e. explain sources of active risk and interpret tracking risk and the information ratio

- active risk: standard error of active returns = $S_{(Rp-Rb)}$
- active risk squared = active factor risk + active
- a. return from fa

k Sensitivity,) * Factor Return,

class selection

security selection - skill in individual asset selection b. return fron

- information ratio: ratio of mean active return to active risk = $\frac{\overline{R_p R_B}}{S_{(R_p R_b)}}$
- f. describe uses of multifactor models and interpret the output of analyses based on multifactor models;
- factor based approach to build portfolio •
- F1: size effect SMB: small big
- F2: style effect HML: high low for Book/Markets
- F3: momentum effect WML: winners loser
- F4: Markets risk free

g. describe the potential benefits for investors in considering multiple risk dimensions when modeling asset returns.

Topic 10 Portfolio Management

- specialised operating systems
- optimise computer code; faster developing language
- contingency tables that contain prearranged action plans

uses:

- 1. advanced order limit orders with limit prices that change as market conditions change
- 2. trading tactic plan for executing a simple function that involves submitting multiple orders to find hidden liquidity
 - e.g. immediate or cancel order(IOC) to find hidden liquidity btw markets' guoted bid-ask spread
- 3. algos programmed strategies for filling orders
- 4. hidden order orders only exposed to the brokers/exchanges who receive them
- 5. leapfrog: when bid-ask spread is wide, dealers often are willing to trade at better prices than they quote;
 - e.g. traders place bids just above the current bid price, that bid is instantly raised to a price just above the bid placed by the traders
- 6. flickering quotes: exposed limit orders that electronic traders submit and then cancel shortly, often within a second
- 7. electronic arbitrage:
 - a. take liquidity on both sides
 - b. offer liquidity on one side when obtain a fill in one, take liquidity to the other to complete the construction of arbitrage portfolio; when trade opportunity disappears, cancel order in first market
 - c. offer liquidity in both: like dealers

h. describe comparative advantages of low-latency traders;

- taking: take advantage of market opportunities before others do •
- making: receive time precedence that allow them to trade sooner when offering liquidity to others
- cancelling: ensure order cancellation when they no longer want to fill the order
- i. describe the risks associated with electronic trading and how regulators mitigate them;
- systemic risk: 1. runaway algo programming mistakes
- a. overlarge orders demand more liquidity than market can prove CO. UK
 4. malevolent orders disrupt markets
 test
 tigorous market access controls
- solutions: 1. test
 - 2. rigorous market access controls
 - 3. rigorous access controls of sufficient develope
 - 4. real-time trade on a lance by traders and excha
 - 5 brakes Voulo surveil all cliento o rs

o. price nmit / stop trac 🕫 🥱

j. describe abusive trading practices that real-time surveillance of markets may detect.

- front running: buying/selling in front of anticipated purchase/sales
- market manipulation: produce misleading /false market prices, quotes or fundamental information to profit from distorting market
 - trading for market impact: trades to raise or lower prices deliberately(large orders)
 - rumor mongering: dissemination of false information to alter investors' value assessments

- wash trading: trades arranged among commonly controlled accounts to create the impression of market activity at a particular price

- spoofing/layering; traders place exposed standing limit orders to convey a false impression via multiple small orders; e.g. if the spoofer wants to buy stock cheaply, a hidden buy order might be placed in the market. The spoofer then places one or more exposed sell limit orders in the market to convey the impression prices may soon fall. After seeing the spoofing sell orders, traders may conclude that true values may be lower than market prices suggest and sell into the spoofer's buy order.

_{if} 110

- bluffing: submitting orders and arranging traders to influence other traders' perceptions of value(not filled)
- gunning the market: selling quickly to push price down to trigger stop-loss sell orders
- quote stuffing: enter large quantities of fictitious orders and instantaneously cancelling them
- squeezing/cornering: force traders to do disadvantages trades:
 - a. manipulator obtains control over resources necessary to settle trading contracts
 - b. unexpected withdraw all resources, causing traders to default on their contracts
 - c. profit by providing resources at high prices; or closing contracts at exceptionally high prices