

# **Schweser Review Workshop**

## Mind Maps

2017 Level III CFA®



SCHWESER REVIEW WORKSHOP MIND MAPS: 2017 LEVEL III CFA®  
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# Review Course

## **Introduction and Expectations**

# **Review Course: Introduction and Expectations**



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## Review Course Introduction

### The Exam

- Saturday, June 3, 2017
- Six hours: 9:00 am to noon, 2:00 to 5:00 pm
- **The exam structure is substantively different from levels I and II.**
  - **Constructed response (CR) in the morning**
    - Write your answer on “blank paper”
  - 10 × 18-minute item sets in the afternoon

## Review Course Introduction

### The Level III Problem

- Past candidates consistently report underestimating the adjustments required for the CR section.
- The CFA Institute has stated:
  - Exam scores for Level III are materially lower in the morning.
  - Candidates do not understand what is expected.
  - Exam scores would increase if candidates did not try to answer every question.\*
  - You cannot earn a perfect score on Level III.
- Yet, 90% of past CR questions are not surprising, hard, or obscure.

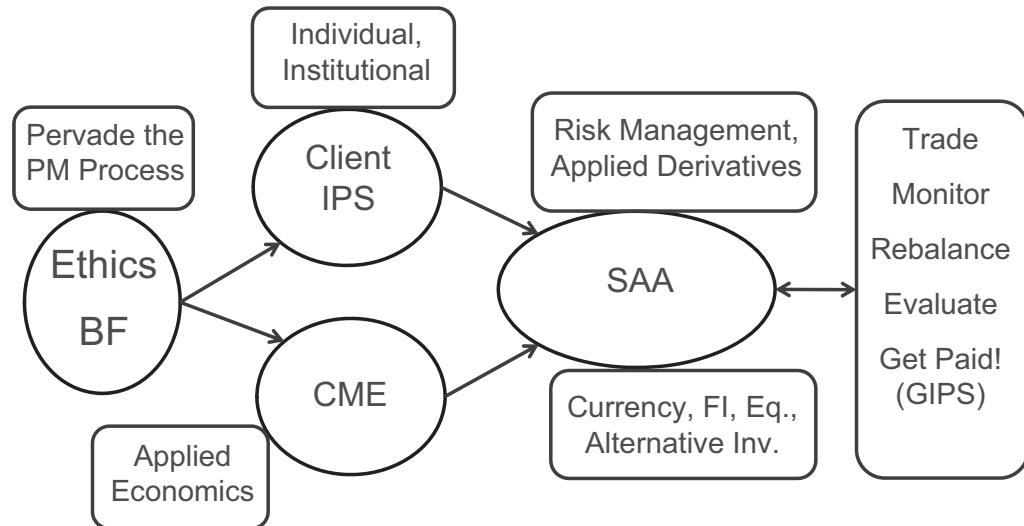
## Review Course Introduction

### The CR Problem

- **Level III is intended to test critical thinking and judgement, more than memorization.**
  - Repeating what you saw in a different question is not critical thinking.
- **A typical question involves three issues:**
  - **The question**
  - **The case facts**
  - **The relevant taught material**
- You must apply the relevant taught material to the case facts provided and directly respond to the question asked.

## Review Course Introduction

### Level III Content is Highly Integrated



## Review Course Introduction

### Topic Area Weights

Ethical & Professional Standards	10–15%
Economics	5–15%
Equity Investments	5–15%
Fixed Income	10–20%
Derivatives	5–15%
Alt. Investments	5–15%
Portfolio Management*	40–55%

- These weights are “vague” compared to Level I and II.
- The weights “overstate” what you know.
  - The CFA Institute considers them only as general guidelines.
  - Any one exam is only about a 30% sample of the curriculum.
- The weights are a starting point for study time allocation.
  - They are not weights for any one exam.

## Review Course Introduction

### Review Course Expectations

- **A review of primary issues**
  - For full content coverage, see the SchweserNotes, OnDemand videos, class slides, and class discussion questions.
- **Review course emphasis is application**
  - **+50% is allocated to the questions book**
- Most candidates find the pace intense and good preparation for the exam.

## Review Course Introduction

### Final Review Strategy

- Focus on the Schweser Practice Exams and Mock.
- Review the recent CFA morning exams.
- Correct your repetitive mistakes.
  - Drill like a professional, retake a few exams, and *practice how to solve and efficiently write*, not rote memorization.
  - Verify you can now score 90%, providing a margin of error on exam day.

## Mind Maps

SS	Subject	Slide Number
1 & 2	Ethical and Professional Standards	1
3	Behavioral Finance	13
4 & 5	Private Wealth Management	35, 53
6	Portfolio Management for Institutional Investors	67
7	Applications of Economic Analysis	81
8 & 9	Asset Allocation	94, 105
10 & 11	Fixed-Income Portfolio Management	119, 126
12	Equity Portfolio Management	134
13	Alternative Investments	146
14	Risk Management	161
15	Risk Management Applications of Derivatives	172
16	Trading, Monitoring, and Rebalancing	192
17	Performance Evaluation and Attribution	203
18	GIPS	214

# **Study Sessions 1 & 2**

## **Ethical and Professional Standards**

# Ethical and Professional Standards

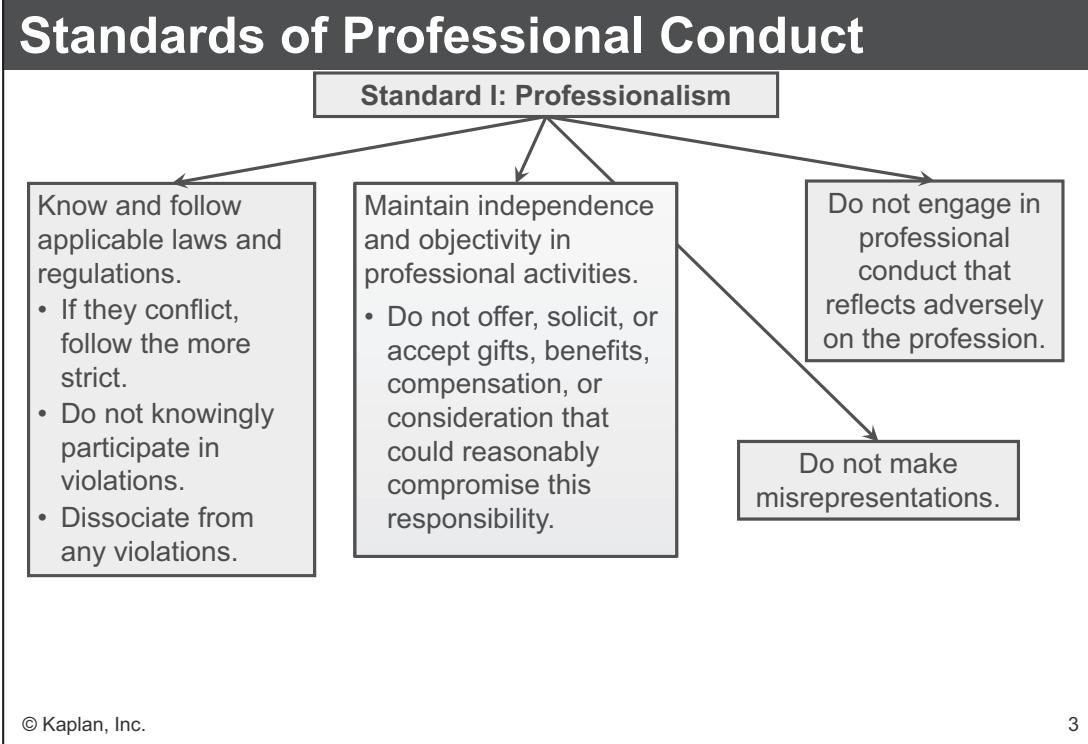
## Study Sessions 1 & 2

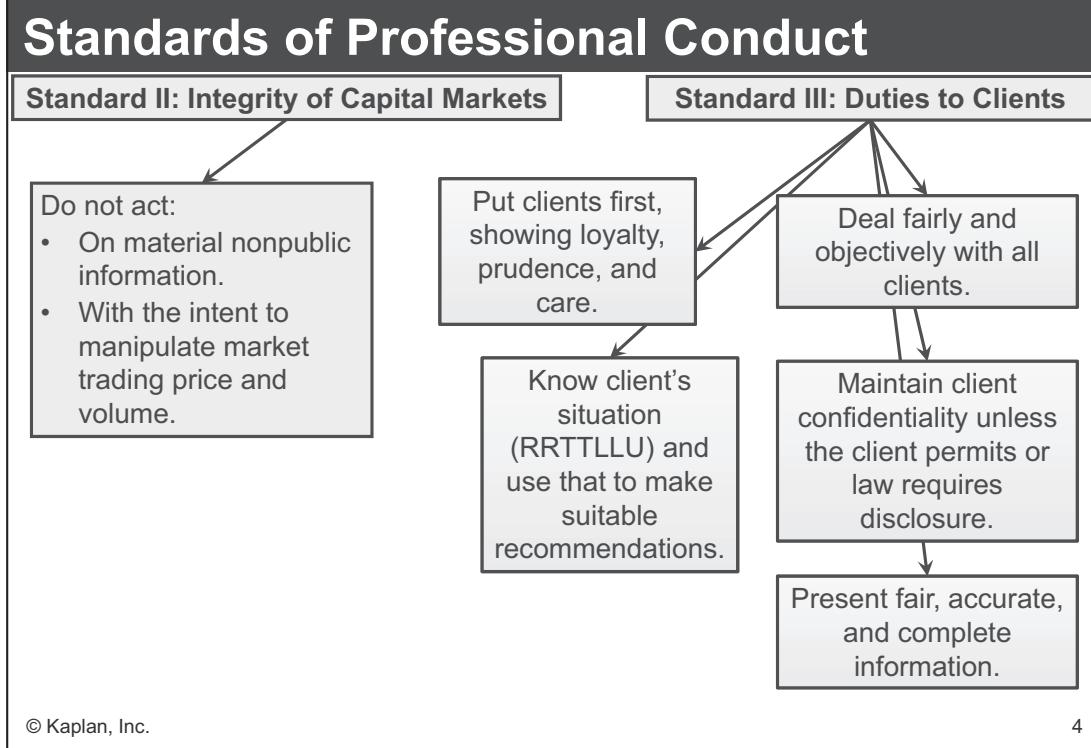


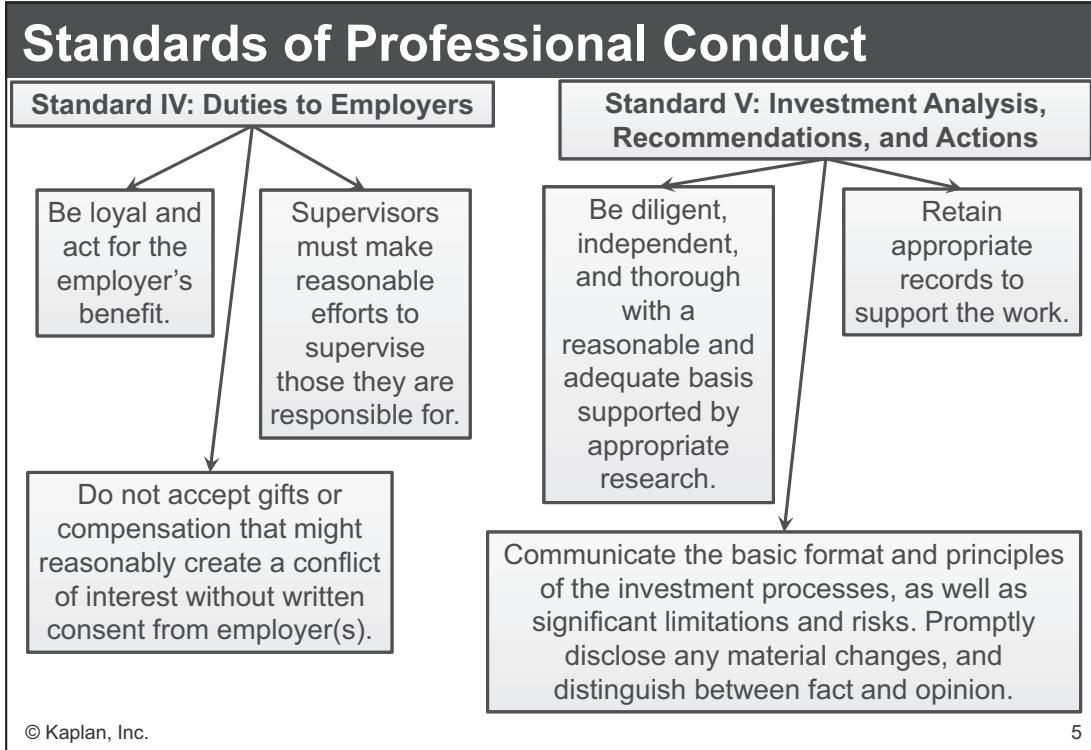
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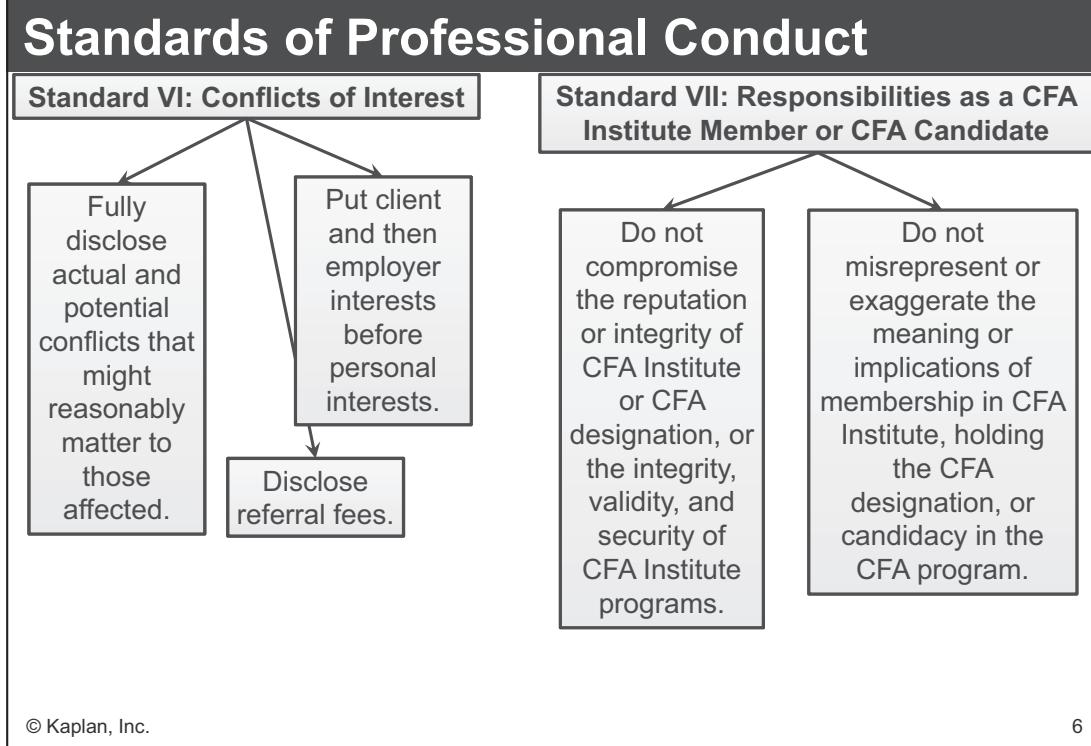
## Final Review: Ethics

- Understand the principals behind each Standard.
- Review the Recommended Procedures for Compliance several times before exam day; there are too many to rationally expect memorization.
- Review the Professional Conduct Program (disciplinary process).
- Review the Asset Manager Code, focusing on the additional requirements of the AMC.
- Rework the CFA end-of-chapter ethics questions. Expect some questions (less than 10%) to be factually vague.
  - Make a best guess and move on. That was the point of the question.

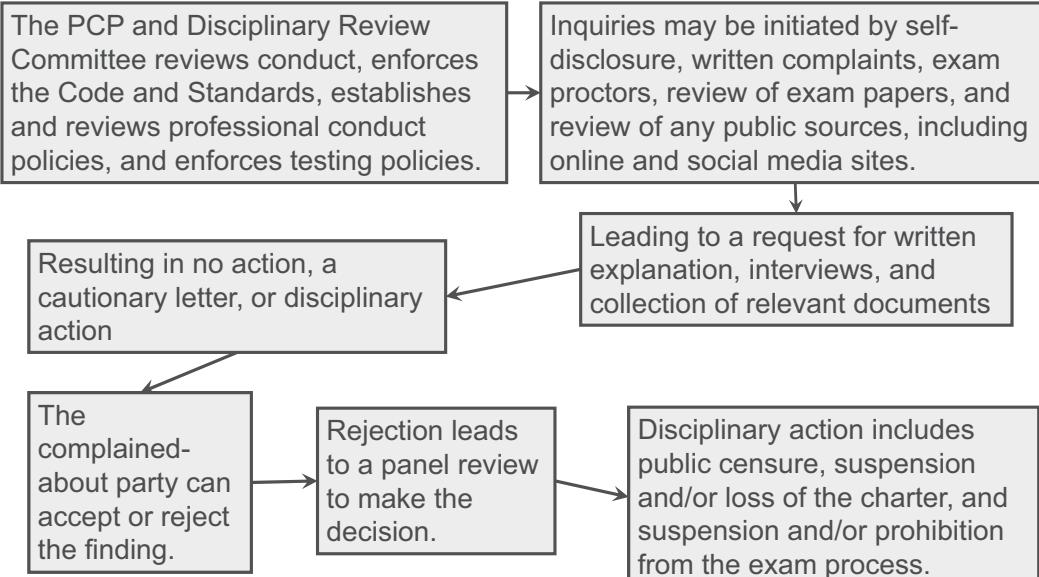








## Professional Conduct Program (PCP)



## Study Session 2: Topics

Case studies → Illustrating application of the Code and Standards

### **Asset Manager Code of Professional Conduct:**

- Applies to investment firms
- Adoption is encouraged, not mandatory
- If adopted, requires additional steps beyond the Code and Standards

General principles:

1. Act ethically and professionally.
2. Act in the client's best interests.
3. Act independently and objectively.
4. Act with skill, competence, and diligence.
5. Communicate accurately with clients.
6. Comply with capital market laws and regulations.

AMC covers:

- A. Loyalty to Clients
- B. Investment Process
- C. Trading
- D. Risk Management, Compliance, and Support
- E. Performance and Valuation
- F. Disclosures

## AMC

- Loyalty to Clients:
- Clients come first.
  - Maintain client confidentiality.
  - Do not compromise independence, objectivity, and loyalty to clients.

Investment Process and Actions:

- Use reasonable care and judgement.
- Do not manipulate market price and volume
- Deal fairly with all clients.
  - *Higher levels of service for higher compensation levels are allowed if disclosed and available to all clients.*
- Have a reasonable basis for investment decisions.

- Portfolios and funds with a specific mandate, strategy, or style:*
- *Manager does not directly determine suitability.*
  - *Follow the style and provide adequate disclosures for the user to determine suitability.*

- Understand and follow client's objectives and constraints, managing from the client's total portfolio perspective.
  - *But, ultimately, it is up to the client to decide how much information to share with the manager.*

## AMC

### Trading:

- Do not act on or cause others to act on material nonpublic information.
  - *Adopt compliance procedures to segregate such information within the firm.*
- Put client trades ahead of the manager and firm's interests.
- Use client commissions (soft dollars) for the benefit of the client.
- Seek best execution.
- Establish fair trade allocation policies.

### Performance and Valuation:

1. Present fair, accurate, relevant, timely, and complete information with no misrepresentation.
2. Use fair market pricing (*or fair value when that does not exist*).

## AMC

### Risk Management, Compliance, and Support:

- Firms must:
  - *Maintain detailed policies and procedures (P&P) to meet the AMC and all applicable legal and regulatory requirements.*
  - *Appoint a competent, knowledgeable, credible compliance officer with authority to implement the P&Ps.*
  - *Provide clients with accurate portfolio information that has been confirmed by independent third-party review. Verification must go beyond review of the firm's internal records.*
  - *Maintain records to document investment actions (at the firm level).*
  - *Employ qualified staff and sufficient human and technological resources to thoroughly investigate, analyze, implement, and monitor investment decisions and actions.*
  - *Establish a business-continuity plan.*
  - *Establish a firmwide risk management process to measure and manage risks taken. It must be objective and independent of portfolio manager influence.*

## AMC

### Disclosures:

- Principals of disclosure:
  - Ongoing and timely communication
  - Truthful, accurate, complete, and understandable information
  - Include all material facts regarding the firm and its process
- Disclose:
  - Conflicts of interest
  - *Regulatory or disciplinary actions against the firm or its personnel*
  - *The investment process and information on lock-ups, risk, derivatives, and leverage*
  - *Soft dollars and bundled commission information*
  - Regular and timely communication of performance information
  - *Valuation methods used in decision making*
  - *Shareholder voting and trade allocation processes*
  - *Firm review or audit results*
  - Significant changes in personnel or organization
  - *The risk management process*



# **Study Session 3**

## **Behavioral Finance**

# Behavioral Finance

## Study Session 3



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## Final Review: Behavioral Finance

- Recognize, apply, and discuss **frequently used behavioral finance (BF) terminology and concepts.**
  - These concepts pervade Level III.
  - Many of the concepts are redundant and/or overlap.
  - BF generally fails to reach definitive conclusions but offers possible (multiple) interpretations for market imperfections.
  - Avoid looking for more than there is; the goal of BF is to help us do a better job working with clients.
    - Expect questions to be fair (i.e., you understand the main points covered by the material).

## Traditional vs. Behavioral Finance

**Traditional finance (TF)** is normative, describing what investors should do. It assumes investors:

- Are *rational economic men* (REM)
- Have no limits on ability to absorb and process information
- Always selfishly seek to maximize personal utility subject to a budget constraint
- Are always risk averse
- Leading to efficient markets

**Behavioral finance (BF)** is descriptive of how investors actually behave. It assumes investors:

- Have cognitive limits and emotional biases
- Therefore, markets may not be efficient.
  - Micro BF focuses on how individuals deviate from efficiency.
  - Macro BF focuses on how markets deviate from efficiency.

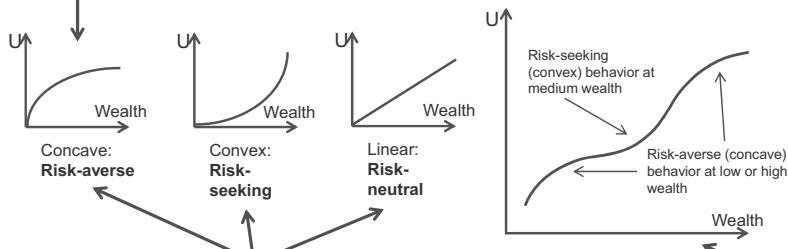
These views are not either/or. Imperfect managers can use insight from both TF and BF to help imperfect clients achieve better results in an imperfect world.

## Utility vs. Prospect Theory

Utility theory assumes investors gain utility (satisfaction) as their wealth increases.

Prospect theory assumes investors' value (satisfaction) depends on changes in perceived gain versus loss.

TF accepts utility theory and further assumes all investors are risk-averse—experiencing diminishing marginal utility (utility increases at a decreasing rate as wealth increases).



BF considers multiple possibilities:

- Some investors could be risk-averse, others risk-neutral, and others risk-seeking.
- Or an investor's risk function may vary with level of wealth (Friedman-Savage Double Inflection Function).

Or Prospect (not Utility) theory is the relevant model.

## Prospect Theory

Prospect theory incorporates:

- Bounded rationality and satisfice as investors use enough information to make adequate but not TF-perfect decisions
- Decision theory as investors first edit and then evaluate the information

Loss aversion:

- Gain or loss depends on the reference point.
- Gains lead to risk-aversion.
- Losses lead to risk-seeking.

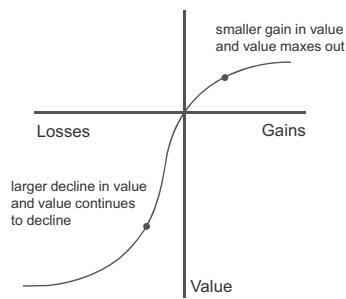
An altered utility function:

x, potential outcomes  
p, probabilities

$$U = w(p_1)v(x_1) + w(p_2)v(x_2) + \dots$$

w, overweights small probabilities

v, assigns a larger impact to loses than gains



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## Market Efficiency

TF leads to an expectation of market efficiency; BF does not.

Weak form: Covers **past** public price and volume data only

Semi-strong form: Covers **all** public information

Strong form: Covers **all** public and nonpublic information

Adding value with technical analysis violates WF, SSF, and SF; generally supported by tests

Adding value with basic fundamental analysis violates SSF and SF; generally supported but with anomalies

Adding value with proprietary information only violates SF; generally rejected

## BF Insights Managers Can Use

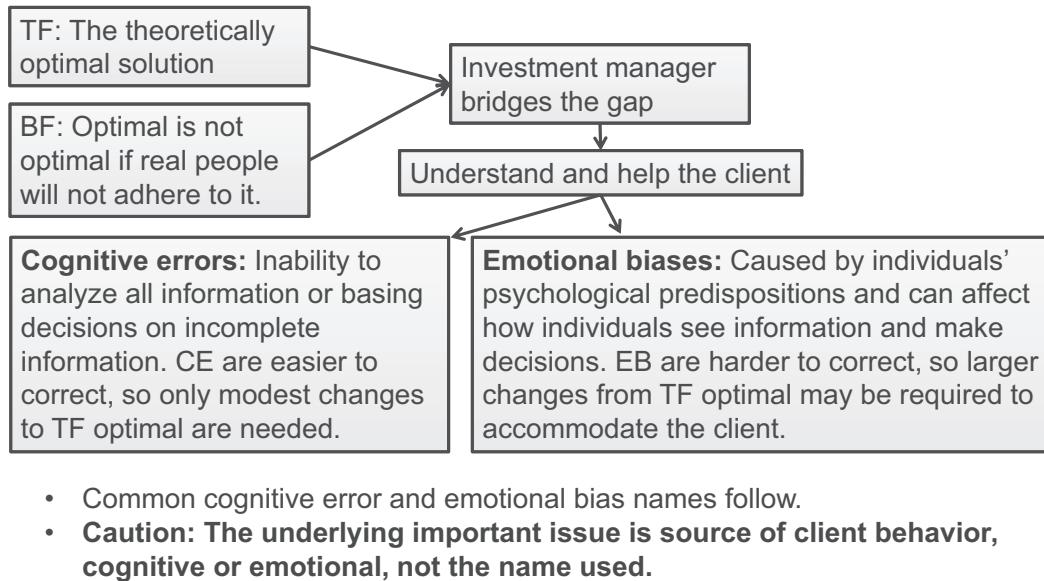
**Consumption and Savings Model:** Individuals should save for retirement early in life but prefer current consumption over saving. Frame how they perceive their income sources and assets in a way that encourages saving.

**Behavioral Asset Pricing Model:** Includes a sentiment premium to traditional fundamental risk-based models (like CAPM) required return. This premium is proxied by dispersion of analysts' forecasts. Informed investors may be able to exploit the premium if it is systematic.

**Behavioral Portfolio Theory (BPT):** Investors tend to tier their portfolios in layers according to their goals, matching lower/higher risk assets to higher/lower priority goals. (Later discussions suggest using this to help clients understand the portfolio.)

**Adaptive Markets Hypothesis (AMH):** Successful market participants apply heuristic rules until they no longer work and then adjust the rules. Success in the market is an evolutionary process. Those who do not or cannot adapt do not survive. Investors satisfice rather than maximize utility.

## The Key Issues



## Cognitive Errors

Belief perseverance errors arise out of attempts to avoid **cognitive dissonance**—the pain of accepting undesired/contradictory information.

- **Conservatism bias:** An initially rational view is maintained even when new information contradicts.
- **Confirmation bias:** New evidence is sought or used to support an original view.
- **Representativeness bias:** New evidence is classified and interpreted based on past classification or experience.
  - **Base-rate neglect:** The accuracy of a base probability is not considered.
  - **Sample-size neglect:** Assuming a small sample of data is adequate for reaching conclusions.
- **Illusion of control:** Individuals feel they have more control over outcomes than they actually have and, therefore, overestimate probabilities of success.
- **Hindsight bias:** Selectively remembering what was done or known in the past.

## Cognitive Errors

Information processing errors arise when information is used improperly or irrationally.

- **Anchoring and adjustment:** Subsequent adjustments for new information are around the initial “anchor” point, making the adjustments insufficient.
- **Mental accounting:** Funds are treated differently based on how they are categorized.
- **Framing:** Data presentation order affects the decision.
- **Availability bias:** Probability estimates are based on ease of recall.

## Emotional Biases

Emotional biases are due to psychological predispositions.

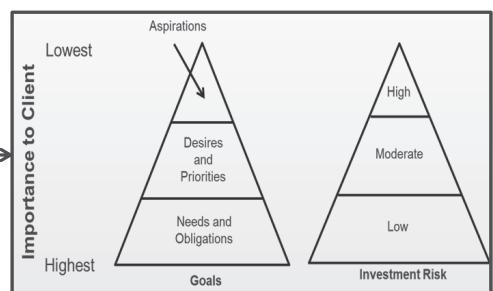
- **Loss aversion:** Gains and losses are treated differently.
  - Perception of gain versus loss depends on the reference point used.
  - Gain or loss is not emotionally felt until realized.
    - Risk aversion is shown with gains; sell to feel the gain.
    - Loss aversion is shown with losses; hold to avoid feeling the loss.
  - Leading to the *disposition effect*: hold losers too long and sell winners too soon.
- **Myopic loss-aversion:** A macro affect; if many investors avoid equity to avoid the emotional pain of losses, equity prices will be biased downward and future returns upward.

## Emotional Biases

- **Overconfidence** (often associated with *illusion of knowledge*): An unrealistically high opinion of intuitive reasoning/cognitive ability.
- **Self-control bias:** Lack of self-discipline to delay gratification in pursuit of long-term goals.
- **Status quo bias:** What exists is comfortable, so do nothing.
  - **Endowment bias:** Ownership increases an asset's perceived value.
  - **Regret-aversion bias:** Avoid errors of commission while ignoring errors of omission.

## BF Insights: Client

**Goals-based investing:**  
Work with clients to develop a plan they can adhere to



### Behaviorally Modified Asset Allocation

Two factors:

- Standard of living risk
  - Wealth/needs
  - Cognitive vs. emotional

Control degree of deviation from TF optimal allocations.

Low SLR: Adapt to client desires

Cognitive:  
Moderate  
client  
behavior

Modest  
deviation  
Minimal  
deviation

Larger  
deviation  
Modest  
deviation

Emotional:  
Adapt to  
client  
desires

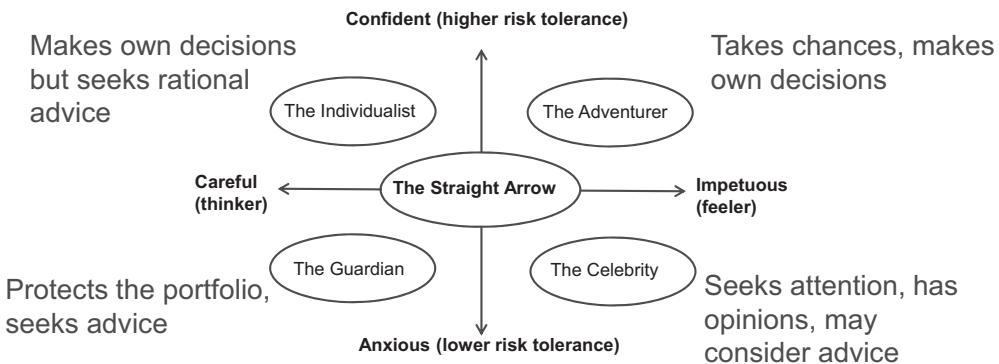
High SLR: Moderate client behavior

## BF Insights: Client

### Barnewall Two-Way Model:

- **Passive investors** have not risked their own capital to gain wealth and tend to be more risk averse.
- **Active investors** have risked their own capital to gain wealth and tend to be less risk averse.

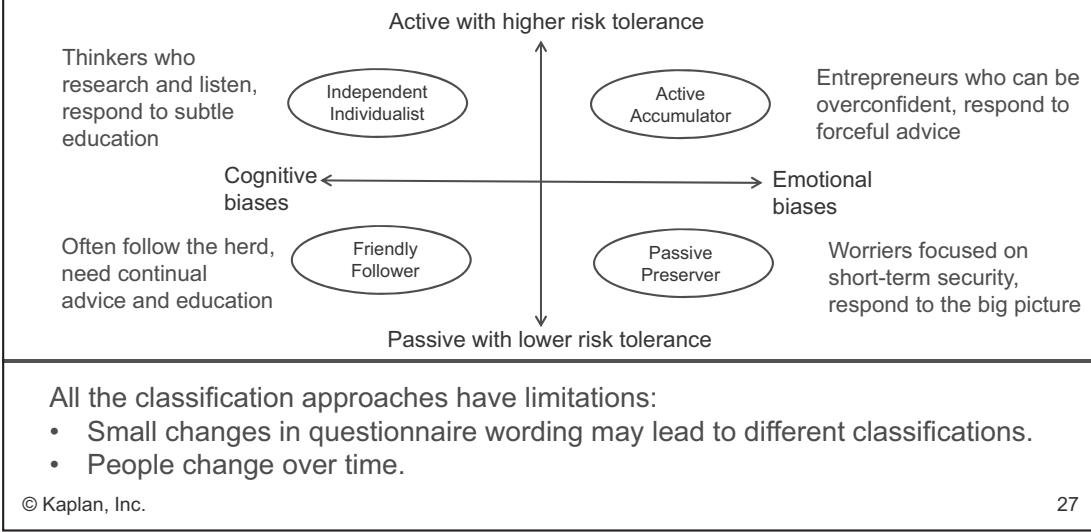
### Bailard, Biehl, and Kaiser Five-Way Model



## BF Insights: Client

### Pompian Model

1. Interview to determine if active or passive
2. Plot on risk tolerance scale
3. Test for behavioral biases
4. Classify into one of the BITs



## BF Insights: Client-Adviser Relationship

Use BF insights to improve the long-term relationship:

1. Understanding the “why” behind a client’s financial goals builds the relationship.
2. Allows the manager to successfully present investment advice.
3. Assists the manager in meeting client expectations.
4. Benefits both the client and manager:
  - Most clients want more than numeric results—they want to be heard.
  - A stronger bond with the client builds the manager’s business.

Overconcentration in employer stock:

- *Familiarity*: I work there it must be a good investment.
- *Overconfidence*: I know the company.
- *Naïve extrapolation of past results*: It will keep doing well.
- *Framing and status quo effect of matching contribution*: If the company gives me the stock, it must be a good investment.
- *Loyalty effects*: It is disloyal to sell.
- *Financial incentives*: They offer a discounted price.

## BF Insights: DC Plans vs. Retail Clients

DC plan participants tend to undertrade (do not make desirable changes):

- *Inertia and default + status quo bias:* Keep what you have and take the default allocation.
  - Target date funds make automatic changes consistent with a planned retirement date.
- *Naïve diversification & 1/n diversification:* Allocate the same amount to everything.
  - This could reflect *framing bias* and *regret avoidance*.
- *Home bias:* A *familiarity bias*; only invest domestically.

While retail brokerage clients tend to overtrade:

- *Overconfidence:* Have a false sense of insight.
- *Regret avoidance & disposition effect:* Sell winners too soon and hold losers too long.
- These differences may reflect *self-selection:* Active traders are choosing to invest in self-traded retail accounts, not DC plans.

## BF Insights: Analysts

Analysts frequently overestimate their accuracy:

- *Illusion of knowledge*: They believe they have better information than others.
- *Self-attribution*: They take personal credit for past successes, but not failures.
- *Representativeness*: Conformity to available data is confused with accuracy.
- *Representativeness*: Assume a sound company will be a good investment.
- *Availability bias*: Easy recall must mean relevant.
- *Illusion of control*: More complex models must be more accurate.
- *Hindsight bias*: They recall predicting what would happen.
- *Cognitive dissonance*: To avoid mental pain, they ignore conflicting information.
- *Availability, framing, anchoring*: Company executives provide selective information to put the company in the best light.
- *Overconfidence and illusion of control*: Company executives and analysts overestimate the probability of favorable results.
  - Incentive compensation plans can reinforce this tendency.
- *Confirmation bias*: Seek what supports the conclusion.
- *Gamblers fallacy*: Assume the trend will reverse.

## BF Insights: Investment Committees

Often make poor decisions:

- Investment committee members have biases, and the committee structure can make it worse:
  - *Social proof* as members go along with the group.
  - Withholding contrary opinions leads to *overconfidence* that decisions must be right.
  - Member turnover inhibits feedback and learning from past results.
  - Go along with the chairperson's views to avoid offending.

Actions by the chairperson to mitigate poor decision making:

- Build a group of diverse individuals with relevant skills and background.
- Seek out contrary opinions and views.
- Stick to a relevant agenda.
- Require clear decisions after all data and views are heard.

## BF Insights: Mitigation

Generally useful approaches to mitigate the effects of biases include:

- Be self-aware of personal biases.
- Systematically *frame* analysis by gathering all relevant data.
- Don't overly rely on company-supplied information.
- Consider both likely and unlikely outcomes.
- Consider the limitations of the data search process.
- Seek out contrary facts and opinions.
- Determine how new information will be incorporated.
- Seek others' feedback.
- Document all decisions for later review.

## BF Insights: Market Anomalies

Basic insight of BF: Anomalies may persist because they are related to underlying cognitive errors and/or emotional biases.

Market bubbles and crashes are more frequent than consistent with a normal distribution.

- Bubbles reflect investors *herding* together and reinforcing the trend.
  - *Anchoring and adjustment* keeps an initial favorable view in place.
  - *Availability bias, hindsight bias, and recency effect* project the trend to continue.
  - *Trend chasing* keeps it going.
- Then the crash—when the trend goes too far and collapses.

Success of technical trading momentum rules:

- See discussion above regarding bubbles.

## BF Insights: Market Anomalies

### Value vs. Growth:

- Value stocks often outperform.
- TF assumes this is an aberration or a failure to properly specify risk.
- BF suggests growth may be overpriced due to:
  - The halo effect: Good growth → good investment.
  - Overconfidence: Past growth will continue.
  - Home bias: They are often well-known companies.



# **Study Sessions 4 & 5**

## **Private Wealth Management**

# Private Wealth Management (1)

## Study Session 4



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## Final Review: Private Wealth Management (1)

- **Prepare and use the IPS.**
  - Broad IPS questions are usually tested in the morning.
- **Understand the various approaches to taxation and their investment implications.**
- **Understand and apply approaches to maximizing after-tax wealth.**
  - These more specific issues can be blended in as parts of IPS questions and stand-alone morning questions, and they also lend themselves to the afternoon session.

## The Portfolio Management Process

The IPS is client specific:

- Real-world IPS range from a half page to a book.
- The CFA focus is on objectives and constraints.
- There is a common structure followed to create it.

It is a planning document; it can and generally must change over time.

- Constraints** often significantly impact the risk and return objectives:
- **Time horizon**
  - Taxes
  - **Liquidity**
  - Legal/regulatory
  - Unique

**Objective—Risk:**

- Ability, factual
- Willingness, psychological
- Conclusion, usually the lower

**Objective—Return:**

- Real or nominal
- Pre- or after tax

- The specifics and relevant components of each IPS will depend on the case facts and questions asked.
  - By definition, a generic IPS is unethical and wrong!

## Useful Tools

### Situational Profiling

- **Source of wealth:**
  - Active may be more **willing** to bear risk
  - Passive, not as much
- **Measure of wealth:** Higher perceived wealth may increase **willingness**.
- **Stage of life:** Ability to bear risk tends to decline over time.
  - Foundation phase
  - Accumulation phase
  - Maintenance phase
  - Distribution phase

- **Traditional Finance:** The optimal economic solution

- **Behavioral Finance:** Viewing the portfolio in layers may be useful

### The Portfolio Manager (YOU!):

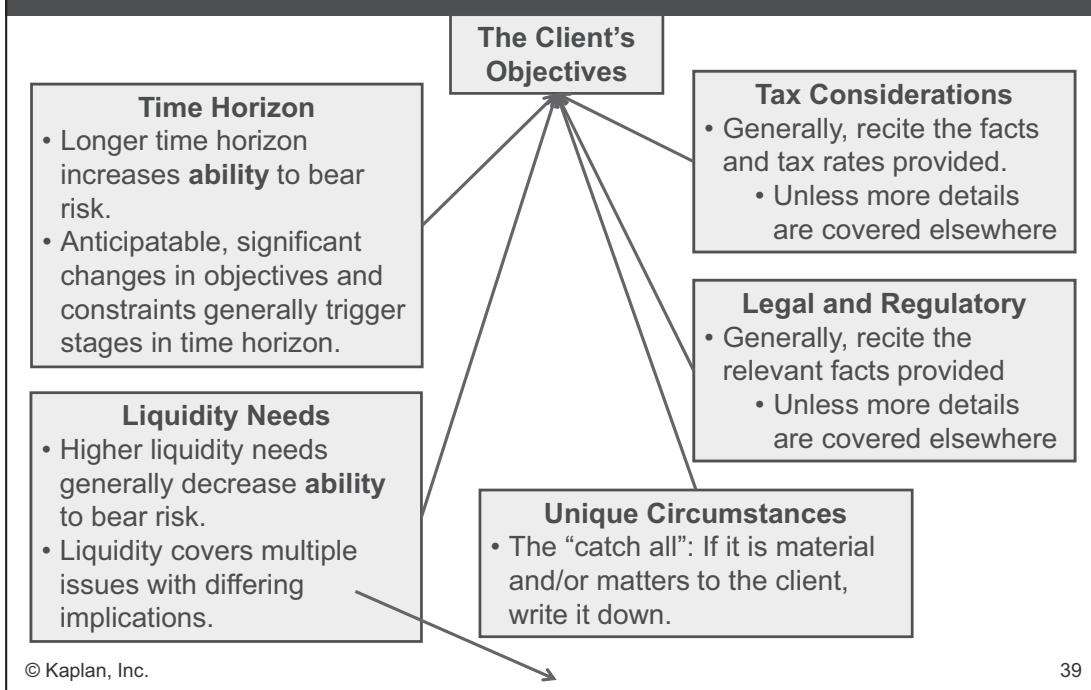
- Assemble the case information
- Apply the relevant taught concepts
- Answer the question asked

**Personality Types:** Another version of the BB&K 5-Way model, same implications

**Level of Wealth:** Greater wealth versus need increases **ability** to bear risk.

- This lowers standard of living risk (SLR).

## IPS: Constraints



## Liquidity: Common Situations

Need ongoing distributions: Earn it, Return Objective

- Generally (but erratically) listed as a liquidity constraint

One-time distribution

- A liquidity constraint and cash equivalent in the AA until distributed
- < 12 months, expedient to deduct it from investable assets

Want a liquidity reserve (i.e., ongoing with no plan to distribute)

- Listed as a liquidity constraint, ongoing cash equivalent in the AA
- Not deducted from investable assets

One-time receipt

- Listed as a liquidity inflow (may logically show up under liquidity constraint, unique, or time horizon)
- If material, it likely triggers a time horizon stage

Holdings of illiquid or restricted assets

- List under liquidity, unique, or legal

A differential in portfolio inflows and outflows: May be relevant to determining investable assets

## Return: Solving Common Scenarios

- Determine what the client expects.
- Quantify the investable asset base.
- Quantify the need.
- Total return = distribution% + future infla.
- Expect variations.
- Read the case facts
- Apply time value of money principles you have been taught.

Scenario 1: Project this year's nominal return requirement starting now:

- Calculate current investable base
- Need for coming year
- Divide
- Add future inflation

Scenario 1A: Project nominal return requirement starting one year from today:

- Project investable base
- Project need starting in one year
- Divide
- Add future inflation

Scenario 2: Project nominal return requirement over X years:

- Determine starting investable base, real annual distribution, and ending value
- Use CF functions to calculate real periodic return; add future inflation rate.
- If all inputs are nominal, future inflation is already included in the solution.

## Pre- vs. After-Tax Return

Read and solve the question asked:

- If all data is after-tax, the result is after-tax.
- If all data is pre-tax, the result is pre-tax.
- If data is mixed, make adjustments to answer the question asked:
  - Pre-tax total return, including future inflation
$$\times (1 - \text{effective tax rate}) = \text{after-tax return}$$
  - After-tax total return, including future inflation
$$/ (1 - \text{effective tax rate}) = \text{pre-tax return}$$
- **Generally, you cannot deduct (exclude) inflation from taxation unless you want to go to jail!**

## Choosing an Asset Allocation

### Process of Elimination

Eliminate asset mixes that:

- Do not meet the return or violate the risk objectives
- Violate constraints, for example:
  - Prohibited or inappropriate assets
  - Too much or insufficient cash equivalents

If multiple mixes remain, use appropriate return to risk rankings (e.g., Sharpe or Safety First).

### Traditional Deterministic Approach:

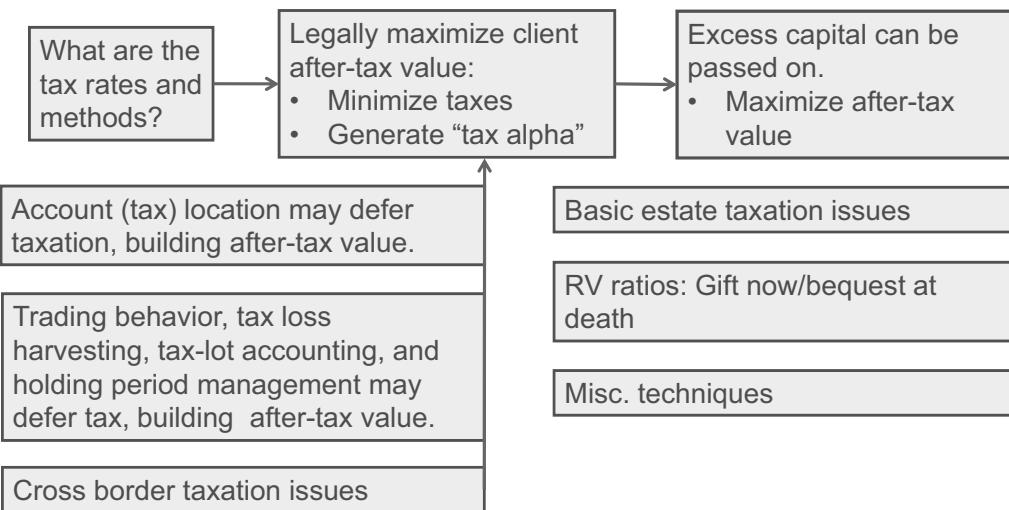
- Linear projection of  $E(R)$ : Linear  $E(R)$  path may be increased/decreased by sigma to analyze risk.
- Risk focus is short-run volatility.

### Monte Carlo Simulation:

- Uses probability distributions of inputs to simulate many outcome paths
- Incorporates path dependence of prior distribution's affect on next period starting value
- Provides a client-friendly visual display
- Shifts risk focus to long-run probability of ruin

## Taxes

- This is a global exam.
- The emphasis is various taxation methods and implications.
- The answer is based on what is covered, not specific tax rules you may use.



## Taxation Basics

- Tax drag \$ =  $FV_{NT} - FV_{AT} = gain_{NT} - gain_{AT}$
- Tax drag % = tax drag \$ / gain<sub>NT</sub>
- $R_{AE} = (FV_{AT} / PV)^{1/n} - 1$
- $r(1 - T_{AE}) = R_{AE}$
- $T_{AE} = 1 - (R_{AE} / r)$

Use to compare various tax situations

**Accrual tax:** Paid periodically  
 •  $FV_{AT} = PV [1+r(1-t)]^n$

- Tax drag % > tax rate
- Tax drag \$ and % increases as n and r increase

**Periodic wealth tax:**  
 •  $FV_{AT} = PV [(1 + r)(1 - t_w)]^n$

- Tax drag % > tax rate
- As n increases, tax drag \$ and % increase
- As r increases, tax drag \$ increases but % decreases

**Capital gains tax:** Paid on the gain at sale  
 •  $FV_{AT} = PV [(1+r)^n (1 - t_{cg}) + t_{cg}B]$   
 • B = cost basis/market value

- Tax drag \$ increases as n and r increase
  - B < 1, an URG so tax drag % > t
  - B > 1, an URL so tax drag % < t
  - As n ↑, tax drag % approaches t

## More Taxation Issues

### Blended Taxes

Calculate:

- Weighted average realized tax rate (including realized but excluding unrealized capital gains)

$$\text{wartr} = p_i t_i + p_d t_d + p_{cg} t_{cg}$$

- Return after realized taxes

$$r^* = r(1 - \text{wartr})$$

- Deferred capital gains tax rate

$$T^* = t_{cg} [p_{\text{deferred}}/(1 - \text{wartr})]$$

- FV<sub>AT</sub> =

$$PV[(1+r^*)^n(1 - T^*) + T^* - (1 - B)t_{cg}]$$

### Tax Location

- Taxable (TA):** pay the applicable taxes, no location benefits

$$FV = PV [1 + r(1 - t)]^n$$

- Tax-deferred (TDA):** front-end benefits with tax deductible contribution

$$FV = PV [(1 + r)^n (1 - t_n)]$$

- Tax-exempt (TEA):** back-end benefits with contribution after-tax but FV tax exempt

$$FV = PV [1 + r]^n$$



### Tax-Exempt or Tax-Deferred?

- t lower today, use TEA and pay now
- t lower in future, use TDA and pay later

### TDA and TEA versus TA

- When contributions are limited, place more heavily taxed items in TDA and TEA.

## More Taxation Issues

**Holding period management:**

- In general, longer deferral of taxes builds AT value.
- Defer gains until they are taxed at lower LT rather than ST rates.
- If near tax year-end:
  - Realize losses now.
  - Wait and take gains after year-end to defer taxes for a year.

**Tax loss harvesting:** Realize investment losses to offset realized gains.

- Saves taxes now by increasing expected taxes later

**Tax lots and partial sale**

- Designate highest cost basis (**HIFO**) as lot sold to maximize realized loss/minimize realized gain.
- Unless tax rates are expected to rise, then use **LIFO** (sell lowest cost basis first).

**Generating tax alpha:**

- Any (legal) activity to reduce taxes and increase after-tax value.

**Taxes and risk:**

- Taxation lowers AT upside return (and, with deduction for losses, also reduces AT downside).
- Therefore, taxation lowers after-tax risk.

## Estate Planning in a Global Context

Estimate excess capital using:

- Mortality tables
- Monte Carlo simulation

Transfers of excess capital may be subject to taxes and/or limits:

- Gifts (during life) subject to gift taxes
  - May be tax exempt up to designated limits

- Bequests at death subject to:
  - Estate taxes—paid by transferor
  - Inheritance taxes—paid by recipient

- Disposal of assets may be limited and subject to clawback:
- Forced heirship rules (e.g., children have specified minimum claims)
  - Community property rights (e.g., spouse has specified minimum claim to marital assets)
  - Separate property may be treated differently.

- Wills are subject to probate, leading to public disclosure and expenses.
- Various mechanisms may be used to avoid probate, for example:
    - Joint ownership with rights of survivorship
    - Living trusts, retirement plans, and life insurance

## Determining Core & Excess Capital

### Mortality table approach:

- Sum: Discounted PV of probability (of life) weighted spending needs
- Discount nominal needs at nominal and real at real risk-free

### Monte Carlo Simulation:

- See earlier discussion
- Compared to an asset-only focus, typically produces:
  - More equity and less fixed income
  - Higher portfolio standard deviation
  - Higher portfolio return
  - Higher portfolio ending value
  - Lower probability of ruin

### Excess Capital:

- $$\text{Excess Capital:} = \text{total capital} - \text{core capital}$$
- Gift now or at death?

### Calculate RV ratios

#### Caveats:

- Once given, cannot be recovered
  - Needs could increase
  - About half live longer than mortality tables assume
  - Returns could be less than the discount rate used to calculate core capital
- = Keep a safety reserve

## RV Ratios: Gift Now/Bequest at Death

n: time to the bequest  
 r: pretax return  
 g: the gift receiver  
 e: the gift giver  
 i: investment income  
 oi: ordinary income  
     (not investment)  
 $T_g$ : gift tax rate  
 $T_e$ : estate tax rate on  
     bequest  
 t: periodic tax rate

Gift tax

$$\text{None: } RV = \frac{[1+r_g(1-t_{ig})]^n}{[1+r_e(1-t_{ie})]^n(1-T_e)}$$

Paid by  
receiver:

$$RV = \frac{[(1-T_g)][1+r_g(1-t_{ig})]^n}{[1+r_e(1-t_{ie})]^n(1-T_e)}$$

Paid by  
giver:

$$RV = \frac{(1-T_g+T_g T_e)[1+r_g(1-t_{ig})]^n}{[1+r_e(1-t_{ie})]^n(1-T_e)}$$

Tax deductible gift to  
tax-exempt entity:

$$RV = \frac{(1+r_g)^n + T_{oi}[1+r_e(1-t_{ie})]^n(1-T_e)}{[1+r_e(1-t_{ie})]^n(1-T_e)}$$

## Other Tax Strategies

Generation skipping:  
Transfer assets directly to third generation.

Spousal exemption:  
Most countries allow an unlimited or large transfer to the surviving spouse with no gift or estate tax.

Deemed disposition: Some countries treat a bequest as if the assets were sold, taxing only the capital gain.

- Consult qualified tax and legal advisors.
- Maximize client after-tax value.

For illiquid assets, reduce taxable value for:

- Lack of liquidity
- Minority interest position

Life insurance may provide tax benefits:

- Premiums paid after-tax make payouts tax free.
- Policy value may accumulate tax free.
- Generally excluded from probate and estate taxes.

## Other Issues

### Types of Trusts

- Revocable trust: Settlor can resume ownership of the assets
- Irrevocable trust: Cannot be revoked
  - May provide tax and legal advantages
- Fixed trust: Trustee follows rules as set in the trust document
- Discretionary trust: Trustee has discretion to meet the intent of the trust document
- Spendthrift trust: Used for those too young or otherwise unable to manage the assets

### Cross Boarder Double Taxation Relief

- Exemption method: Pay the source country tax rate; income then exempt in residence country:
  - Always best for the taxpayer
  - Net: pay  $t_S$
- Credit method: Pay the source country tax rate; pay any additional tax owed to the residence country
  - Full resolution of the conflict, but
  - Net: Total tax bill is higher of  $t_S$  and  $t_R$
- Deduction method: Pay the source country tax rate, and that tax reduces residence country taxable income
  - Most expensive to the taxpayer; only partial resolution

# Private Wealth Management (2)

## Study Session 5



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## Final Review: Private Wealth Management (2)

- Understand why concentrated positions carry additional complications to consider.
  - Understand the basic strategies used for altering concentrated risk.
    - Plus their pros and cons
  - Understand the concept and components of the holistic (economic) balance sheet and the role of insurance (particularly life and annuities) in total risk management.

## Concentrated Single-Asset Positions

- Publicly traded stock
- Privately owned business
- Real estate: commercial or investment

### Objectives:

- Reduce the concentrated **risk**
- Generate **liquidity** to meet diversification or spending needs
- Optimize **tax efficiency**

### Strategies, Monetization:

- Hedge the asset to reduce the risk
  - Presumes the hedge provider has sufficient data to offer the hedge
- Use the hedged position as collateral for favorable loan terms

### Risks:

- Concentrated positions lack diversification and create high nonsystematic (company- or property-specific) risk
- Many often have high systematic (market) risk

### Obstacles:

- Legal or other restrictions
- Capital gains tax
- Concentrated positions offer control and potential for wealth creation
- Emotional objections
- RE property used in operating a business
- Illiquid asset

## Decision Process

Select the strategy that best meets what is most important to that investor:

- Minimum initial cost
- Maximum upside potential
- Maximum downside protection
- Minimum tax
- Meets other objectives

**Goal-based planning:** Concentrated positions fall in the **aspirational risk bucket** (surplus capital) .

- If remaining assets (**personal** and **market** risk buckets) are insufficient, reduce the concentrated risk or lifestyle is imperiled.

### LP + gifting + valuation discounts:

- Form limited partnership to hold the asset
- Serve as GP to maintain decision control
- Gift LP interests
- Minimize tax gain with illiquidity and control discounts

### Estate tax freeze:

- Restructure concentrated stock position as:
  - Voting preferred retained for control
  - Nonvoting common gifted, with minimal dividend and current value
- Only transfers future appreciation and gain

## Other Strategies

### Reduce downside and retain upside:

- ATM protective put
- OTM protective put
- Protective put with shorter protection period
- Knock-out or -in options
- Sell call + buy put for a collar

### Prepaid variable forward:

Sell the shares forward (at a below market price) versus:

- Deliver the shares in the future
- Or deliver fewer shares if the share price appreciates

### Gift the asset to charity:

- Tax-deductible gift
- Could attach conditions as donor-advised fund or trust

### Best strategy is case specific:

- Meet client objectives
- Minimize tax and costs

### Tax-optimized equity strategies:

- Index-tracking strategy: Invest total portfolio for index tracking but emphasize more favorably taxed return sources
- Completeness portfolio: Invest balance of portfolio so total portfolio better tracks the desired index

## Other Strategies

Sale to strategic vs.  
financial buyer vs.  
MBO vs. family vs.  
ESOP vs. IPO

Control positions in private companies  
introduce other considerations:

- Psychological and economic considerations
- Must determine exit strategy and value
- Additional strategies may be possible

**Exchange fund:**  
Participants contribute  
different concentrated  
stock positions.

- Share pro rata in the  
fund return
- Retain initial cost  
basis until fund  
sale/liquidation
- Generally costly with  
legal restrictions

**Use shares as  
loan collateral:**

- Directs the  
company to  
borrow and  
guarantee the  
loan
- Or borrow  
directly from  
the company

**Recapitalize the company**  
with more debt or **sell noncore  
assets**.

- Use cash proceeds to pay  
owner a large dividend or  
have company repurchase  
owner's stock.
- Owner retains remaining  
outstanding shares and  
control.

## Additional RE Strategies

### Sale and leaseback:

- Sale provides funds
- Leaseback restores right to use (for a time period)

### High loan-to-value loans for monetization

- are more common.
- A nonrecourse loan is effectively a protective put.
  - RE value exceeds loan balance, pay loan
  - RE value less, default and lose the RE

For concentrated position, no one strategy dominates; ask yourself:

- What funds are received?
- What are the costs and taxes?
- What diversification is created?
- Is control retained?
- Does this accomplish what the case asked for?
- Then, solve the question.
- Taxation or legal details will be provided, if needed.

## Holistic Balance Sheet and Net Wealth

HC: The PV of expected future labor income; sum:

- Projected (year end) salary × probability of life
- Discounted at risk-free rate + risk premium correlated to riskiness of earnings
- Discount real by real or nominal by nominal

FC: All other owned assets, including the PV of DB plan benefits (private and government)

Liabilities: Explicit and the PV of planned future expenses and bequests

$$\begin{array}{c} \xrightarrow{\hspace{1cm}} \text{HC} \\ + \text{FC} \\ = \text{Total wealth} \end{array} \quad \begin{array}{c} | \\ \text{Individual's liabilities} \\ | \\ \text{Net Wealth} \end{array}$$

The holistic BS and net wealth provides a more comprehensive view than the traditional BS:

- A better tool for planning lifetime consumption and bequests
- But HC, future expenses, and future bequests are difficult to estimate

## The Role of Insurance

**Risk management: Insure risks that are infrequent and severe**

Insurance shares (diversifies) the risk:

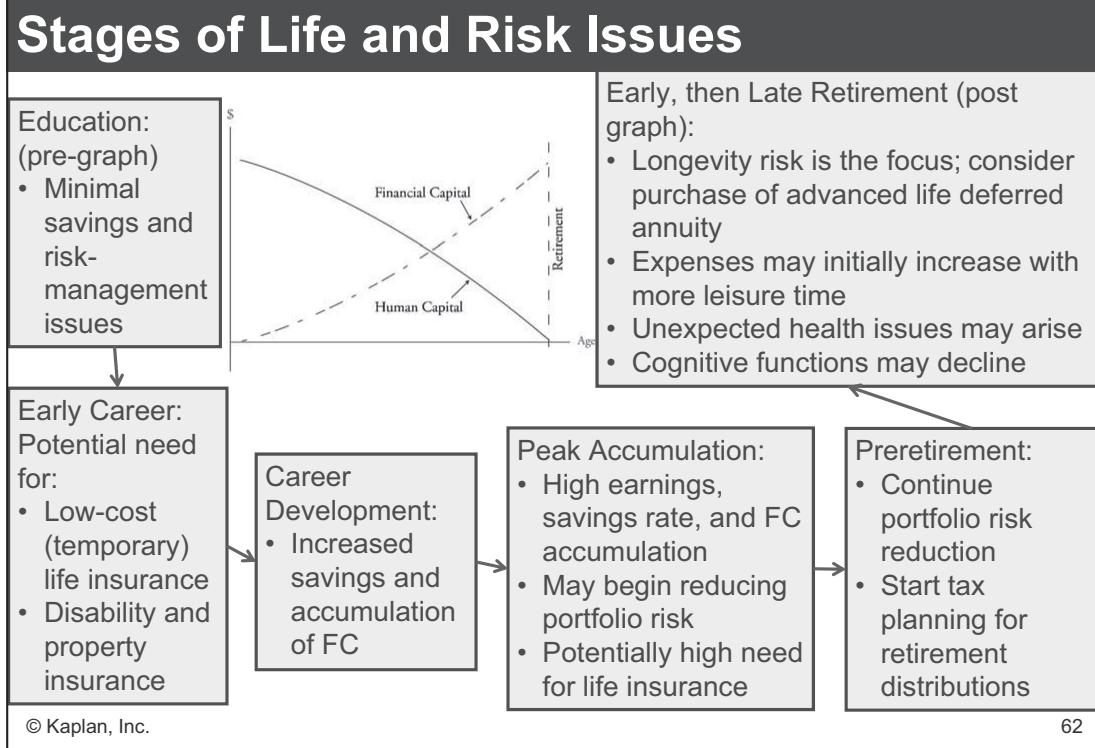
- In aggregate, insurance reduces the wealth of the insured.
- Insurance cost reflects:
  - Mortality estimates of when payout will occur
  - ROI earned by the insurance company on premiums collected
  - Load (expenses) and profit for the company

**Life insurance** hedges **mortality risk**.

- Insure needs that would have been met in the absence of premature death
  - Beneficiaries receive at death
  - Die sooner and beneficiaries earn mortality credits

**Annuities** hedge **longevity risk** (outliving FC).

- The economic opposite of life insurance
  - Pay once, receive for life
  - Live longer and earn mortality credits



## Annuities vs. Life Insurance

**Annuities\*:**

- Finite period
- For life
  - With minimum payout specified
  - For joint life
- For deferred start of payout (which lowers the price)

The lower the probability of death, the more payouts the company will make, lowering the periodic payout or increasing the premium cost

**Life\*:**

- Temporary (term) for one year: Lowest cost
  - With guaranteed annual renewal
  - With guaranteed level premium
- Whole life for insured's lifetime
  - Build up of cash value
- Universal life, allowing choice of investment options and premium flexibility

The greater the probability of death, the sooner the payout occurs, increasing the premium cost or lowering the amount of insurance

\* Multiple permutations exist for both products. Adding features increases cost and makes policy comparisons more difficult.

## Comparing Life Insurance Policy Cost

1. Calculate FV of premiums as annuity due
2. FV of any dividends received as ordinary annuity
3. Terminal cash value

Net Payment Cost Index:  
assumes death and policy payout  
at end of analysis

$FV = \#1 - \#2$   
• Annuitized the FV difference  
as an annuity due PMT

Net Surrender Cost Index: assumes  
termination of policy and cash value  
payoff at end of analysis

$FV = \#1 - \#2 - \#3$   
• Annuitized the FV difference  
as an annuity due PMT

## Comparing Fixed and Variable Annuities

### Fixed annuity:

- Higher initial payout
- Good for higher risk aversion
- Payout largely set by initial interest rates
- Less likely to allow early cash withdrawals

### Variable annuity:

- Shifts more risk to annuitant
- Probably higher lifetime payout
- Early withdrawals (with fees) is more likely
- Complex and harder to analyze with a less-competitive market

## Total Risk Management:

- Manage systematic risk with traditional portfolio and asset allocation tools
- Manage unsystematic with:
  - Portfolio and TW diversification
  - Insurance

**Insure risks that are infrequent and severe**

**Optimize TW asset allocation:**

- HC is higher risk or equity like—tilts FC to bonds
  - HC is lower risk or bond like—tilts FC to equity
- Subject to the desired TW asset allocation

**Insurance for:**

- Premature job loss—use disability insurance
- Premature death risk—use life insurance
  - Amount = PV of funds not earned (annuity due calculation)
- Longevity risk—use annuities
- Property risk—use property insurance
- Liability risk—use liability insurance



# **Study Session 6**

## **Portfolio Management for Institutional Investors**

# Portfolio Management for Institutional Investors

## Study Session 6

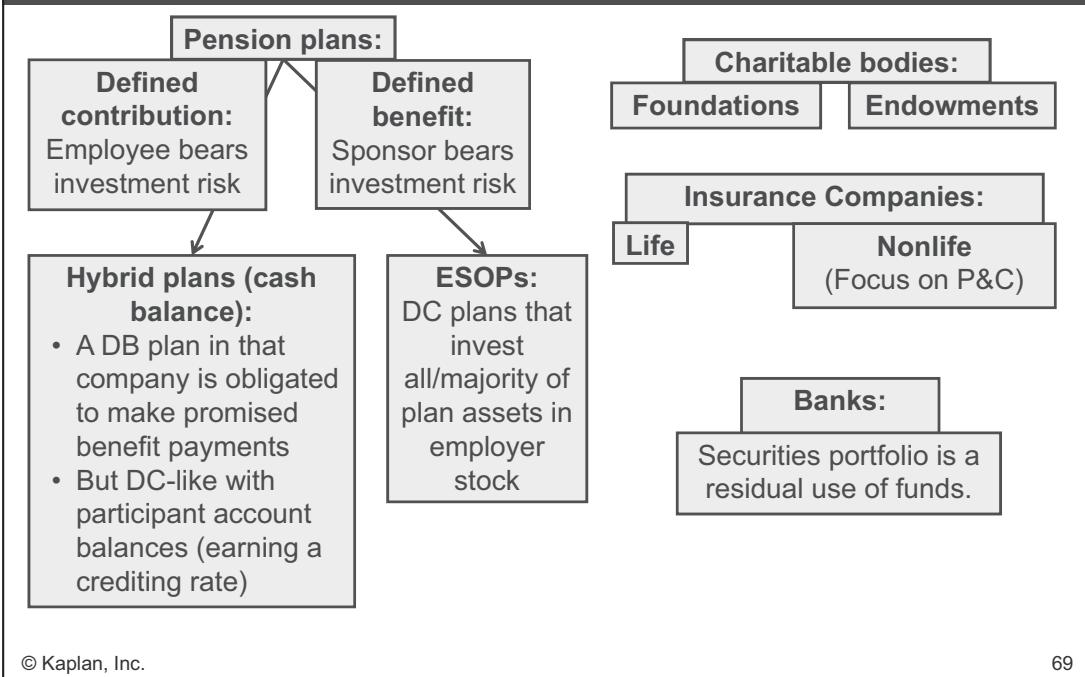


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## Final Review: PM Institutional

- **RRTTLLU applied to specified types of institutional portfolios.**
- Some key differences from IPS for individuals:
  - Risk—focus is on ability
    - Presumption of investor sophistication, making willingness to bear risk irrelevant unless indicated otherwise in the case
    - Legal/regulatory issues may be material
  - Understand how liability mimicking may improve on basic ALM for some DB plans.

## Institutional Investors: Overview



## Defined Benefit Plans: Objectives

### ALM perspective:

**Return:** Minimum return equal to the plan actuarial discount rate

- Higher return primarily benefits the sponsor, not the plan beneficiaries
- Slightly higher to reduce sponsor burden is acceptable (e.g., 1 or 2%)

**Risk tolerance:** Increases if the plan can absorb disappointing returns and still meet plan obligations

Key factors decreasing *ability* to bear risk:

- Underfunded status,  $PVA < PVL$  (i.e., -surplus)
- Weaker financial status of sponsor
- Higher +correlation of plan asset returns and sponsor business
- Plan features increasing liquidity needs and decreasing time horizon
- Workforce characteristics increasing liquidity needs and decreasing time horizon

Generally, a highly aggressive tolerance is inappropriate.

## Defined Benefit Plans: Constraints

**Time horizon:** Primarily determined by plan participant characteristics (i.e., duration of liabilities)

- Active and retired lives may be managed separately.
- For terminated plans, focus on payout date.

**Taxes:** Tax exempt; watch for case-specified exceptions

**Liquidity:** Needs increased by:

- Larger portion of retired lives
- Lower sponsor contributions
- Features such as lump-sum payoff and early retirement

**Legal/regulatory:** Manage with professional skill for the sole benefit of plan participants

**Unique:** Often none

- Case specified restrictions on investment type
- Lack of resources to handle complex strategies

## Foundations & Endowments: Objectives

Functionally the same for IPS purposes

- Asset-only perspective:

**Return:** Meet long-term distribution targets + maintain real value, and often cover portfolio expense

- Maintain intergenerational neutrality
- Multiplicative, not additive, is preferred

**Risk Tolerance:** Often high and increased by:

- Generally perpetual time horizon
- Lack of contractual payouts and flexible to lower spending requirements
- Recipients who are less dependent on portfolio distributions
- Need to maintain purchasing power

## Foundations & Endowments: Constraints

**Time horizon:** Usually perpetual, watch for case-specific exceptions

**Taxes:** Usually tax exempt, watch for case-specific exceptions such as Unrelated Business Income Tax

**Liquidity:** Usually low, watch for case-specific requests like cash reserve or one-time distribution events to fund

- Smoothing rules make distribution amounts more predictable, for example:
  - A weighted average of:
    - Distribution % times rolling average of past market values
    - Past distribution amount increased by inflation

**Legal/Regulatory:** Relatively unregulated (varies by country and case)

**Unique:** Often none (do watch out for case-specific restrictions on investment type, SRI, concentrated or restricted existing holdings, lack of resources to handle complex strategies, and director biases and opinions)

## Insurance Companies: Objectives

**Life and non-life are comparable except where discussed otherwise.**

- ALM perspective

**Return:** Meet the actuarial crediting rate required to meet policy obligations

- Enhanced return will increase the surplus.
- Portfolio may be segmented by line of business or as specified.
- Nonlife companies are more varied in situation and more willing to pursue total return fixed income management (mismatching asset and liability duration).

**Risk:** Life is heavily regulated, limits on asset type and portions, specified asset reserve and capital requirements

- Generally duration matched ALM with equity limited to the surplus account

Nonlife is less regulated and theoretically higher risk, but:

- Shorter liability duration and less predictable cash flow limit risk taking
- More willing to take interest rate risk
- Insuring replacement value creates inflation risk

## Insurance Companies: Constraints

**Time horizon:** Tied to liability duration; generally shorter for nonlife

**Taxes:** Complicated; generally return up to the crediting rate is untaxed and remainder is taxed

**Liquidity:** Meet policyholder payout requirements

- Life faces disintermediation risk if policyholders are allowed to make withdrawals or borrow at a low interest rate.
  - Increasing cash needs when interest rates increase and asset values are down
- Nonlife needs are less predictable in amount and timing.
  - Policy liability durations are short but with a long tail; claims that end in litigation and delayed payout
  - Emphasis on liquid and short-term assets with matching of any known specific needs

**Legal/Regulatory:**

- Life: Extensive and highly varied by jurisdiction
- Nonlife: Less regulated

**Unique:** Case specific; watch for information on specific product mix or limits for what can be done

## Insurance Companies: Issues

Special issue for nonlife: Underwriting/tax/profitability cycle

- When profitable,  $t > 0$ 
  - Lower premiums (product price) to attract business
  - Hold tax-free bonds to avoid taxes
  - Extend asset duration for higher yields (steeper tax-free yield curve)
  - Lower premiums later lead to losses
- With losses,  $t = 0$ 
  - Switch to taxable bonds for higher yields
  - Reduce asset duration (flatter taxable yield curve gives less incentive to extend duration)
  - Raise premiums to restore profitability

## Banks

**Bank securities portfolio** is a **residual use** of bank funds.

- Used to manage overall balance sheet exposures
- ALM perspective

**Issue:** Primary bank assets (loans) are usually longer-term and less liquid than the primary liabilities (deposits), creating interest rate and liquidity risk

Four objectives for securities portfolio:

- Manage **interest rate risk:** Hold shorter-term securities
  - Regulators monitor leverage-adjusted duration gap:
    - $LADG = D_{assets} - (\text{liabilities} / \text{assets}) \times D_{liabilities}$
    - Duration matching adjusted for size of assets versus liabilities
    - Example: +LADG,  $r \uparrow$ , A declines more than L, equity capital declines
- Manage **liquidity risk:** Hold highly-marketable securities
- Generate **income** for the bank
- Diversify **credit risk**

## Banks – Objectives & Constraints

### The Securities Portfolio:

**Return:** Contribute to positive interest spread

**Risk:** Focus is ALM and protecting surplus; very conservative

**Legal/regulatory:** Extensive with limits on stock and below-investment-grade securities, plus capital and reserve requirements

**Liquidity:** A key focus for regulators

- Meet deposit withdrawals

**Time horizon:** Short and driven by need to manage total asset versus liability duration

**Taxes:** Realized G/L flow directly to income creating an incentive to hold losers and sell winners (to increase reported earnings)

**Unique:** Often none

## Misc. Institutions

### Investment companies:

Include mutual funds, closed-end funds, unit trusts, and exchange-traded funds

**Commodity pools** invest in commodity related products and derivatives.

**Hedge funds** are private, largely unregulated pools of money.

In contrast to other types of institutional portfolios:

- Generalizing about the O & C provides little value.
- These vehicles are intended to pool investors' funds and then invest according to rules of the specific portfolio.

## Linking Pension Assets to Liabilities

**Liability-relative:** Extends basic ALM duration matching to better mimic other characteristics of the plan liabilities (benefits)

Benefits:	Risk exposure:	Surplus:	Best assets:
Fixed, nominal	Interest rate risk	Fluctuates with changing interest rates	Traditional nominal bonds
Linked to future inflation	Inflation risk	FV and PV of liabilities change with inflation	Real-rate, real-return inflation indexed bonds
Increase in excess of inflation	Real wage growth	FV and PV of liabilities change with productivity	Equities

Portfolio management cannot address all risks:

- Benefits for future employees
- Company must fund
- Liability noise
- Changing plan assumptions and demographics

Compared to asset-only management:

- Lower equity allocation
- Lower expected return/portfolio costs more
- Less volatile surplus

- The client may choose higher risk, seeking to grow the surplus.
- Derivatives can be used to achieve desired bond and equity exposures.



# **Study Session 7**

## **Applications of Economic Analysis**

# **Applications of Economic Analysis**

## **Study Session 7**

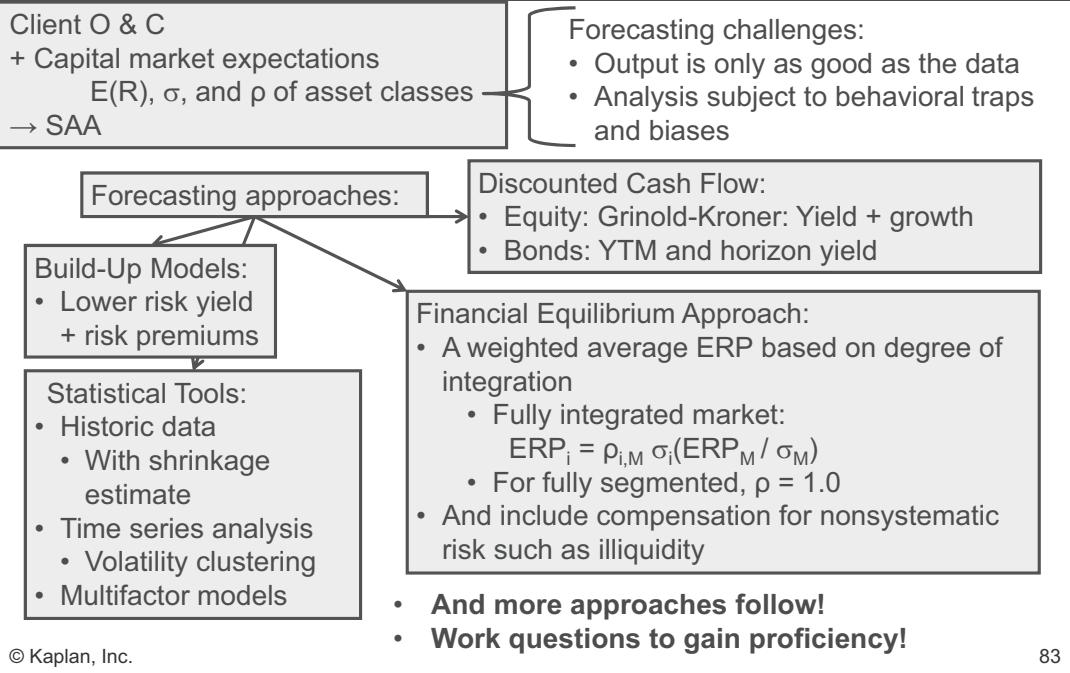


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## Final Review: Applied Economics

- Apply economic tools and concepts to forming capital market expectations and asset allocation.
- This is a collection of applied economic concepts.
  - Not the derived economic theory of Levels I and II

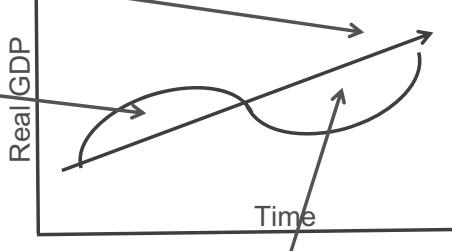
## Formulating Capital Market Expectations



## Economic Growth

The slope represents the trend rate of growth over time; a change in slope is a change in rate of growth.

Above trend line is an unsustainable level of activity



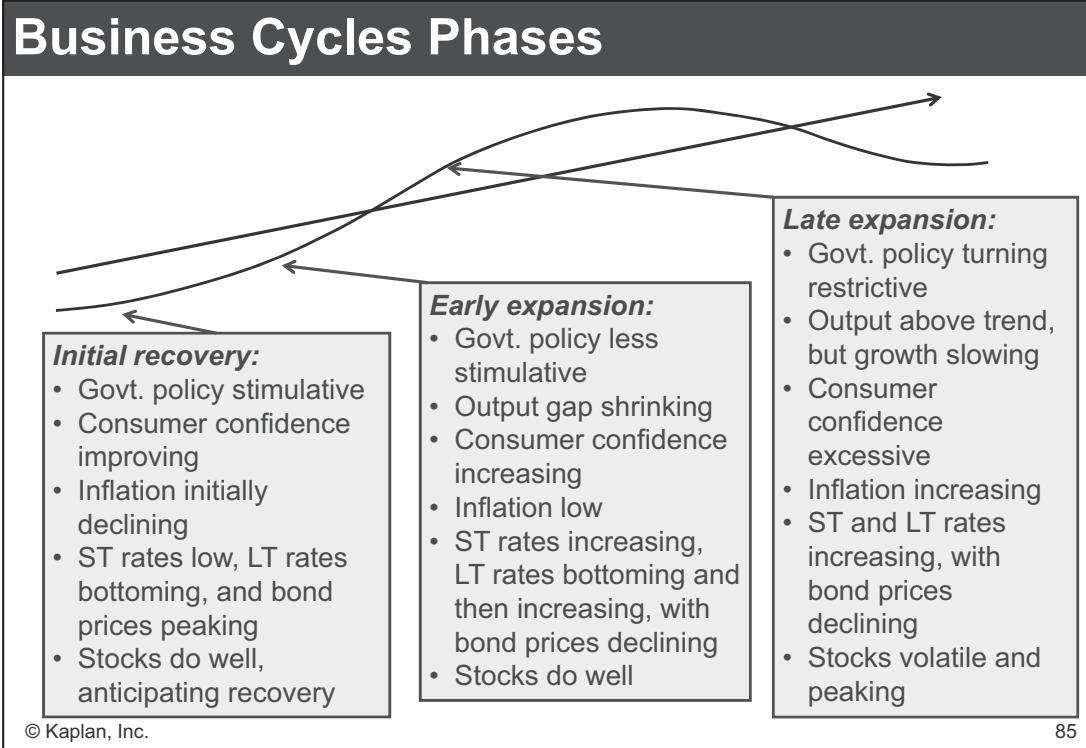
Trend rate of growth is driven by:

- Growth in employment
  - Population growth
  - Labor force participation
- Growth in (physical) capital
- Growth in productivity

- Below trend line is an output gap and associated with a declining rate of inflation.

These business-cycle variations around trend may be further amplified or suppressed by a shorter-term inventory cycle.

- Voluntary inventory accumulation is bullish for growth.
- Involuntary is bearish.



## Business Cycles Phases and LT Growth

### **Slowdown:**

- Govt. policy turning neutral
- Output above trend but growth rate below trend
- Consumer confidence peaking
- Inflation still increasing
- ST and LT rates peaking and then declining, with bond prices bottoming
- Stocks declining

### **Recession:**

- Govt. policy easing
- Output gap increasing
- Consumer confidence weak
- Inflation peaking
- ST and LT rates declining, bonds do well
- Stocks begin to increase in anticipation of the economic turn

### **Govt. policies to improve trend growth:**

- Support free markets, infrastructure and human capital development, free trade, and capital flows
- Sound fiscal and monetary policy
- Avoid “twin deficits:” Govt. budget deficit enabling trade deficit

## Government Policy

**Monetary:**

- Stimulative: Money supply  $\uparrow$ , ST rates  $\downarrow$
- Contractionary: Money supply  $\downarrow$ , ST rates  $\uparrow$
- ST rates indirectly affect LT rates

**Fiscal:**

- Stimulative: Deficit  $\uparrow$
- Contractionary: Deficit  $\downarrow$
- Budget deficit =  $G - T$
- Policy changes to the deficit have more impact than cyclical fluctuations
- Greater impact on LT rates

**Relationship to yield curve:****Fiscal and monetary policy expansive**

- The economy should improve
- Yield curve sharply upward sloping in anticipation

**Fiscal and monetary policy restrictive**

- The economy should contract
- Yield curve downward sloping in anticipation

To anticipate the next change in inflation and real growth, apply the Taylor rule to forecast the next change in ST rates:

$$\begin{aligned} R_{\text{target}} &= \text{policy neutral ST rate} \\ &+ 0.5 (\text{expected}_{\text{infla}} - \text{target inflation}) \\ &+ 0.5 (\text{expected}_{\text{GDP}} - \text{trend GDP growth}) \end{aligned}$$

## Forecasting Approaches

### Forecasting the Economy:

- Econometrics, complex and comprehensive
- Economic indicators, simple and available
- Checklist approach, simple but subjective

- Unfortunately, no approach works all the time.

### Forecasting Exchange Rates

1. Relative PPP, higher inflation associated with currency depreciation.
2. Greater economic strength attracts capital, bidding up the currency's value.
3. Capital flows to the most attractive investment opportunities, bidding up the currency's value.
4. Savings investment imbalance approach can explain (after the fact) why currency values diverge from fair value for extended periods.

### Inflation:

- At or below expectations: Cash, bonds, equity, and RE can all do well
- Above expectations: Cash and RE can do well, equity (with exceptions) and bonds do poorly
- Deflation: Default-free bonds gain purchasing power, cash has low interest rate, equity and RE lose value

## Forecasting Approaches

- Cash equivalents: Forecast changes in monetary policy and ST rates
- Default-free bonds: Forecast change in LT rates
- Credit risky bonds: Forecast changes in credit spread
- Foreign-denominated emerging market debt: Forecast the country's economic and political policies
- Inflation indexed bonds: Forecast changes in real yield and demand for inflation protection
- Common stock: Forecast changes in earnings and P/E
- Emerging market stock: Forecast the G-7 business cycle

Warning signs for emerging markets:

1. Irresponsible fiscal and monetary policies, government deficit/GDP ratio > 4%
2. Insufficient real economic growth, < 4%
3. An overvalued currency and twin deficit, current account deficit > 4% of GDP
4. Excessive foreign-denominated debt, foreign debt/GDP ratio > 50%
5. Inadequate short-term liquidity, foreign currency reserves/ST foreign currency debt ratio < 100%
6. Risky political situation and government policies not supportive of LT growth

## Equity Market Forecasting

Cobb-Douglas to forecast real g  
 • Input to DDM to forecast stock market value

Solow Residual rearranges and solves for TFP

$$\frac{\Delta Y}{Y} \approx \frac{\Delta A}{A} + \alpha \frac{\Delta K}{K} + (1-\alpha) \frac{\Delta L}{L}$$

Growth in TFP; improves with:

- Better technology
- Fewer restrictions on capital flows, labor mobility, and trade
- Favorable laws
- Discovery/availability of natural resources

weight × growth in capital

weight × growth in labor

H-Model is more useful to value emerging markets

- “Adds” a high growth phase to basic DDM

Gordon Growth is more useful for established markets

$$V_0 = \frac{D_0}{r - g_L} \left[ (1 + g_L) + \frac{N}{2} (g_S - g_L) \right]$$

## Equity Market Valuation Tools

Use previous absolute value DDM tools to forecast “correct” level.

- Macroeconomic top-down tools to value overall markets
- Micro bottom-up tools to value individual securities and then aggregate to overall view

Relative value tools indicate over- vs. undervalued

- Earnings (income statement) based RV tools:

Fed Model:  $\text{S&P earnings yield} / 10\text{-year Tr. Yield}$   
 $\text{earnings yield} = \text{operating earnings}_1 / P_0$

Yardeni:  $\text{Fair EY} = E_1 / P_0 = Y_B - d(\text{LTEG})$   
 $V_0 = E_1 / (Y_B - d(\text{LTEG}))$

Cyclically Adjusted P/E Ratio:  $P/10\text{-year MA of E}$

- In CAPE, P and all E are inflation adjusted to any single base year
- Then compare current P/E to CAPE

## More Relative Value Tools

### Asset (balance sheet) based RV tools:

$$\begin{aligned} \text{Tobin's } q &= \frac{\text{asset market value}}{\text{asset replacement cost}} \\ &= \frac{\text{market value of debt + equity}}{\text{asset replacement cost}} \end{aligned}$$

$$\begin{aligned} \text{equity } q &= \frac{\text{market value of equity}}{\text{replacement cost (rc) of net worth}} \\ &= \frac{\text{market value of equity}}{\text{rc of assets - liabilities}} \end{aligned}$$

## Applied Economics

- Level III has shifted from theoretical to applied economics.
- You should not expect any forecasting tool for risky assets to work consistently all the time.
- Multiple tools are likely to lead to different conclusions.
  - Providing valuable insight into market consensus or lack of consensus
- Work questions to gain proficiency in applying the tools to the data provided.

# **Study Sessions 8 & 9**

## **Asset Allocation**

# Asset Allocation (1)

## Study Session 8

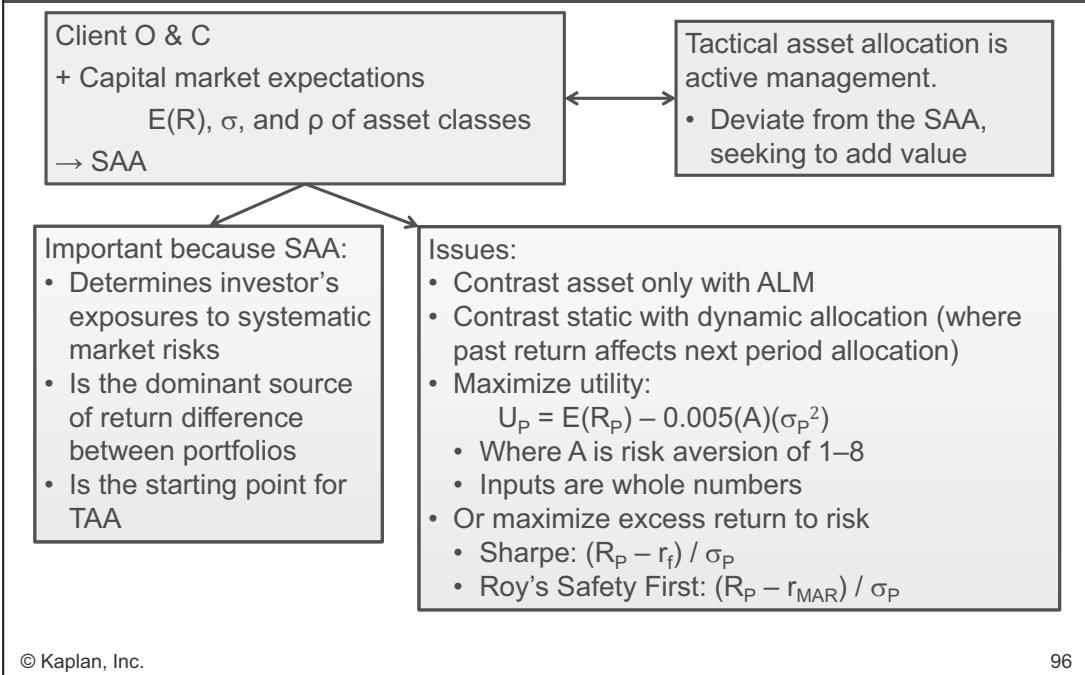


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## Final Review: Asset Allocation (1)

- Understand the role of SAA (and TAA) in portfolio management.
  - Determine when an asset class will add value.
- Understand the “six approaches” to SAA:
  - MVO and its refinements (including CP Theory and CML)
  - Resampling
  - Black-Litterman
  - MCS
  - ALM
  - Experience based (process of elimination)

## Strategic Asset Allocation



## Strategic Asset Allocation

Add asset classes to diversify:

- Improve return to risk (i.e., increase the Sharpe ratio)

Criteria specifying an asset class:

- Homogeneity of assets within the class
- Classes should be mutually exclusive
- Classes should be diversifying
- Classes should make up a preponderance of world investable wealth
- Classes should be liquid enough to absorb a significant portion of a portfolio

Add if:  $\text{Sharpe}_{\text{new}} > \text{Sharpe}_P \times \rho_{\text{new},P}$

- And the proposed addition meets portfolio constraints
- Full MVO is still needed to determine the asset allocation

## Strategic Asset Allocation

Additional issues with international investing

Contagion: Correlation appears to increase during periods of crisis.

- Partially a measurement issue of increasing sigma
- Partially real
- Use conditional correlation matrices, one for normal and one for crisis conditions

Currency exposure affects both the return and risk.

- Effect on risk is more pronounced for bond than equity markets.

Market integration and emerging markets:

- Early in the integration process, security prices reflect a largely segmented market:
  - Primarily reflect stand-alone risk
- As capital flows in, diversification increases, lowering risk and producing very high realized returns as prices are bid up.
- As the market matures, prices are higher with risk and expected future returns lower.
- Once integrated:
  - Correlation is higher but sigma is lower
  - Cost of capital is lower

# MVO

## Mean Variance Optimization:

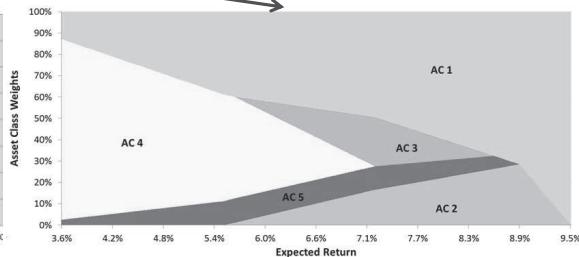
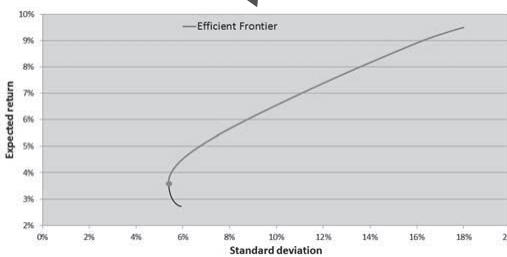
Inputs:

- $E(R)$ ,  $\sigma$ ,  $\rho$

Output:

- Efficient frontier
- AA for each point on EF

AC	$E(R)$	$\sigma$	Correlation Coefficients				
			1	2	3	4	5
1	9.5%	18%	1				
2	7.4%	15%	0.65	1			
3	3.8%	7%	0.25	0.40	1		
4	2.7%	6%	-0.15	0.30	0.75	1	
5	4.0%	9%	0.20	0.45	0.60	0.50	1



- + MVO is a well-understood concept using widely available software.

## MVO Problems and Solutions

### Major issues—MVO:

- Tends to select highly concentrated portfolios, lacking practical diversification
- The **instability problem**: Inputs are unknowable and small changes in inputs (particularly  $E(R)$ ) often produce large changes in AA. Solutions:

#### Resampling

- Start with basic MVO and best-guess inputs.
- Generate random variations around initial inputs and multiple outputs.
- For any point on the EF, use the average AA for that point.

#### Pros:

- Typically more asset classes are used
- AA is less sensitive to additional changes in  $E(R)$

#### Cons:

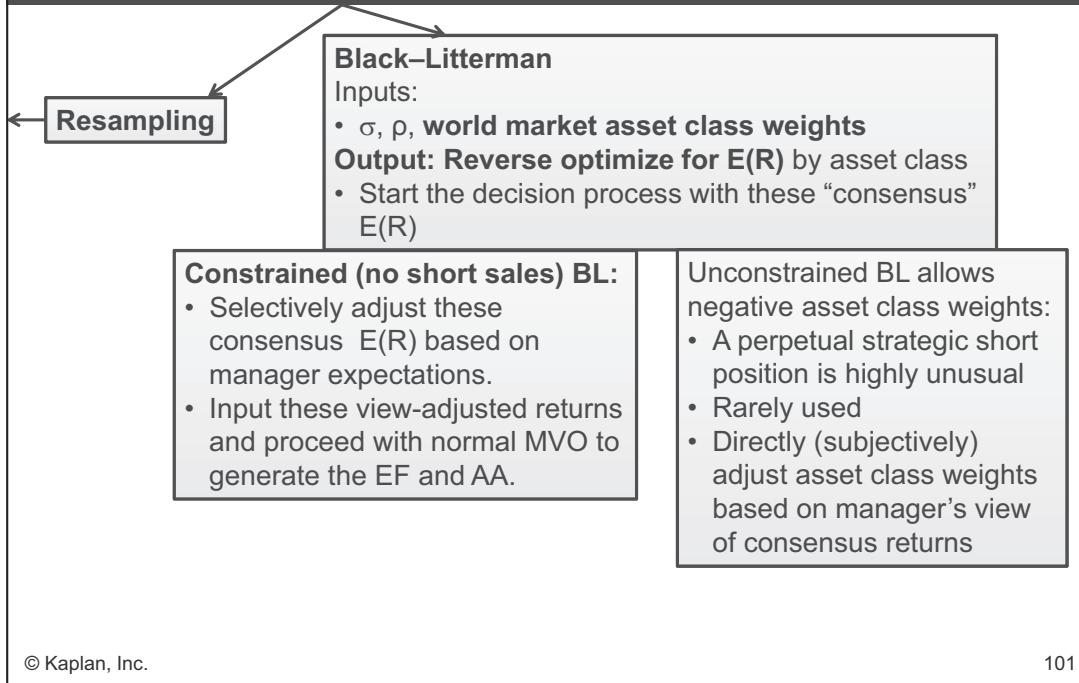
- Lack of theoretical underpinning
- Reliance on historical data as starting point

#### Black–Litterman

Note that the resampled EF will “appear” inefficient:

- Plot to the right of the single MVO starting point EF
- Lower return to risk  
However, recall the initial EF is based on unknowable inputs.

## MVO Instability Solutions



## MVO Variations

### Asset-Liability Management:

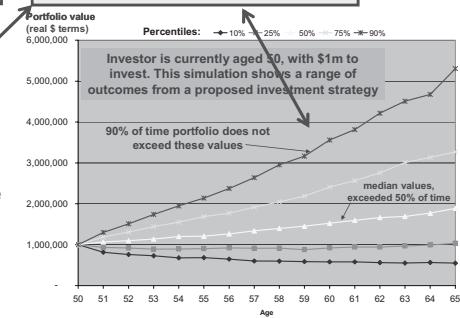
- Apply MVO and generate a surplus ( $PVA - PVL$ ) EF and the associated AAs.
- Resampling and Black-Litterman can be applied as well.

\* Random means consistent with specified parameters; for example:

- $E(R)$  of 7% with a 3%  $\sigma$
- Or hire a smarter quant and “randomize” subject to more complex assumptions of skew, kurtosis, etc.

### Monte Carlo Simulation:

- Select a single AA and generate random\* possible paths; can be ranked for probability of results over time.
- Can analyze asset or value of the surplus.



### Experience Based:

See earlier discussion for process of elimination.

- Not based on sound theory
- Too simplistic for some cases

- + Generally consistent with the conclusions of more sophisticated techniques
- + Less math and input driven

## Corner Portfolio Theorem (and the CAL)

MVO can identify corner portfolios:

- Portfolios on the EF where asset class weight shifts between + and 0
- And the GMVP

The CAL between  $r_f$  and the tangent portfolio is not commonly used for asset allocation.

- It requires a true risk-free asset
  - 0 sigma and correlation to other assets

Math drives MVO analysis:

$$E(R_p) = w_1 E(R_1) + w_2 E(R_2)$$

$$\sigma_p^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \rho_{1,2} \sigma_1 \sigma_2$$

The apparent precision is based on an illusion of knowledge, knowing the  $E(R)$  of risky assets

Straight line interpolation between CPs treats correlation as 1 and:

- Identifies the actual asset allocation
- Approximate sigma
- Approximate tangent portfolio for the CAL is the CP with highest Sharpe

## TAA (and Client Issues)

TAA: Active management, deviations from SAA, seeking to add value

Current Market Prices Approach:

- Current market prices determine dividend and bond yield.
- Factor in expected price change to determine expected real return.
- Higher/lower real return makes the asset class more/less attractive.

Relative E(R) to Risk Approach:

- A predicted increase/decrease in this ratio makes the asset class more/less attractive.

Mean Reversion Approach:

- Higher/lower returns will revert down/upward.

Client Issues: The CFA reading includes a discussion of issues better covered in the Study Sessions on individual and institutional IPS.

## Asset Allocation (2)

### Study Session 9



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## Final Review: Asset Allocation (2)

### Currency\*:

- Know the currency calculations.
- Apply the concepts of  $R_{DC}$ ,  $R_{FC}$ , and  $R_{FX}$  to return and risk.
- Approaches to forecasting, managing, and hedging currency:
  - Active vs. passive
  - Forwards/futures vs. option based
  - Perfect vs. Cross vs. Macro, vs. MVHR

### Indexes and Benchmarks: Know the common uses

\* Currency is also covered in other sections of the Level III curriculum. The sections are consistent on all important issues.

## Currency Management: Return & Risk

Return from a foreign asset in domestic currency units:

$$R_{DC} = 1 + R_{FC} \cdot \frac{1 + R_{FX}}{1 + R_{FC}} - 1$$

Foreign asset return      Change in the foreign currency

$$R_{DC} = R_{FC} + R_{FX} + R_{FC} \times R_{FX}$$

$$R_{DC} = R_{FC} + R_{FX}$$

Variance of foreign asset in domestic currency units:

$$\sigma^2 R_{DC} = \sigma^2 R_{FC} + \sigma^2 R_{FX} + 2\sigma R_{FC} \sigma R_{FX} \rho R_{FC}, R_{FX}$$

- This is the standard 2-asset portfolio variance formula where weights to  $R_{FC}$  and  $R_{FX}$  are each individually 1.0.
- Special case—a foreign risk-free asset

$$\sigma R_{DC} = \sigma R_{FX} \sqrt{1 + R_{FC}}$$

For a portfolio of foreign assets:

- $R_{DC}$  is the weighted average of the individual  $R_{DCs}$ .
- Portfolio variance is the normal portfolio variance calculation.
- Weights are based on start of period value.

## Currency: Strategic Decisions

- **Passive:** Match benchmark exposures
- **Discretionary:** Focus is risk control, but allowing smaller deviations from the benchmark
- **Active:** Focus is value added, allowing larger deviations

An **overlay manager** could be used to implement any of the above.

### Favoring passive:

- Higher risk aversion
- Shorter-term investment objectives
- Shorter-term income and liquidity needs
- Fixed-income assets
- Low hedging costs
- A client skeptical of the manager's ability to add value and/or a manager with no views

### Active approaches:

- **Economic fundamentals:** Favorable indicators: lower inflation, higher real and nominal interest rates, decreasing currency risk, greater long term undervaluation
- **Carry trade:** Borrow in the low interest rate currency, convert to and invest in the higher interest rate currency, remain unhedged and accept the currency risk
- **Volatility trade:** Go long/short both calls and puts to profit from increasing/decreasing volatility
  - Does poorly during market crises (volatility spikes)
- **Technical trading rules**

## Currency Hints

Determine the currency to focus on (B) and work with direct quotes for that currency (P/B).\*

- Buying futures, forwards, or calls on B increases exposure to B.
- Selling futures or forwards, or buying puts on B decreases exposure to B.
- A call on B is a put on P, and a put on B is a call on P.
- Futures symmetrically adjust upside and downside.
- Options asymmetrically adjust exposure and have an initial cost.
  - Reducing option costs requires reducing upside or increasing downside exposure.
  - Absolute ATM option delta is approximately 0.5.
  - OTM is lower.
  - ITM is higher.

\* In the most common situation, a domestic investor (country P) invests in a foreign asset (country B) and is at risk if the foreign currency depreciates.

## Futures/Forwards Hedging and Roll Yield

**Static Hedge:** Do nothing

- Set initial term equal to hedging period

**Dynamic Hedge:** Periodically rebalance size of the hedge

- Increasing cost but improving accuracy

**Or enter and roll shorter contracts**

- Initially static; dynamic at rollover

If:  $F_{P/B} > S_{P/B}$ ,  $i_P > i_B$

- Shorting B earns positive roll yield, decreasing hedging cost.
- Long B earns negative roll yield, increasing hedging cost.



If:  $F_{P/B} < S_{P/B}$ ,  $i_P < i_B$

- Shorting B earns negative roll yield, increasing hedging cost.
- Long B earns positive roll yield, decreasing hedging cost.



## Forwards/Futures Hedging Issues

A perfect hedge held to expiration locks in the forward premium/discount.

- But may not exist
- May be deemed a sale for taxes

A cross hedge is riskier:

- Hedged item and hedging vehicle are not identical, therefore highly but not perfectly correlated

A macro hedge seeks to hedge portfolio-wide risk as opposed to a single risk.

- It will be imperfect and a cross hedge.

Minimum variance hedge ratios use regression to jointly optimize and minimize risks.

- They are both a cross and macro hedge.

The MVHR is determined by regressing:

- Change in  $R_{DC}$  as the dependent variable
- Against change in  $R_{FX}$ , as the independent variable
- The slope coefficient ( $b$  or  $\beta$ ) is the MVHR:  
where :  $y = a + bx$

$$\text{And } \beta_i = \rho_{R_{DC}, R_{FX}} \frac{\sigma(R_{DC})}{\sigma(R_{FX})}$$

## Forwards/Futures Hedging Issues

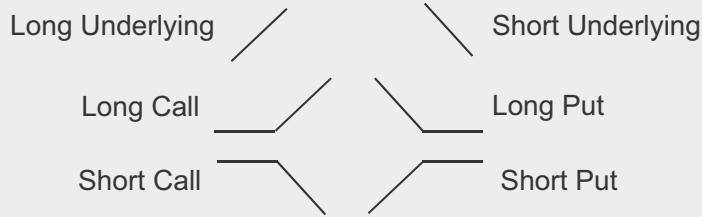
### Forward/futures

- Provide symmetric modification, eliminating upside and downside
- No upfront premium cost
- Forwards are typically used for currency hedging.

↔ Option hedging strategies provide asymmetric risk modification.

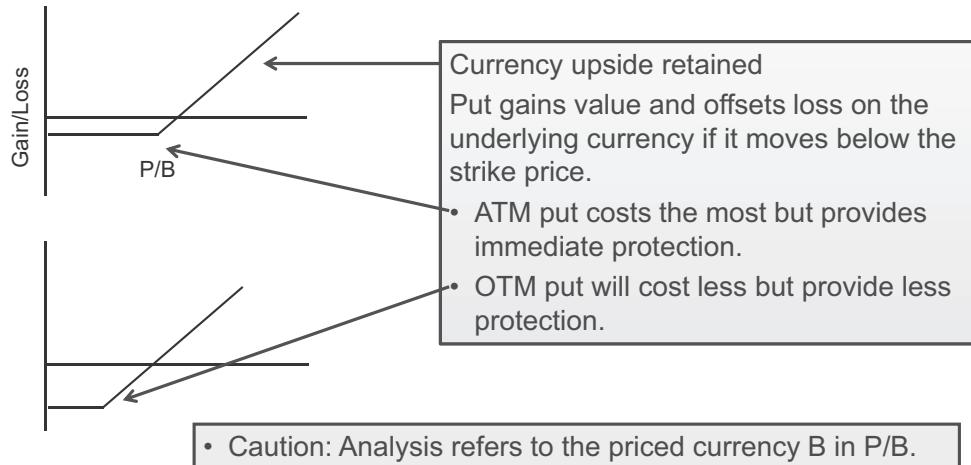
- They involve upfront option premium costs.
- Lowering the cost involves accepting less upside and/or more downside.

Option (combination) hedging results are composed from six underlying positions:



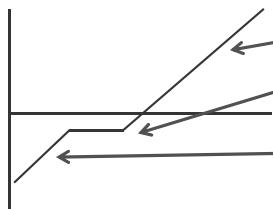
## Hedging With Currency Options

**Protective put:** Long exposure to currency and buy a put



## Hedging With Currency Options

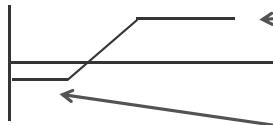
### Protective put and sell a further OTM put:



Currency upside retained

- Long put gains value and offsets loss on the underlying currency if it moves below the strike price.
- Short put starts to lose value and re-exposes position to losses.
  - But short put generates premium income, reducing initial cost.

### Collar: Long currency & sell OTM call & buy OTM put

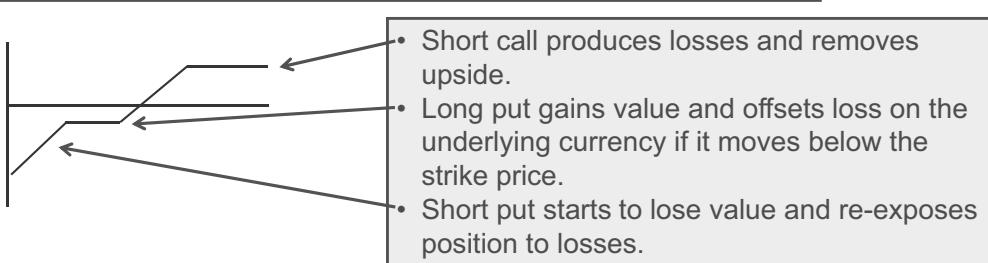


Short call produces losses and removes upside.

- But generates premium income, reducing initial cost
- Long put gains value and offsets loss on the underlying.

## Hedging With Currency Options

**Seagull:** Long currency & sell OTM call & buy OTM put & sell further OTM put. The sale of two options reduces initial cost.



## Emerging Market Issues

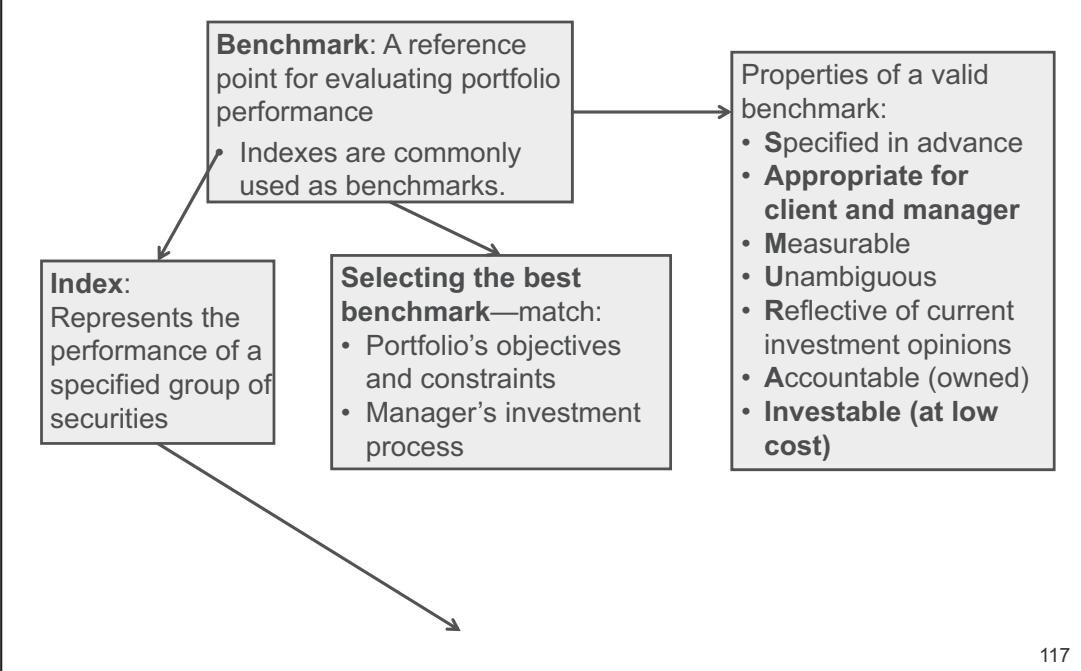
Emerging market currencies pose additional challenges.

- Less liquid contracts with higher transaction costs
- Contagion between markets
- Non-normal negative skew distributions
- EM governments that restrict the transfer of currency across borders

Nondeliverable forwards:

- Settle gain or loss in a developed market currency to avoid restrictions on EM currency transfers

## Market Indexes and Benchmarks



## Indexes Construction Methods

### Market cap-weighted:

- The most common method
- Represents aggregate ownership
  - Typically free float adjusted
- CAPM efficient
- Higher market cap securities have greater affect on index

### Equal weighted:

- Reflects an equal value held in each security
- The average of each securities return
  - Versus market cap, it is biased to small cap returns
- Would require continual rebalancing

### Price weighted:

- Reflects holding an equal # of shares in each security
- Higher priced securities have greater affect on index return

### Construction tradeoffs:

- **Completeness** by including everything or **investability** to lower replication costs
- **Reconstitute & rebalance** frequently to reflect changes or minimize **turnover** to lower replication costs
- **Objective & transparent rules** for index construction to make replication easier or **judgement** to allow for unforeseen issues

# **Study Sessions 10 & 11**

## **Fixed-Income Portfolio Management**

# Fixed-Income Portfolio Management (1)

## Study Session 10



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## Final Review: Fixed Income (1)

- Apply duration (and variations) to solve fixed-income problems.
- Apply TVM concepts to solve fixed-income problems.
- Use immunization and its variations.
- Recognize various FI trading techniques.

## Duration and Risks

D: Weighted average time until the cash flows are received

- D of a zero coupon is its maturity.
- D of a fixed coupon is less than maturity.
- D of a floater is treated as  $\frac{1}{2}$  the coupon reset period.
- Duration contribution =  $w \times D$  of each item

Spread duration = D, except:  
Treasuries:  $D_s = 0$ , Floaters:  $D_s$  is tied to maturity

### Interest rate risk

Parallel shifts in the yield curve:

$$\% \Delta V = -D \Delta r$$

$$\$ \Delta V = V_p D \Delta r$$

$$DD = V_p D 0.01$$

### Yield curve shift risk

Non-parallel shifts in the yield curve:

$$\% \Delta V = -D_k \Delta r_k$$

k, one specific point (key rate) on the yield curve

### Spread risk

Change in spread:  
 $\% \Delta \text{ Rel. } V = -D_s \Delta s$   
 $s = \text{higher} - \text{lower YTM}$

### Other risks:

- Sector and quality allocations and duration contributions
- Sector/coupon/maturity cell weights
- Issuer exposures
- Embedded options

## Risk Management

### Liability-based portfolio:

- Match the liability characteristics
- Immunization and variations

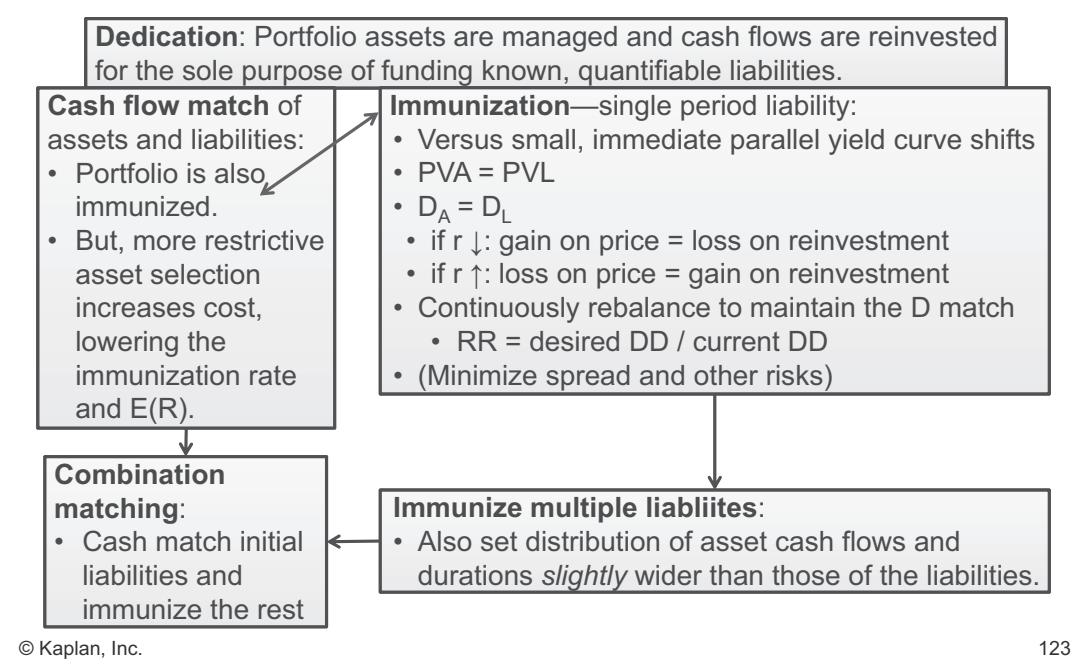
### Asset only (versus benchmark):

- Pure indexing
- Index by matching risk factors
- Index with minor mismatch of risk factors
- Active with larger mismatch (including duration)
- Unrestricted active

### Before you trade, total return (scenario) analysis:

- Determine BV
- Project EV based on assumptions
  - Ending price
  - Coupons plus interest earned on coupons
- $(EV / BV)^{1/n} - 1 = r_p$ 
  - The general rule is that n are 6-month periods
  - Making BEY =  $r_p \times 2$

## Dedication and Immunization



## Variations

Mostly cash-flow matched but allow some mismatch; assume a:

- Low sales price for sales
- Low reinvestment rate for maturity rollovers

Cash-flow match (sequential liabilities) with coupon bearing bonds:

- Match final bond's par + final coupon to final liability
- Work backwards recursively
  - Remembering to allow for coupon cash flows

Immunize general cash flows:

- Treat expected cash contributions like a zero-coupon bond asset already owned.

### Contingent Immunization is active management:

- PVA > PVL, +surplus ( $S$ )
    - As long as  $S$  is +, manage actively.
- Continually monitor  $S$ :
- PVA changes with the market.
  - FVL is fixed but PVL shifts with market conditions and available immunization rate.
  - If successful,  $S$  grows faster than the initial immunization rate.
  - If  $S$  reaches 0, immunize to preserve FVA = FVL.

## Relative Value Analysis\*

Top down (macro) vs. Bottom up (micro); Classic combines both

- Supply and demand (S & D) analysis:
  - Normally: S ↑, price ↓, with YTM and spread ↑
  - Unless: S ↑ “validates” the price (D ↑) in which case price ↑, with YTM and spread ↓\*
- Yield pickup: Buy the higher yield of comparable bonds.
- Credit up/downside trade: Buy/sell the expected up/downgrade bond.\*
- Sector rotation: Buy/sell the expected out/underperforming sector.\*
- New issue: Buy the new issue of comparable bonds.
- Yield curve trade: Holding total duration the same; select the portfolio with the combination of durations expected to provide the best performance.
- Structure trades: Putable/callable bonds outperform when volatility increases/decreases.
- Cash flow trades: Sell/buy to raise/invest cash flow.

\* These are spread trades: When spread decreases/increases the higher yield bond increases/decreases in relative price ( $\% \Delta \text{ Rel. } V = -D_s \Delta s$ ).

# Fixed-Income Portfolio Management (2)

## Study Session 11



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## Final Review: Fixed Income (2)

- Understand and quantify portfolio leveraging and altering portfolio duration with hedging (futures).
- Understand the basics of credit derivatives.
- Understand:
  - International bond investing issues.
  - The implications of IRP for currency hedging any investment.

## Leverage, Duration, and Repos

### Return from leveraged portfolio

$$R_P = R_i + \frac{B}{E}(R_i - c)$$

$$D_E = \frac{D_A A - D_B B}{E} \Rightarrow \left[ \left( \frac{A}{E} \right) D_A - \left( \frac{B}{E} \right) D_B \right]$$

- Leverage magnifies up/down side.
- Therefore, it effectively alters portfolio (investor's equity) duration.
- Leverage is beneficial as long as the return on the underlying asset exceeds the borrowing cost.

### Repos provide leverage:

- Borrow by "selling" a security today while simultaneously agreeing to "buy" it back at a specified future repurchase date.
- The "security" is loan collateral.

If collateral is delivered, the repo rate is lower for:

- Greater control of collateral by lender
  - Shorter term repo, if the yield curve is upward sloping
  - Greater quality/quantity of collateral
  - Collateral in short supply
  - A lower general level of interest rates
- If not delivered, then for a higher quality borrower

## Adjusting Duration With Derivatives

1. Buy/sell bond contracts to increase/decrease duration.
2. Compute the quantity.

$$N_f = \frac{(D_T - D_P) V_p}{D_{CTD} P_{CTD}} \times CF \times \text{yield beta}$$

Hedging is rarely perfect because:

- Durations and yield beta change
- Basis risk if the relationship between the spot and futures prices change in unexpected ways
  - Minimize by holding contract to expiration
- Cross hedge risk if hedged item and hedging vehicle are not identical
- Sellers deliver options
- Rounding the hedge size

Swap duration:

- Add the duration of the side received
- Subtract the duration of the side paid

- Receive fixed increases duration
- Pay fixed reduces duration

## Credit Derivatives

A credit put option on price; receive if the price declines below strike

A credit call option on spread; receive if the spread widens above strike

- RF: Converts spread change to price change

Binary credit options require both:

- A specified credit event
- A pay off formula applied if the event occurs

### Credit forwards:

- On price, buyer receives/pays if price decrease/increases.
- On spread, buyer receives/pays if spread increase/decreases.
- RF: Converts spread change to price change

$$\% \Delta \text{ Rel. } V = -D_s \Delta s$$

### Credit default swap:

- Protection buyer pays a premium
- Receives based on a contract payoff formula if a defined event occurs

## International Bond Management

### Value added:

- Market and [currency] selection
- Duration and yield curve management
- Sector selection and credit analysis
- “Off index investing”

### Interest rate parity

$$F = S \left( \frac{1+i_d}{1+i_f} \right)$$

And forward premium or discount is:  
 $(F - S) / S @ i_d - i_f$

- Lose the ST rate of the currency sold forward
- Gain the ST rate of the currency bought forward

### Duration management:

% Δ in value of foreign bond for domestic investor =

$$D \times \beta_{yield} \times \Delta r_{Domestic}$$

$$\beta_{yield} = \Delta r_{Foreign} / \Delta r_{Domestic}$$

### Decision rules:

- **Best market:** The market with the highest local market risk premium ( $R_M - r_f$ )
- **Best currency:** Then compare expected change in the foreign currency to the currency's forward premium or discount and select the higher

## BE Spread Analysis

**Breakeven spread analysis** between two bonds with differing duration:

- Determine initial projected return difference.
- Determine and calculate the change in spread required to produce an offsetting change in relative value.
  - Initial spread positive: Use the higher duration for the more conservative (smaller) spread widening before falling to BE.
  - Initial spread negative: Use the lower duration for the more conservative (larger) spread widening required to rise to BE.

Caution: If the case specifies which bond will change, use its duration.

$$\% \Delta \text{ Rel. } V = -D_s \Delta s$$

## Manager Selection/Emerging Market Debt

FI manager selection; consider:

- Style analysis: Identify the sources of active risk and return
- Selection bets: Attribution analysis
- Investment process: Identify the stated approach, research methods, alpha drivers, and support staff
- Correlation of alphas: For multiple managers, consider the correlations and potential diversification benefit

Do quantitative and qualitative match?

Emerging market debt:

- + Better return
- + Diversification
- Currency, political, and credit risk
- Capital flow restrictions

# **Study Session 12**

## **Equity Portfolio Management**

# Equity Portfolio Management

## Study Session 12



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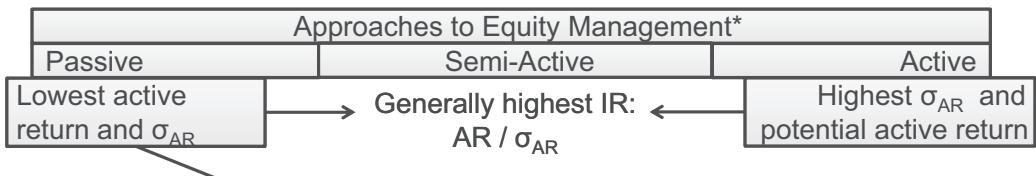
## Final Review: Equity

- Understand and apply returns and holdings-based style analyses.
- Understand and contrast the various long only vs. long-short management approaches, including:
  - Equitize long-short
    - Transported and portable alpha
    - Core-satellite
    - Completeness
    - Alpha beta separation
  - Understand and decompose the Information Ratio.

Caution: This is equity PM, not the price and value focus of Level II.

## Miscellaneous

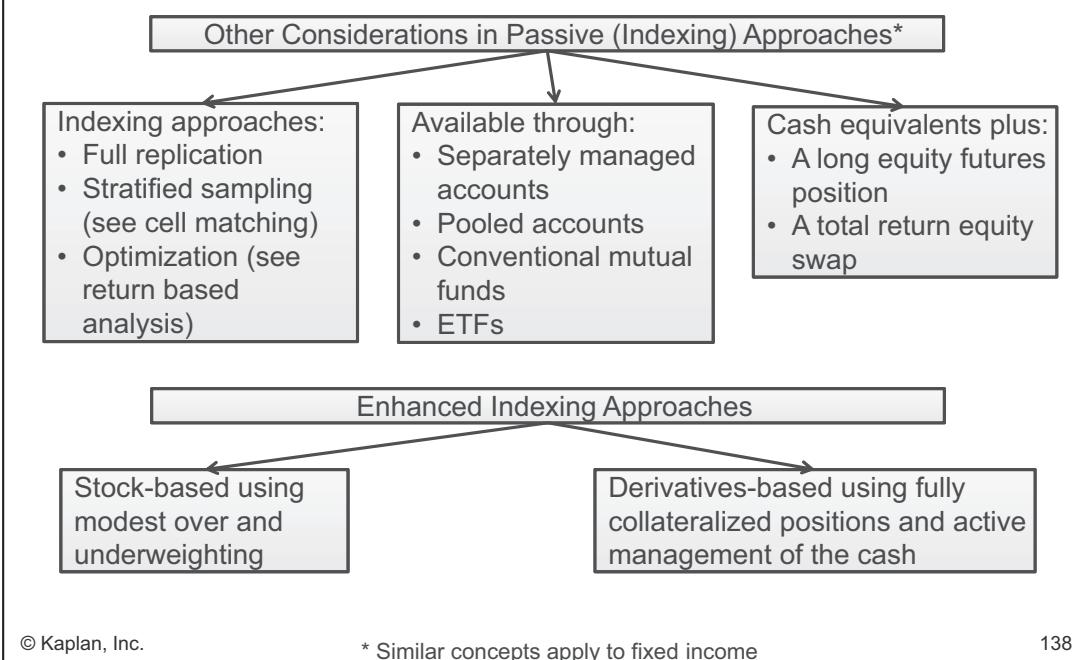
Equities and inflation: Protect purchasing power in the long run  
• But short run correlation with inflation is imperfect



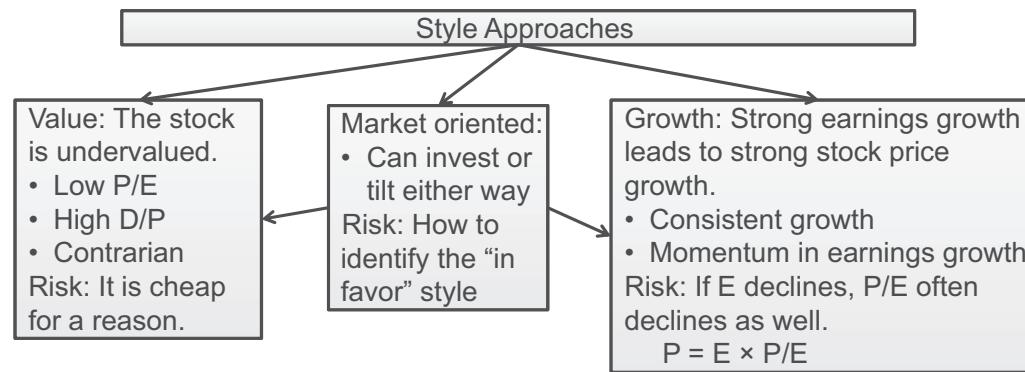
## Miscellaneous

Approaches to Equity Indexing*		
Price-weighted <ul style="list-style-type: none"><li>Replicates buy and hold one share of each security</li><li>Change in highest-priced security has largest affect on the index</li></ul>	Value (market cap) -weighted <ul style="list-style-type: none"><li>Reflects aggregate ownership</li><li>Typically float-weighted for investable shares</li><li>Largest-cap, possibly mature and/or overvalued firms have largest affect</li></ul>	Equal-weighted <ul style="list-style-type: none"><li>Replicates average stock's return</li><li>Requires frequent rebalancing</li><li>vs. value-weighted, biased towards small-cap performance</li></ul>

## Miscellaneous



## Miscellaneous



## Return vs. Holdings-Based Analysis

**Returns-based:** regress (monthly) historical performance versus relevant indexes (or other variables) to determine the best fit (max  $R^2$ ) of exposures:

- Slope coefficients are the weights
- Does not consider actual holdings
- Changing weights suggest style drift
  - But slow to reflect changes
- $1 - R^2$  indicates manager VA
- Inexpensive and captures entire investment process

**Holdings-based:** Classify holdings at a moment in time:

- Based on actual holdings
- Quickly detects style drift
- Opinions on classification may vary
- Data intensive
- May not reflect how the manager makes decisions

	Value	Core	Growth
Large cap			
Mid cap			
Small cap			

Cell matching (style box):

- Changing weights over time would indicate style drift.
- Stratified sampling matches portfolio weights to index weights.

## Long Only vs. Long-Short

### Long only:

- One alpha, undervalued positions
- No inherent leverage
- Max underweighting is limited, don't own it
- Combined source of alpha and beta

### Long-short:

- Two alphas, under- and over-valued positions
- Short positions fund long positions, creating leverage
- Underweighting is not limited
- Investor's capital remains available

### Market neutral:

- Balance long and short aggregate positions

### Pairs trade:

- Balance individual long vs. short positions

### Alpha beta separation:

- Long-short provides alpha
- Location of investor capital provides beta (market exposure)

Invest in other markets to **transport (portable) alpha**

Invest in equity (or equity replicating positions) to **equitize the portfolio**

Invest in  $r_f$  and compare to MM returns

## Other Possibilities

**Core-satellite:**

- Invest a large portion in lower cost index like strategies for market (beta) exposure
- Invest balance in high value added approaches for alpha

**Short Extension:**

- Short a portion of investor's capital (e.g., 20 or 30%)
- Invest (long) all funds (e.g., 120 or 130%)
- Net 100% long
- Compare to long-only portfolios

**Completeness:**

- Start with nondiversified positions
- Add positions to complete the portfolio
  - Minimize tracking error versus the investor's desired benchmark or exposures

## The Short Side May Be Less Efficient

- Long-only investors ignore overvalued securities.
- *Sell-side* analysts fear antagonizing company management with sell recommendations.
  - *Sell-side* analysts mostly make buy recommendations.
- *Window dressing* leads managers to sell underperformers, further depressing their price.
- There are additional costs and complexities to short selling.
  - The short seller may have to borrow the shares and/or pay fees.

### Sell disciplines:

- Rule driven, such as:
  - Sell at a predetermined P/E.
  - After a set up or downside move.
- Substitution is based on comparing projected after-tax return of existing holding with proposed replacement.

## Information Ratio—Drivers

$$\text{IR} = \text{AR}/\sigma_{\text{AR}}$$

= active return / tracking error

Fundamental Law of Active Management: The IR is driven by two factors:

$$\text{IC}\sqrt{\text{IB}} \Rightarrow \text{IR}$$

- Information coefficient (IC): Depth of knowledge (accuracy of forecasts)
- Investor breath (IB): Number of independent investment insights implemented

## Information Ratio—Decomposition

Total AR, risk, and IR can be decomposed:

- Manager's true, due to manager decisions
- Manager misfit, due to client decisions

Manager's return =  $R_P$

Investor's benchmark return =  $R_{IB}$

Manager's benchmark return =  $R_{MB}$

Total AR:

$$R_P - R_{IB}$$

Manager's "true" AR:

$$R_P - R_{MB}$$

Manager's "misfit" AR:

$$R_{MB} - R_{IB}$$

$$\text{Total active risk} = \sqrt{(\text{true active risk})^2 + (\text{misfit active risk})^2}$$

$$\text{True information ratio} = \frac{\text{true active return}}{\text{true active risk}}$$

- In a diversified portfolio of multiple managers, the true IR better reflects an individual manager's contribution to the total portfolio.



# **Study Session 13**

## **Alternative Investments for Portfolio Management**

# Alternative Investments for Portfolio Management

## Study Session 13



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## Final Review: Alternative Investments

- Understand the role of and challenges with using alternative investments (AI) in a portfolio.
- Know the common characteristics of AI.
  - But, focus on the main issues and differences between the AI types.

## AI: Overview

Common features:

- Potential portfolio diversification
- High due diligence costs
- Informationally inefficient
- Low liquidity (and return premium)
- Difficult to find appropriate, investable benchmarks

Traditional AI:

- Private equity (PE)
- Commodities, long only
- Real estate (RE)

Modern AI:

- Hedge funds (HF)
- Managed futures (MF)
- Distressed securities (DS)

- RE and commodities have inherent asset class characteristics.
- HF and MF are manager skill based.
- PE and DS are a blend of asset class and manager skill.

## AI: Overview

### Due diligence requirements:

- Assess the market opportunity.
- Assess the investment process.
- Assess the manager's organization and people.
- Assess the investment terms and structure.
- Assess the service providers (e.g., lawyers, brokers, ancillary staff).
- Review the documents.
- Write it up.

### Special issues for high net worth clients:

- Tax issues: Partnerships, trusts
- Suitability: Goals, time horizons, subjective concerns
- Communication: Assess the client's level of knowledge.
  - Decision risk: Assess whether the client understands and will stay with the investment.
- Consider the client's existing exposures (such as equity and homeownership) before adding AI (such as PE and RE).

## AI: RE

Indirect investment:

- CREFs (commingled real estate funds)
  - Pooled or separately managed accounts
  - REITs (real estate investment trusts)
  - Stock in companies involved in the RE business
- Direct ownership of actual properties
- Personal residences are generally excluded from the “investable assets” of the client, but do affect asset allocation decisions.

While classified as indirect, **unsmoothed**

**NCREIF** provides the best indication of true RE characteristics:

- Unsmoothed data removes the “**smoothing effects**” of using **appraisals** to value property.
  - Unadjusted smoothed data understates  $\sigma$  and overstates the diversification benefits.
- NCREIF is not an investable index.

NAREIT represents the performance of traded shares of companies that invest in RE:

- Investable indexes exist.
- But, the investment reflects a blend of equity and RE characteristics.
- “Hedged” REIT data removes corporate leveraging effects.
  - But, unsmoothed NCREIF is still considered more reflective of true RE characteristics.

## AI: RE

### RE characteristics

#### Return:

- Inverse relationship with interest rates
- Positive correlation with changes in GNP and population
- Mixed results, but generally provides an inflation hedge

Risk reduction is enhanced when RE is diversified by property type and geographically.

#### Primary portfolio impact:

##### Adding unsmoothed NCREIF:

- Return ↓, sigma ↓
- Sharpe ↑

##### Adding REITS to portfolio:

- Return ↑, sigma ↓
- Sharpe ↑
- But, REIT data reflects embedded equity like characteristics.

## AI: PE

- Requires skills beyond standard equity investing
  - What is the market opportunity?
  - What is the business plan?
    - Active role in corporate strategy and management
    - Use of material nonpublic data for corporate purposes is allowed
  - What is the financial and legal structure of the deal?
  - Risk is high and commonly bimodal (success or failure).
- Investment is commonly done through funds (see LPs).

**Venture capital (VC):** Financing for new or growing private companies

- Higher underlying risk, so typically unleveraged
- Often done with convertible preferred stock
- Longer multi-year time horizon

**Buyout funds (BO):** Buy established companies or divisions thereof

- Established cash flow means lower underlying risk and return
  - Often leveraged up
- Somewhat shorter time horizon

## AI: PE

### PE characteristics

- High return (and risk)
  - Wide variation by time period and type of PE
  - VC return generally exceeds BO fund return
- Low correlation with public equity
- Data is subject to significant appraisal and smoothing issues.

### Primary portfolio impact:

- Potential return enhancement
- Highly dependent on manager skill
  - Lack of investable benchmarks

## Limited Partnerships

- Limited partnerships are a legal structure restricted to qualified investors.
- They are illiquid and involve complex tax issues.
- They are commonly used for many types of AI.
  - The underlying investments could be: RE, PE, commodities, derivatives, distressed securities, and any other specified in the partnership document.
- High, incentive fee structures are normal.

LP timeline:



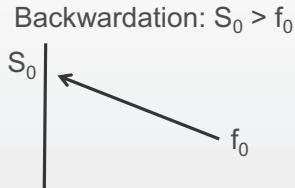
## AI: Commodities

- Have inherent asset class characteristics
- Direct investment is usually done through fully collateralized long commodity derivative positions.
  - The underlying derivatives are liquid and replicable.
- Investable benchmarks generally exist.

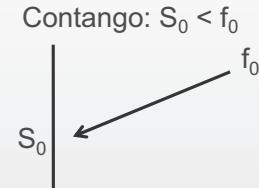
Return can be decomposed as:

- Collateral return:  $r_f$
- Spot asset return:  $S_t - S_0$
- Roll return\*:  $\Delta f - \Delta S$ 
  - If held to expiration:  $\text{roll} = S_0 - f_0$

\* Caution: Roll is only one component of return to the long contract position.



+ roll for long contract held to expiration\*



- roll for long contract held to expiration\*

## AI: Commodities

### Commodity characteristics

- Lower return and higher risk than stock
- But wide variation in characteristics based on type and weighting of commodity exposure
- Very low correlation (about 0) to stock and bond returns
- Highly liquid

### Primary portfolio impact:

- Excellent diversification
- A potential inflation hedge
  - Storable commodities linked to the business cycle have had high positive correlation to inflation.

## AI: Hedge Funds

- Lack definable asset class characteristics
- Private, largely unregulated pools of money
- Often use long and short positions with high leverage
  - Lock-up periods during which withdrawals are not allowed are common
  - As are high water marks to prevent a second incentive fee as a fund returns to a previous high

Extensive due diligence and evaluation issues, including:

- Reporting frequency does not mean liquidity.
- Looking through leverage calculations may be useful.
- Appraisal and smoothing issues understate risk and overstate diversification and Sharpe ratio benefits.
- Self-reporting of data by managers and survivorship bias raise questions regarding the data.
- Compounded return with “multiplicative” risk calculations distort the Sharpe.
- Sigma frequently used to report risk, but returns show negative skew.

## AI: Hedge Funds

Using a fund-of-funds (FOF) provides:

- Diversified HF exposure
- Access to a manager skilled in assessing and with access to hedge funds
- But a double fee structure

### Hedge fund characteristics

- Wide variation in return and risk
- Some periods and strategies show high return with favorable Sharpe ratios

### Primary portfolio impact:

- Potential return enhancement

## AI: Managed Futures

Similar to hedge funds

- Invest in long and short derivative positions
- Can specialize in many different markets
- Some follow systematic trading rules and may be replicable
  - Others are discretionary

Managed futures characteristics

- Return similar to stock with lower risk
- Low correlation
- But with wide variation by style and strategy

Primary portfolio impact:

- Diversification and improved Sharpe ratio

## AI: Distressed Securities

- Investing in securities of in or near bankrupt companies
  - Potentially an under-followed area
- Some are structured as open-ended hedge funds, others as closed-end private equity funds
- Requires credit, business, and legal expertise
- High event, liquidity, and J factor (judge) risk
  - Little market risk (i.e., uncorrelated to general market)

### Characteristics

- High return, low sigma, and high Sharpe ratio
- Returns are heavily event driven with low correlation to stock return

### Primary portfolio impact:

- Return enhancement

# **Study Session 14**

## **Risk Management**

# Risk Management

## Study Session 14



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## Final Review: Risk Management

- Understand why risk management is essential for organizations to survive and prosper.
  - And why centralized risk management is superior to decentralized
- Know the three approaches to VaR (analytical, historical, and Monte Carlo) plus the pros (and cons) of VaR versus other tools for controlling risk.
  - Plus the extensions and supplements to VaR
- Be able to determine current and potential credit risk for forward contracts, swaps, and options (OTC).

## Risk Management

### Risk Governance:

1. The governance structure:  
~~centralized~~ or decentralized
2. The infrastructure
3. Reporting lines
  - Reporting independent from line managers
4. Methodology

### Risk Management Process:

1. Identify and measure specific risk exposures
2. Set specific risk tolerance levels
3. Report risk exposures to stakeholders
4. Monitor and take necessary corrective actions to adjust the risk exposures

Enterprise (Wide) Risk Management (ERM): a centralized system for the organization:

- Aggregates risks and considers correlation
- Allows specialization of risk management labor and resources
  - A serious time commitment and expense
- Goal: Identify and take profitable risks
- Capital at zero risk only earns  $r_f$

## Sources of Risk

### Financial:

- 1. Interest rates
- 2. Exchange rates
- 3. Equity prices
- 4. Commodity prices
- 5. Credit risk
- 6. Liquidity risk

1–4: reflect supply and demand for financial assets

5: credit derivatives are giving this market like aspects

### Non-financial:

- Operational
- Model
- Settlement (Herstatt)
- Regulatory
- Legal/contract
- Tax
- Accounting
- Sovereign/political
  - Has credit risk elements but more complex
  - Ability versus willingness to pay
- Miscellaneous risks:
  - Changes related to environment, society, government, and new securities or derivatives
  - Performance fee netting (when they do not offset)

Aggregating risk requires considering correlation and diversification.

## VaR

**Value at Risk (VaR)**—A measure (amount or %) of downside risk:

- Estimate maximum (and minimum) loss at a specified level of probability over a specified time period.
  - Time period based on organization needs and situation
  - Probability most commonly: 1% or 5% (in a single tail)

Calculation Methods:

- Analytical (variance-covariance method)
  - $E(R) - z\sigma$
  - 1% probability,  $z = 2.33$
  - 5% probability,  $z = 1.65$
- Historical
  - Based on ranking historical outcomes
- Monte Carlo simulation
  - Model potential outcomes and then treat like simulated history

Extensions of VaR:

- Incremental VaR
- Tail VaR
- Cash flow or earnings at risk
- Credit VaR
- Scenario and stress testing to compliment VaR

## VaR

### Pros

- Easily understood by senior management
- Favored by regulators
- Versatile—used for:
  - Risk-adjusted performance
  - Capital allocation

### Cons

- Can be difficult to estimate
  - Multiple methods and assumptions
- Can create a false sense of security
  - Losses can be larger
- Individual VaRs can be aggregated by assuming a correlation
  - Credit VaR is right tail and difficult to aggregate with market risk
- Ignores the upside

## Credit Risk

Current (actual) credit risk:

- Cash flow due to be received now
- Often zero

Potential credit risk

- The market value (if positive) of the position
- Must be estimated for nontraded items

- Both will likely change over time
- Potential credit risk is typically the issue, unless directed otherwise

$E(R)$

Market VaR (loss)  
is typically high  
when returns are  
low.

But, credit VaR is  
typically high when return  
and market value is high.

Credit risk is generally managed through:

- Position limits
- Marking to market and requiring collateral
- Netting on swap payments
- Credit quality standards
- Credit derivatives

## Budgeting for Market Risk

Set a:

- VaR limit
- Working capital limit—working capital that can be lost
- Size limit on each position
- Liquidity limit—size limit versus typical trading volume
- Stopout—liquidate any position with a loss of more than “x”
- Risk factor limit (e.g., beta, duration, VaR, or credit quality limits)
- Limit on leverage
- Set a max loss amount under a standardized scenario analysis

## Calculating Potential Credit Risk

Forward currency contract, value at  $T_t$  per foreign currency unit, quotes must be d/f:

$$\frac{S_t}{(1+f)^t} - \frac{F_0}{(1+d)^t} = \text{value to long}$$

Forward contract on a stock, value at  $T_t$  (no dividend cash flows):

$$S_t - PV(F_0) = \text{value to long}$$

In these two formulas, the discounting ( $t$  exponent and PV) are for remaining term to contract expiration.

## Calculating Potential Credit Risk

Interest rate swap:

- Value the fixed-side cash flows as a fixed-rate bond.
  - Value the floating-side cash flows as next coupon plus par.
    - LIBOR rates must use 360-day year and multiplicative (not compounded) calculations.
  - Received is an asset; add that value.
  - Paid is a liability; subtract that value.
- $\boxed{\quad} = \text{swap value}$

Options:

- The (market) value of the option
  - Only long positions can have positive value and potential credit risk.

## Risk-Adjusted Performance Evaluation

**Sharpe ratio:**  $= \frac{\bar{R}_P - \bar{R}_F}{\sigma_P}$

- Widely used
- Assumes a normal distribution

- Symmetrical measure of risk
- Asymmetric risk measures
- VaR is an asymmetric downside-based risk measure, but the VaR calculation methodology can be symmetric (analytical method) or potentially asymmetric (historical and MCS methods).
- Downside deviation is a sigma-like calculation using only the returns below the hurdle rate.

**Sortino ratio:**  $= \frac{\bar{R}_P - MAR}{\text{downside deviation}^*}$

- Numerator is similar to Sharpe, but
  - Hurdle rate is selected (not  $r_f$ )

**Return over Max Drawdown ratio:**  $= \frac{\hat{R}_P}{\text{maximum drawdown}}$

- Assumes history provides best estimate of risk
- Max drawdown is largest % decline from high to subsequent low

**Risk Adjusted Return on Capital ratio:**  $= \frac{\hat{R}_P}{\text{capital at risk}}$

- VaR is a measure of capital at risk

# **Study Session 15**

## **Derivatives Risk Management Strategy**

# **Derivatives Risk Management Strategy**

## **Study Session 15**



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## Final Review: Derivatives Risk Management

- Apply and understand the issues of using futures contracts to adjust equity and fixed-income exposures in a portfolio.
  - This reading also rehashes currency hedging issues, a worthwhile exercise.
- Apply option basics to combined position strategies.
  - Know the payoff diagram of each strategy and calculations.
- Calculate EAR for option hedged loans, borrower or lender.
- Understand delta hedging.
- Be able to use swaps to modify risk exposures.
  - Understanding and using swap diagrams is key to all swap issues.

## Adjusting Exposure with Futures

- Buy contracts to increase exposure.
- Sell to decrease exposure.

<b>Equity</b> $N_f = \left( \frac{\beta_T - \beta_P}{\beta_f} \right) \left( \frac{V_p}{P_f (\text{Mult})} \right)$	<b>Bonds</b> $N_f = \left( \frac{D_T - D_P}{D_f} \right) \left( \frac{V_p}{P_f (\text{Mult})} \right) (B_Y)$
--	---

- $P_f \times \text{multiplier}$  = full contract price
- $B_Y$  is assumed to be 1 unless given

Synthetic equity more precisely replicates the beginning and ending value of actual positions.

It is based on the above formula:

- Using the FV of  $V_p$
- Assuming the absolute value of  $(B_T - B_P) / B_f$  is 1.00, unless other data is given

Synthetic cash: Sell equity futures  
+ Hold the number of shares required to "deliver" at contract expiration, "discounted" at the dividend yield

Synthetic equity: Buy equity futures  
+ Hold the cash equivalents required to "pay" at contract expiration, "discounted" at  $r_f$

## Basis Risk

The most technical definition is *unexpected changes in f versus S.*

- Perfect hedging locks in  $f_0$ , not  $S_0$ .
- Holding the contract to expiration dictates  $F_T = S_T$  for a *known* change in relationship.
- Eliminating the “basis risk”

The more common usage is any imperfection in the hedge:

- Hedge and contract length do not match, the issue above
- Betas, durations, and yield beta changing from the estimates used in the hedge
- Initial misvaluation in the arbitrage relationship between the spot and contract prices
- Rounding the number of contracts

Read the case facts and give pertinent reasons if asked.

Cross hedge is a related term: Any hedge where the hedged item and item underlying the hedging vehicle are not identical, creating basis risk

## Currency Forwards (and Futures)

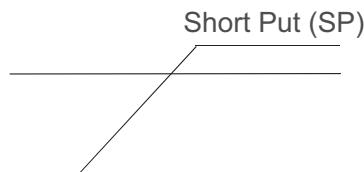
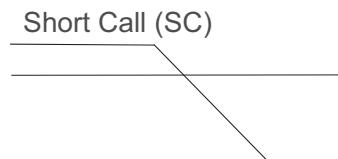
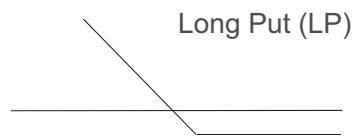
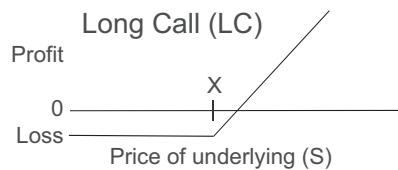
Position in the foreign currency (FC)	Risk	Required hedge
Future receipt (i.e., long)	FC ↓	Sell FC forward
Future payout (i.e., short)	FC ↑	Buy FC forward

A domestic investor in a foreign asset earns the local market return ( $R_{FC}$ ) and foreign currency return ( $R_{FX}$ ).

- Hedge neither risk: Both  $R_{FC}$  and  $R_{FX}$  are risky and depend on subsequent market changes.
- Hedge only the currency risk: Earn the forward premium ( $\approx r_{f(dom)} - r_{f(for)}$ ) and the risky  $R_{FC}$ .
  - The currency hedge will be imperfect as beginning units of FC are sold forward but actual currency exposure is based on ending units.
- Hedge only the foreign market: Earn risk-free<sub>for</sub> and the risky  $R_{FX}$ .
- Hedge both risks: Net earn risk-free<sub>dom</sub>
  - Hedging the foreign market locks in risk-free<sub>for</sub>, allowing the actual ending currency risk exposure to be hedged as well.

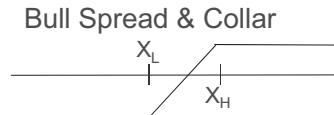
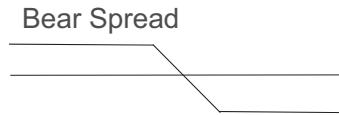
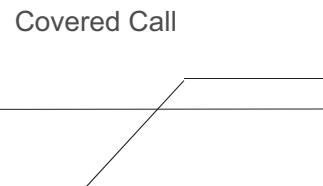
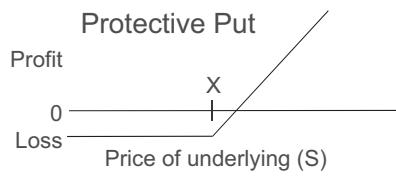
Conclusions assume contracts are fairly priced and held to expiration.

## Option Basics



- X, the strike price sets change in line direction and determines IV
- Call IV is the greater of  $(S - X)$  or 0
- Put IV is the greater of  $(X - S)$  or 0
- Intrinsic value (IV) is + for the long and – for the short

## Combined Option Payoff Diagrams

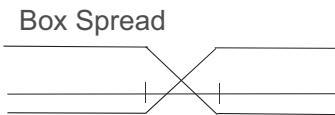
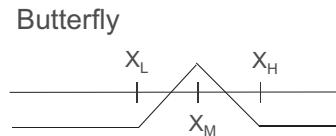
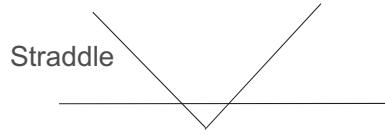


- X, the strike price sets change in line direction
- L, M, and H subscripts denoting lower, medium, and higher strike prices

Collar and Bull Spread have the same payoff pattern but are built differently

- Bull spread (e.g.,  $LC_L$  and  $SC_H$ )
- Collar (e.g., Long the underlying,  $LP_L$  and  $SC_H$ )

## Combined Option Payoff Diagrams



The Box Spread combines a matched Bull and Bear Spread (same strikes and expiration), creating a known beginning and end value.

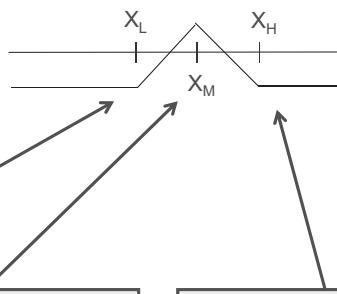
- It is a riskless arbitrage position.
- If initial investment (BV) is a:
  - Net expenditure—EV is a receipt that is higher by  $r_f$  periodic
  - Net receipt—EV is a payback that is higher by  $r_f$  periodic

## Combined Option Payoff Diagrams

Caution: Many strategies can be formed from more than one combination.

- Read the instructions and apply the instruments available.
- The butterfly is the “most complicated.”
- But, it is not if you apply the option basics.

Butterfly



Starting from the left:

- This is a  $LC_L$
- With 2  $SC_M$
- And a  $LC_H$

Or, starting from the middle:

- This is a  $SP_M$  and  $SC_M$
- And a  $LP_L$
- And a  $LC_H$

Or, starting from the right:

- This is a  $LP_H$
- With 2  $SP_M$
- And a  $LP_L$

## Combined Option Calculations

All required option calculations can be made from the payoff diagram and option basics:

**First**, calculate total BV (the initial investment); long positions are an expenditure and short a receipt.

**Then**, calculate total EV (ending intrinsic value of all positions) for any desire EV of the underlying:

- Long positions are +EV
- Short positions are -EV

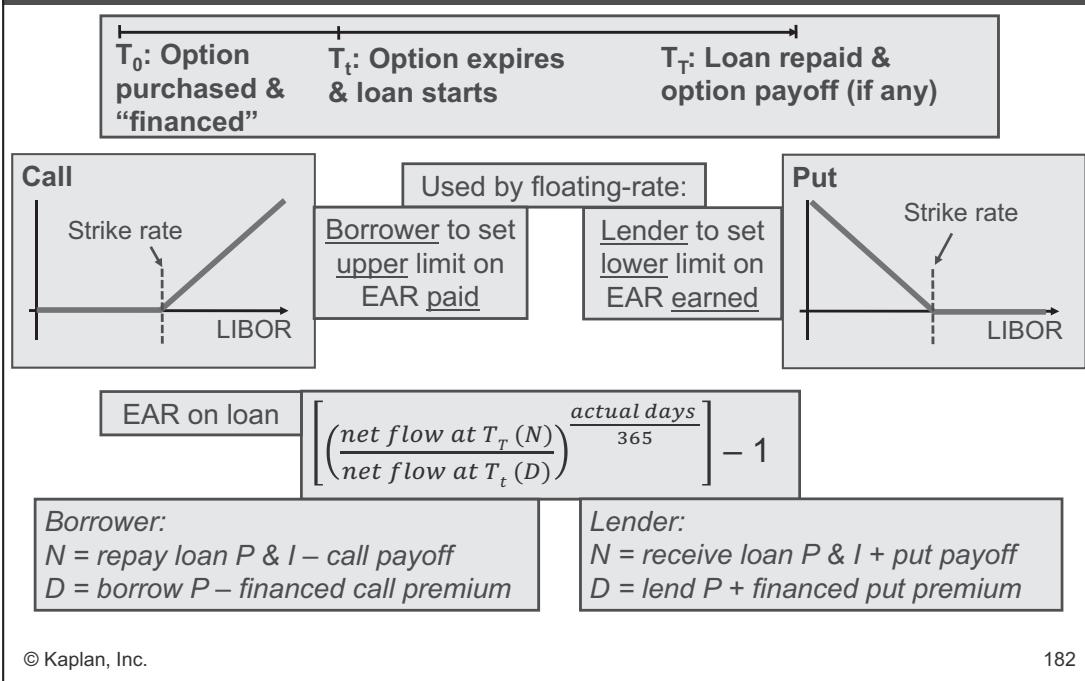
**Last**, calculate G/L as total EV – total BV.

**For max gain:** Examine the payoff diagram and determine the ending value of the underlying required to reach max gain.

**For max loss:** Examine the payoff diagram and determine the ending value of the underlying required to reach max loss.

**For breakeven(s)** (0 profit or loss): Examine the payoff diagram and, from max gain or loss, determine how much the underlying must increase or decrease for breakeven(s).

## Hedging the Effective Annual Rate (EAR)



## Caps, Floors and Collars

**Cap**

A set of interest-rate calls (caplets), all with same strike rate

**Floor**

A set of interest-rate puts (floorlets), all with same strike rate

**Collar**

A cap and a floor:

- Long cap plus short floor—used to limit borrowing rates within a range
- Long floor plus short cap—used to limit lending rates within a range

For a zero-cost collar, select strike rates such that the premium paid = premium received.

When hedging a loan, terms for the interest calls, puts, caps, and floors must match the hedged loan terms:

- Expiration dates match the LIBOR reset dates on the hedged loan.
  - But settlement dates (payouts) are at the end of loan interest periods (the “in arrears” convention).

## Delta Hedging

**Delta-hedging** uses offsetting positions in the underlying and options such that **small, instantaneous changes in one offset the other.**

- The intent is a fully hedged position, not asymmetric modification.
  - $E(R)$  of  $r_f$

- Short call—hedged with long the underlying
- Short put—hedged with short the underlying

Number of shares for hedge =  
 $-\text{delta} \times (\text{number of options})$

- Long stock—hedged with short calls *or* long puts
- Short stock—hedged with long calls *or* short puts

Number of options for hedge =  
 $(-1 / \text{delta}) \times (\text{number of shares})$

Delta:

- Can be given
- $= \Delta \text{ option} / \Delta \text{ underlying}$
- Call delta is  $N(d_1)$  in Black Scholes Merton
- Sum of the absolute deltas of a match call and put = 1.00

## Delta Hedging: Issues

As delta changes, recompute and adjust the hedge.

- Additional funds required to buy are financed at  $r_f$ .
- Funds created by sale are invested at  $r_f$ .

Gamma measures:  
 $\Delta \text{ delta} / \Delta \text{ underlying}$

- Highest for ATM options approaching expiration
- Making the hedge less stable and riskier

Delta hedging can be refined to consider other risks such as vega:  
 $\Delta \text{ option} / \Delta \text{ volatility}$

- Long calls and puts are positively correlated with volatility.
- Short calls and puts are negatively correlated with volatility.

## Using Interest Rate Swaps

Converting asset or liability between fixed- and floating-rate trades cash flow for market value (duration) risk:

Swap notional principal required for conversion:

$$NP = V \left( \frac{D_{target} - D_V}{D_{swap}} \right)$$

- Converting floating-rate to fixed:
- Decreases cash flow risk
  - Increases (absolute) duration

- Converting a fixed-rate to floating:
- Increases cash flow risk
  - Decreases (absolute) duration

Swap duration:

- Add the duration of swap side received (asset)
- Subtract the duration of swap side paid (liability)
- Fixed-side duration is that of an equivalent fixed-rate bond.
  - Assume 75% of maturity if nothing else is given.
- Floating side averages  $\frac{1}{2}$  the swap reset period.

## Currency Swaps

Standard currency swap:

- 2 currencies, swap fixed rates (SFR), and notional principals (NP)
- NPs are exchanged and returned based on initial spot exchange rate ( $S_0$ )

Used to convert loan in one currency to another currency

Special currency swaps with *no* exchange of principals:

- Used to convert one constant future currency stream ( $CF_A$ ) to another currency stream ( $CF_B$ )
- The SFRs will be different from the standard currency swap SFRs.

Convert a constant stream of currency A to currency B:

- Infer  $NP_A: CF_A / SFR_A$
- Infer  $NP_B$  from  $NP_A$  at  $S_0$
- Compute  $CF_B: NP_B \times SFR_B$

## Equity Swaps

### Equity swaps

One of the flows derives from the *return* on a risky security (often equity)

#### Uses:

- Diversification of a concentrated position
- International diversification
- Asset allocation overlays

## Swaptions

### Swaption

Owner has right to enter into (or cancel) a prespecified swap at a future date: Strike = swap fixed rate

$T_0$ , enter the swaption       $T_t$ , swaption can be exercised       $T_t$ , swap terminates, if swaption was exercised

- **Receiver** swaption: Right to receive fixed
- **Payer** swaption: Right to pay fixed

- The right to receive fixed is valuable if: new SFR < swaption SFR
- The right to pay fixed is valuable if: new SFR > swaption SFR

## Swap Diagrams are the Key to the Analysis

A bond issuer paying a 6% fixed rate fears decreasing rates and wants to pay floating

6% ↓

Solution: Enter a pay LIBOR (L)  
Vs. receive 5% fixed\*

6% ↓ ← 5% → L %

Net:

•  $-6 + 5 - L = \text{pay } L + 1\%$

↓ L + 100 bp

The swap effectively converted fixed to floating.

\* Note that SFR are set by market conditions, and if  
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## Swap Diagrams are the Key to the Analysis

What if that issuer would now like to benefit if rates fall but be protected if they are higher in one year?

↓ L + 100 bp

Solution: Needs the right to enter a receive L vs. pay fixed of 4.9%\* (i.e., buy a payer swaption for 60 bp × NP)

L + 100 bp ↓ ← L% → 4.9%

Net, in one year:

- If new SFR > 4.9%, exercise the swaption
  - $-L - 1 + L - 4.9 = \text{pay } 5.9\%$
- If new SFR ≤ 4.9%
  - Do nothing and let swaption expire

\* Note that SFR and price are set by market conditions, and  
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# **Study Session 16**

## **Trading, Monitoring, and Rebalancing**

# **Trading, Monitoring, and Rebalancing**

## **Study Session 16**



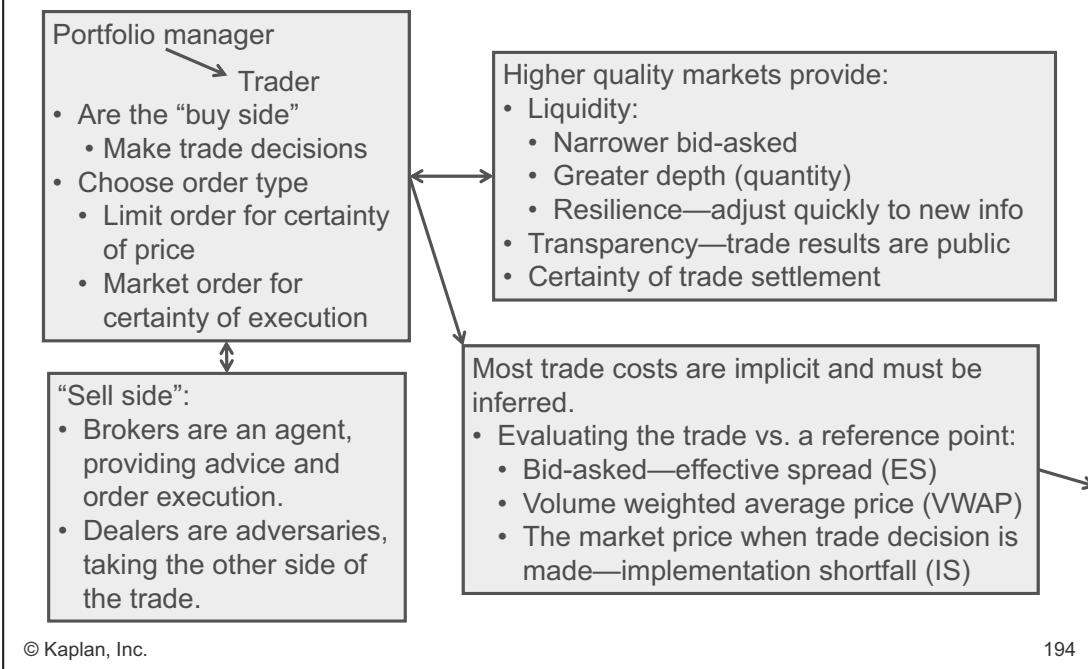
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## Final Review: Trading, Monitoring, Rebalancing

- Understand the various methods of evaluating trade execution and components of trade cost.
  - Plus the relationships between trade motivation and trade costs
- Compare and contrast the three rebalancing strategies.

This section of CFA material includes another IPS discussion that is better covered in Study Sessions 4 and 6.

## Trade Flow



## Calculations

### Effective spread (ES):

- The estimated round trip cost
- $ES = 2 \times (EP - B/A \text{ average})$
- Compare to QS (best asked – best bid)
  - $ES < QS \rightarrow$  higher quality execution
  - $ES > QS \rightarrow$  lower quality execution

### Volume weighted average price (VWAP):

- Execution price (EP) versus volume weighted average trade price for the day
- Easy to game by making the trade decision late in the day

### Implementation shortfall (IS): Total =

Actual – hypothetical no cost profit (easier for buys)

Actual – hypothetical no cost ending value (easier for sells)

- Not subject to gaming
- Complicated
- Can be decomposed into components and related to trade motivations

## IS Component Calculations

DP (decision price): most recent market price when trade decision made

EP (execution price): price of trade, excluding any explicit costs

BP\* (revised benchmark price): price if trade is not executed in a timely fashion;  
timely is first trading day if not directed otherwise

CP (cancelation price): market price when any remaining shares are canceled

Trade analysis timeline: DP → BP\* → EP → CP

Explicit costs: Commissions (and direct trading fees)

Missed trade (opportunity, unrealized G/L) costs:  $|CP - DP| \times \text{shares canceled}$

Delay (slippage) costs:  $|BP^* - DP| \times \text{shares later executed}$

Price (market impact, realized G/L) costs:  $|EP - (DP \text{ or } BP^*)| \times \text{shares executed}$

Hint: Implicit costs (any model) can be a cost or negative cost (account benefit):

- Cost: Price up while buying or down while selling
- Negative cost: Price down while buying or up while selling

## Trading Tactics

Pre-trade econometric modeling: Regresses past trade results to relate cost to relevant variables (any formula must be given)

- Common factors that lower costs: More liquid markets, less volatile/risky stocks, smaller trades, and contrarian strategies

Information-motivated traders seek quick execution:

- Favor market orders and dealer execution
- Accept higher explicit and market impact costs

Value-motivated traders can be patient:

- Favor limit orders and ECNs
- Often contrarian
- Risk higher missed trade costs

Liquidity-motivated need to adjust cash:

- Favor market, market not held, portfolio and principal orders plus ECNs

Passive traders can be patient:

- Favor limit and portfolio orders plus ECNs

## Trading Tactics & Best Execution

**Algorithmic trading:** Use quantitative analysis to break up larger trades

- Simple logical participation
  - VWAP: participate in a portion of expected trading volume for the period (usually a day)
  - TWAP: participate evenly throughout the period
  - % of volume: execute at a set portion of trading volume till order is filled
- IS: use computer analysis to solve for expected lowest total IS
- Opportunistic: react to changing market trading volume
- Specialized: any other (e.g., hunter, execute when conditions are favorable)

### Best execution

characteristics:

- Must be related to the trade decision and motivation
- Cannot be known ex-ante (in advance)
- Any trade can be evaluated ex-post
  - Focus on aggregate results and trends
  - Any single trade evaluation is subject to distortion
- Success is a long-term organizational process

## Rebalancing to the SAA

+ SAA is the theoretical optimal allocation which maximizes utility	But costly: – Transaction costs – Tax on realized gains
+ Rebalancing restores the desired risk exposures	
+ Resets to the desired level of risk as riskier assets appreciate over time	
+ Commits the client to rebalancing away from overpriced assets	

### Ways to rebalance:

- Calendar: do it after every “X” time period
- %-of-portfolio: do it if the allocation corridor is breached (e.g., 40  $\pm$  5% can be 35–45% or 38–42%)
- Hybrid method: rebalance every “X” period if in violation of the corridor

Optimal corridor widths are *wider* for:

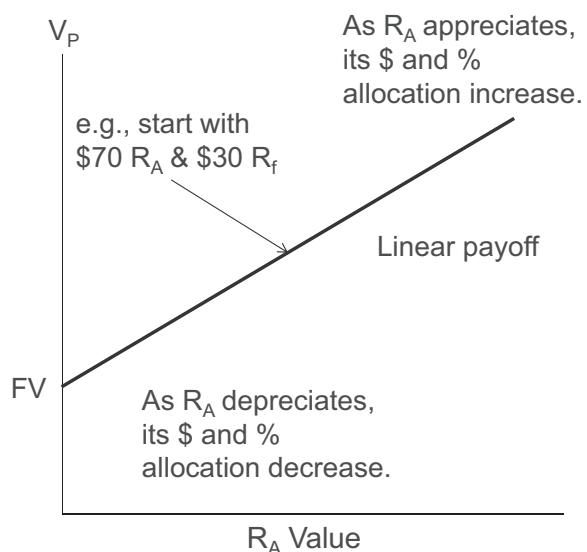
- Higher transaction costs
  - Higher risk tolerance
  - Higher (+) correlation between asset classes
- And *narrower* for:
- A highly volatile asset class
  - If the other asset classes are highly volatile

## Rebalancing Strategies

### Buy and Hold

- Investor risk tolerance,  $RT$  (amount in  $R_A$ ): increase/decrease matches increase/decrease in  $R_A$ 
  - $RT = 0$  when  $R_A = 0$
- Floor value ( $FV$ ) is initial amount in  $r_f$
- $R_A$  amount = 1 ( $V_P - FV$ )
- Infinite upside, but portfolio value increases more slowly than  $R_A$
- Does best in mixed markets (volatile but around a trend) after considering costs

Do nothing strategy:



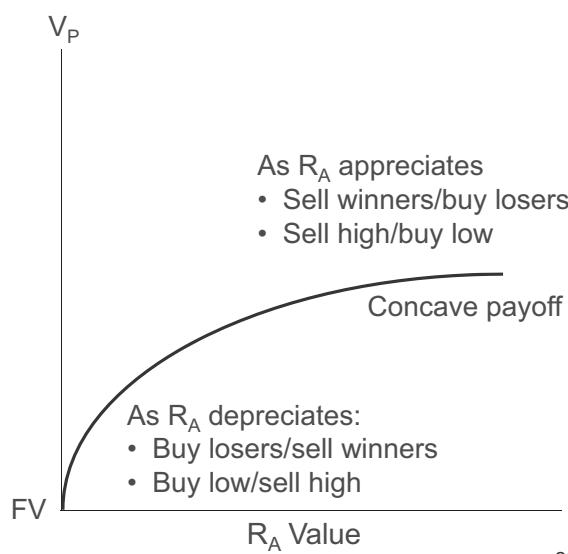
## Rebalancing Strategies

### Constant Mix

- RT (amount) changes more slowly than  $V_P$ : % change in RT matches % change in  $V_P$
- Best for investors with constant relative RT
- $RT = 0$  when  $R_A & V_P = 0$
- $R_A$  amount =  $m (V_P - FV)$ , where  $m < 1$
- Diminishing rate of upside
- $FV = 0$

- Does best in volatile mean-reverting markets
- But its over-popularity creates market stability

Contrarian strategy:

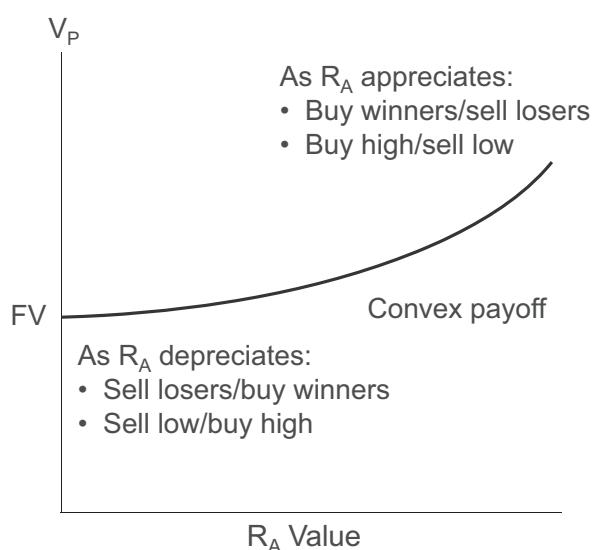


## Rebalancing Strategies

### Constant Proportion (CPPI)

- RT (amount): increases/decreases faster than increase/decrease in  $R_A$  and  $V_P$
  - $R_A$  amount =  $m (V_P - FV)$ , where  $m > 1$
  - Increasing rate of upside
  - FV exceeds initial amount in  $r_f$
- Does best in simple trending markets
    - But its over-popularity creates volatile mean reversion

### Momentum strategy:



# **Study Session 17**

## **Performance Evaluation**

# Performance Evaluation

## Study Session 17



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## Final Review: Performance Evaluation

- Understand basic time- and money-weighted return calculations and issues.
- Understand how to use benchmarks to deconstruct sources of portfolio return.
- Understand and use performance attribution models.
- Assess manager return and risk results.

## TWR vs. MWR

$$T_0: \\ BV = 100$$

$$T_{3 \text{ months}}: \\ V = 110 + 20 \text{ contribution} = 130 \text{ EV}$$

$$T_{12 \text{ months}}: \\ EV = 136.50$$

$$r_p: \\ 110/100 - 1 = 10\%$$

$$r_p: \\ 136.50/130 - 1 = 5\%$$

Time-weighted geometrically links subperiod returns:

$$(1.10 \times 1.05) - 1 = 15.5\%$$

- Requires market value at start and end of every subperiod
- Every ECF triggers subperiod
- Therefore, TWR is unaffected by the ECFs
- Generally required for GIPS

Money-weighted is a trial and error determination of the IRR that makes the FV of CFs equal the EV:

$$136.50 = 100(1 + R)^{(12/12)}$$

$$+ 20(1 + R)^{(9/12)}; R \approx 14.4\%$$

- No market value on ECF dates required
- MWR is affected by timing and size of ECFs
- Required for GIPS if the manager controls timing of ECFs

With no ECFs or in smoothly trending markets, the two results will be materially the same.

## Benchmarks

### Properties of a valid benchmark:

- Specified in advance
- Appropriate
- Measurable
- Unambiguous
- Reflective of (the manager's) investment opinions/style
- Accountable (owned)
- Investable

Commonly used benchmarks: Typically fails to meet the properties

- ~~Absolute return~~
- ~~Manager universe~~
- Broad market index
- Style indexes
- Factor-model-based
- Returns-based model
- Custom security based

Usually based on regression analysis

## Deconstructing Portfolio Return

$$P = M + S + A$$

P: Portfolio return

M: Market return (think long term SAA set by client)

B: Return of the manager's benchmark (think shorter term TAA set by client)

S: Style =  $R_B - R_M$  (think value added by client decisions)

A: Active manager decisions =  $R_P - R_B$  (think true value added by manager)

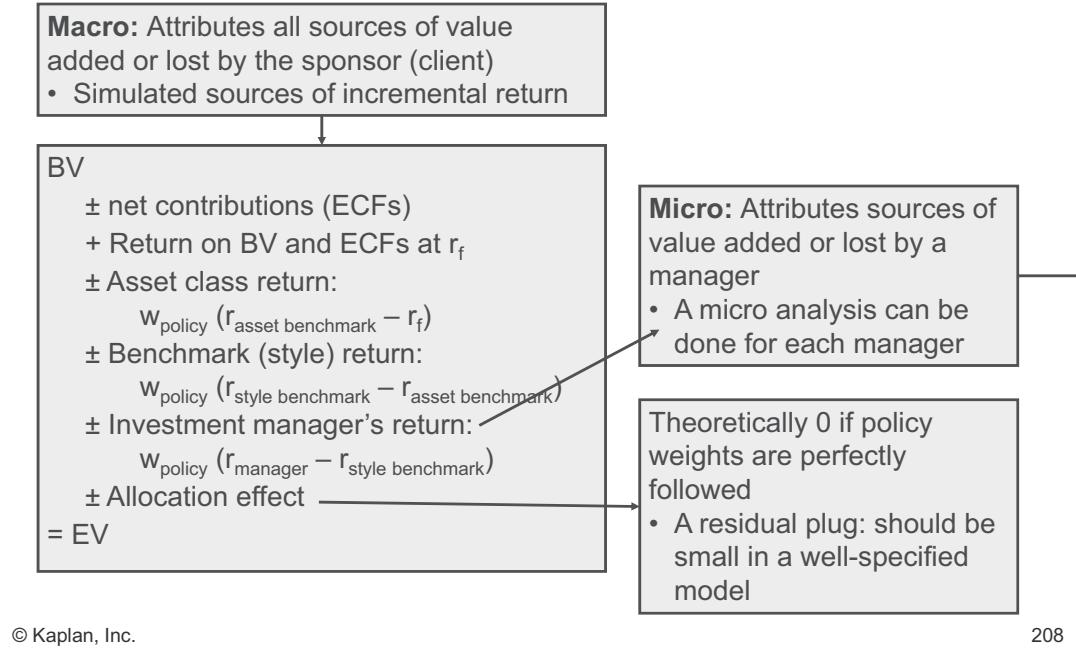
E: Total value added =  $R_P - R_M = S + A$

Benchmark quality tests (think quantification of professional common sense)

- Minimal systematic bias:
  - Correlation of A to S  $\approx 0$
  - Correlation of S to E is positive
- Low  $\sigma$  of A: tracking error
- Similar risk characteristics to portfolio
- High coverage ratio of portfolio securities
- Low turnover (so replicable at reasonable cost)
- Net positive active positions (positions held are over-weighted versus benchmark)

These mean the manager should add true value regardless of whether the style is in favor and the style contributes to total value added.

## Equity Performance Attribution



## Micro Attribution

$$R_P = \sum_{j=1}^S (w_{Pj} - w_{Bj})(R_{Bj} - R_B)$$

Pure Sector Allocation:

- Over- or underweighting of strong or weak performers

$$+ \sum_{j=1}^S (w_{Pj} - w_{Bj})(R_{Pj} - R_{Bj})$$

Allocation/Selection Interaction:

- Difficult to interpret
- Required for the sources to sum to  $R_P$

$$+ \sum_{j=1}^S w_{Bj} (R_{Pj} - R_{Bj})$$

Within-Sector Selection:

- Pure manager security selection

## Other Models

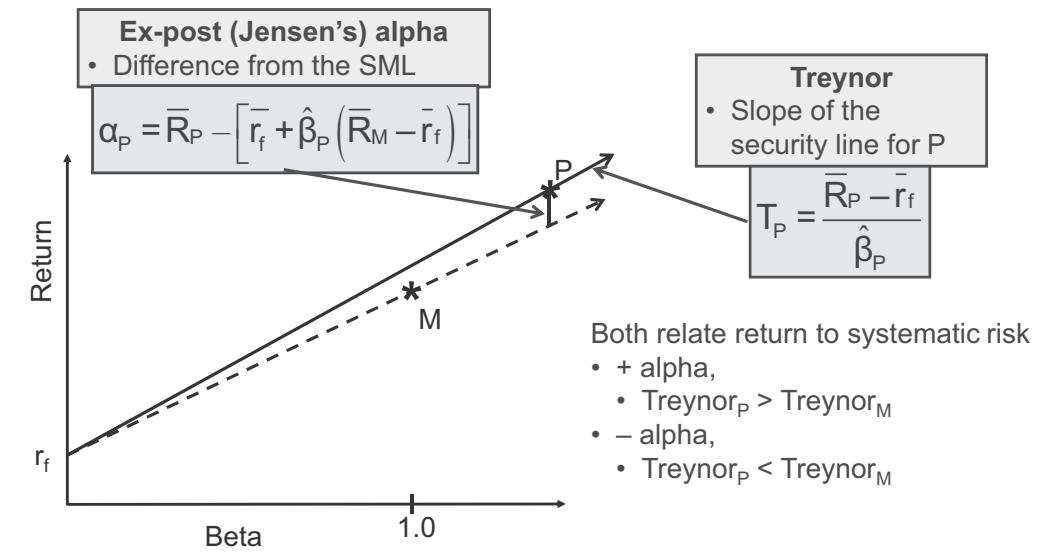
Fundamental factor model micro attribution (equity):

- Regress historical portfolio returns to relevant variables to find best fit weights
- Same process as return-based style analysis (e.g., beta, market cap, industry sector, and financial quality).

Fixed-income performance attribution:

- Computer-based software attributes return to:
  - External interest rate effect: The benchmark's return
  - Interest rate management effects: Simulated incremental return of default-free bonds due to manager deviations from the benchmark in duration, convexity, and yield curve exposures
  - Sector/quality effects: Simulated incremental return due to manager deviations from the benchmark in sector and quality weights
  - Security selection effect: Simulated incremental return from individual securities selected
  - Transaction costs
  - Trading activity: the residual plug

## Risk-Adjusted Measures:



## Risk-Adjusted Measures: Total Risk

**M-squared**

- Return if risk had been the same as the market

$$M_P^2 = r_f + \left( \frac{\bar{R}_P - r_f}{\hat{\sigma}_P} \right) \hat{\sigma}_M$$

**Sharpe**

- Slope of a CAL

$$S_P = \frac{\bar{R}_P - r_f}{\hat{\sigma}_P}$$

Both relate return to total risk

- $M_P^2 < R_M$
- $\text{Sharpe}_P < \text{Sharpe}_M$
- $M_P^2 > R_M$
- $\text{Sharpe}_P > \text{Sharpe}_M$

Note the similarity of Sharpe to IR:

$$IR_P = \frac{\text{active return}}{\text{active risk}} = \frac{\bar{R}_P - \bar{R}_B}{\hat{\sigma}_{P-B}}$$

IR treats  $R_B$  as the investable "risk-free" alternative

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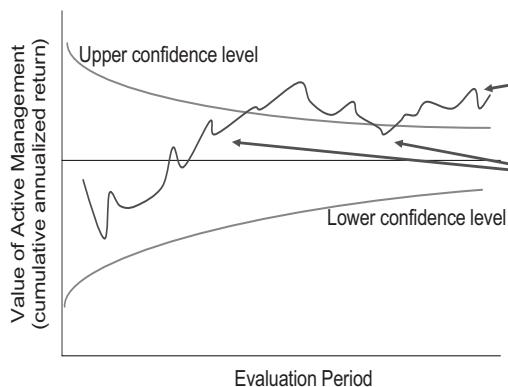
## Evaluating Manager Performance

Hire or fire should be based on:

- Qualitative: what do they say they do
- Quantitative: what does the data say
- Do these match

Quality control charts represent a series of hypotheses tests—is the VA statistically significant:

- Null Hypothesis:  $VA = 0$
- With time (more data) the acceptance range narrows



- VA appears +, not zero
  - Risk: Type I error, manager may subsequently underperform
- VA appears insignificant, zero
  - Risk: Type II error, manager may subsequently out (or under) perform

# **Study Session 18**

## **Global Investment Performance Standards**

# Global Investment Performance Standards

## Study Session 18



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## Final Review: GIPS

- Recognize basic issues of compliance and noncompliance in a current GIPS report.
  - The reading includes a history lesson of past rules.
  - GIPS is principal driven—firms must determine how to meet the intent.

The CFA reading is only a basic overview, and that is mind numbing.

The GIPS Mind Maps cover the key issues we suggest you focus on, not the history lessons.

## GIPS vs. SPC

### Standards of Professional Conduct:

- Mandatory
- Applies to individuals

### GIPS:

- Voluntary but encouraged
- Applies (only) to investment firms
- Nine sections, 0–8

- Fully consistent with each other
- But, if adopted, GIPS will require policies and procedures beyond the SPC

## (0) Compliance

Must be firmwide

- The firm must and has wide latitude to define itself.
  - Bottom line: a recognizable business entity
- Firm assets are based on fair value and include discretionary and nondiscretionary, as well as fee and non-fee paying accounts.
  - Only discretionary accounts are part of the performance results.
  - The firm must define what makes an account nondiscretionary
    - Any *material* impediment to discretion makes a portfolio nondiscretionary.
- May not claim:
  - “Partial” or “except for” compliance
  - Results are “calculated in accordance with GIPS”
    - Except if presenting the results of a client to that client

## (1) Input Data Requirements

Capture (document) all data using:

- Fair value\*: Market value for actively traded securities
- Trade (not settlement) date accounting
- Include accrued income for the value of fixed income securities
- Basic GIPS reporting links periodic returns
  - Value portfolios at least monthly and on the date of all large external cash flows (ECFs).
  - A large ECF is one that would distort the composite (or portfolio) return calculation.

\* Preferred valuation *hierarchy* if market value is not available:

1. Prices of similar assets in active markets
2. Prices of similar assets in inactive markets
3. Observable market inputs other than prices (e.g., PE, DY)
4. Subjective, unobservable inputs (e.g., discounted cash flow)

## (2) Calculation Methods

Geometrically link (time-weighted) sub-period returns

- Basic measurement period is monthly and reporting period is annual.
- Exception: IRR (money-weighted) calculations are required if the manager controls the timing of ECFs.
- No or minimal ECFs—the methods are substantially equivalent.
- The impact of a manager holding cash and cash equivalents must be reflected in return calculations, even if the manager used a third party to manage the cash.
- Returns can be reported gross- or net-of-fees.
  - Gross-of-fee is after direct trading costs.
  - Net-of-fee is gross after investment manager fee.
  - A bundled fee is any fee combining these and/or any other fees.
    - If bundled fees cannot be disaggregated to meet the above intent, deduct the entire fee and fully disclose what is in the fee.

### (3) Composite Construction

GIPS reporting is by composite.

- Composite: a group of comparable accounts
  - Composite returns are weight by BV or BV plus weighted ECFs.
    - EV weighting cannot be used\*

\* BV and EV are beginning and ending fair value, which

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usually means market value.

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### (3) Composite Construction

- “All actual fee-paying discretionary portfolios must be included in at least one composite.”
  - Model or hypothetical results must be excluded.
    - But can be provided as supplemental information
  - Non-fee-paying portfolios may be included if this is disclosed and done consistently.
  - Nondiscretionary assets must be excluded.
    - Remove the account from the composite.
    - Or, remove only the no-discretionary component of the account from the composite.
    - Remove the full month if any part of the month is nondiscretionary.
  - A relevant cutoff size for composite inclusion is allowed (with disclosure).

### (3) Composite Construction

- In multi-composite firms, an account may meet and would be included in all relevant composites.
- Asset carve-out reporting is allowed (but not required) if:
  - Each portfolio segment is set up as a separate account
  - With its own cash balance
  - And managed by that composite's manager

Example:

- TSM manages balanced accounts as well as equity-only and bond-only accounts.
- Account 124 is 100M in size with a strategic allocation of 10% cash, 50% equity, and 40% bonds. Set up a:
  - 124 equity account with 50M and reported in the equity composite
  - 124 bond account with 40M and reported in the bond composite
  - Continue to report 124 (total) results in the balanced composite

## (4) Required Disclosures

**Required (and must appear):**

1. A GIPS compliance statement
2. Definition of the firm
3. Adequate description of the composite
4. Description of the relevant benchmark
5. The currency used to present performance
6. The relevant fee schedule
7. Some measure of internal composite dispersion
  - Not required if less than 6 accounts in composite for full year
8. External dispersion: The annualized standard deviation of trailing 36 monthly returns for the composite and benchmark (this requirement started with year 2011) or if not relevant, explain and present what is
9. Composite creation date
10. A list of composite descriptions will be provided on request. The list must include all composites terminated within the last five years.
11. Policies for valuing, calculating, and presenting performance will be provided on request.

## GIPS – Compliance Statements

### 1: Firm that has been verified

- “(Firm) claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. (Firm) has been independently verified for the periods (...-...). The verification report(s) is/are available upon request. Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm’s policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. Verification does not ensure the accuracy of any specific composite presentation.”

### 2: Individual composite that has had perf. review

- “(Firm) claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. (Firm) has been independently verified for the periods (...-...) “Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm’s policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. The (composite name) composite has been examined for the periods (...-...). The verification and performance examination reports are available upon request.”

### 3: Firm not verified

- “(Firm) claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. (Firm) has NOT been independently verified.”

## (4) Required Disclosures

**Required (but only if relevant):**

- 12.If presenting gross of fees, any fees deducted in addition to direct trading expenses
- 13.If presenting net of fees:
  - If any fees are deducted in addition to management fees and trading expenses
  - If model or actual management fees are used
  - If returns are net of any performance-based fees
- 14.Presence, use, and extent of leverage, derivatives, and short positions (if material), including a description of the frequency and characteristics of the instruments used (i.e., enough information the client can understand the nature of the risks)
- 15.All significant events that would help prospective clients interpret the presentation
- 16.Periods prior to 2000 that include noncompliant data that are included in the presentation
- 17.Date, description of, and reason for redefining the firm

## (4) Required Disclosures

**Required (but only if relevant):**

18. Date, description of, and reason for redefining a composite
19. Any changes to the name of the composite
20. Minimum account asset level for inclusion in the composite and any changes to that level
21. Treatment of withholding taxes on dividends, interest, and capital gains and whether benchmark returns are net of withholding taxes (if the information is material and available)
22. Any known material differences in exchange rates *and valuation sources* among portfolios in the composite or between the composite and the benchmark
23. If the presentation conforms with local laws or regulations that conflict with GIPS and the manner of the conflict
24. Any periods prior to 2010 of carve-out accounting done by internal computations rather than by setting up separately managed subaccounts
25. If the composite contains portfolios with bundled fees, the types of fees included in the bundled fees

## (4) Required Disclosures

**Required (but only if relevant):**

26. Any use of sub-advisors selected by the firm and the periods of usage
27. Any periods prior to 2010 using other than month-end valuation
28. Starting January 1, 2011, report any material use of subjective, unobservable portfolio valuation inputs
29. If composite valuation hierarchy differs materially from recommended hierarchy
30. If the firm has a significant ECF policy for the composite, how the firm defines *significant*
31. If firm determines no appropriate benchmark exists, explain why
32. If benchmark changed: date of, description of, and reasons why benchmark changed
33. If a custom benchmark or a combination of benchmarks is used: the benchmark components, weights, and rebalancing process
34. Whether performance of a past firm or affiliation is linked and included

## (5) Presentation and Reporting

- Reporting is by composite, annual returns
  - The initial report must cover 5 years
    - Unless the composite has existed for less, then report since inception
    - Add 1 year annually until a minimum rolling 10 year record is presented
  - Report relevant benchmark returns for the same periods
- Report a relevant measure of internal dispersion (if 6 or more accounts) for the same periods
  - Sample or population sigma is common but not required (e.g., There were 14 accounts in the Equity Composite for 2015 with a weighted average composite return of 5.7% and standard deviation of 2.2%).
- Report external annualized sigma of the trailing 36 months' returns for the composite and benchmark (e.g., At the end of 2015, the annualized returns and standard deviation of the last 36 months' returns of the Equity Composite were 10.7% and 11.1% respectively.)

## (5) Presentation and Reporting

- Number of portfolios in the composite by year, if 6 or more
- Composite assets by year
  - And total firm assets **or** composite assets as a percentage of firm assets
- Percentage in the composite of non-fee-paying portfolios
- Percentage in the composite of bundled-fee portfolios

### Issues:

- Past performance cannot be changed (except to correct an error)
- Composite performance is not portable, it is the firm's record
  - So if Firm A acquires Firm B, the past record of B now belongs to A and is part of the past performance record of A, provided:
    - Substantially all the decision makers from B are employed by A
    - The decision process remains independent and comparable
    - The past record can be documented

## (6) Real Estate and (7) Private Equity

- RE and PE are frequently:
  - Nonmarketable or illiquid
  - Offered through closed-end finite life funds where the manager controls the timing of the ECFs (admissions and withdrawals)
  - These are **subject to special provisions of GIPS.**
- Liquid marketable securities and funds such as REITs, MBS, and evergreen (open to admission and withdrawal) funds remain under basic GIPS.
- The CFA text states this is a highly complex area and only basic concepts are being introduced.

## (6) Real Estate and (7) Private Equity

Valuation and measurement frequency: (Basic GIPS is monthly)

- RE: Quarterly based on internal (by the firm) valuation
  - Valuation by a qualified external source is required every 12 months (or 36 months if the client agrees, in which case disclose the % of composite that was externally valued for the year)
- PE: Annual
  - Report gross- and net-of-fee returns

For closed-end funds, return is SI-IRR (IRR from fund's inception until its liquidation): (Basic GIPS TWR is not allowed)

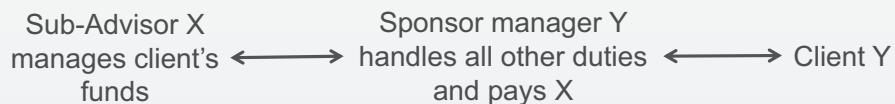
- RE: Using at least quarterly ECFs
- PE: Using daily ECFs
  - Report gross- and net-of-fee returns

Closed-end fund composites for both RE and PE:

- Must group comparable accounts by **vintage year (year of inception)**:
- Return reporting **must disclose sources of return, income versus capital return (price change)**

## (8) Wrap Fees/Separately Managed Accounts

WFSMA rules apply to sub-advisor relationships where both managers are GIPS compliant and one client bundled fee covers both managers. (Basic GIPS already makes a manager who selects a sub-advisor responsible for the sub-advisor's results.)



- Sub-advisor may rely on sponsor to make performance calculations to use in sub-advisor's composite reporting.
  - Basic GIPS requires reporting net of entire bundled fee.
  - Additional rules apply:
    - If combining WFSMAs with other accounts in one composite
    - For composite presentations by the sub-advisor to the sponsor of results made up solely of that sponsor's accounts

## Other: Advertising Guidelines

GIPS-compliant managers may also use a “slimmed down report” for soliciting and retaining clients and advertising that the firm complies with GIPS. It must include:

- A description of firm
- How to obtain a full GIPS compliant presentation and/or a list of all composite descriptions
- The statement: *“(Firm) claims compliance with the Global Investment Performance Standards (GIPS®)”*

If performance data is included then present:

- Most recent 1-, 3-, and 5-year returns, or
- Period-to-date plus 1-, 3-, and 5-year returns for the same periods in the full GIPS report, or
- Period-to-date plus five years of annual returns for the same periods in the full GIPS report
- Plus benchmark returns
- Full disclosure regarding any material use of leverage, derivatives, and short positions

## Other: Verification

Verification is a process of having an independent qualified third party “audit” the firm’s GIPS process:

- The verifier will issue an opinion regarding whether the firm complies on a firmwide basis and has proper policies and procedures in place.
  - Verification is a review of process and not a guarantee of accuracy.
- Verification may also include more detailed review of specified composites.
- Verification covers a minimum of one year but covering the period of the full GIPS report is recommended.
- There are extensive lists of what the verifier will review.

## Other: After-tax Return Reporting

Is supplemental information only:

- It is optional for a firm to do so
- GIPS only provides guidance on how to approach the process.

Start with the composite and benchmark returns in GIPS.

Clearly and fully disclose the assumed tax rates, rules, and assumptions used to convert these to after-tax.

- Pre-liquidation would consider only realized taxes.
- Mark-to-liquidation assumes no tax deferral and 100% realized taxation each period.
- The underlying issue is that clients must be able to judge if the assumptions used are relevant to their tax situation.

## **Notes**

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