2017 Level III

CFA® Exam Prep

Schweser's Secret Sauce®

eBook

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Level III Schweser's Secret Sauce®

SCHWESER'S SECRET SAUCE®: 2017 LEVEL III CFA®

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Foreword

The Secret Sauce is a summary of the high points in the Level III CFA® Curriculum. It builds on the 2017 Level III SchweserNotes™. It is best used after reading that material, attending class, working on Class Discussion Questions, and using the QBank for initial practice.

It cannot cover everything in the roughly 2,000 pages of CFA text. It is a review tool to solidify the important issues the text emphasized. When you find something you are shaky on, go back to the SchweserNotes™ and/or class slides for more detail.

Candidates who study and practice the material have every reason to do well on the exam. But do not fall into the trap of expecting exam questions to be exactly like practice questions. Learn the underlying concepts, apply the concepts in practice questions, and expect surprises on exam day. The CFA Institute always finds a way to throw in a few twists.

At Level I, you largely memorized facts and then regurgitated them on the exam. At Level II, the topical coverage was more difficult, but each topic was tested in a stand-alone item set in much the way it was presented in the curriculum. At Level III, you will be expected to combine different topics from different parts of the curriculum into a single, multi-part question.

The other major challenge is constructed response. You must know the material, think logically, and then respond directly to what is asked in the question. The CFA Institute does not award points for a general display of knowledge. Our Weekly Class Workbook and Practice Exams illustrate how to answer constructed response questions. It is a skill learned through practice.

Level III provides its own unique challenges. Work hard, practice, and you can make your own good luck.

I wish you all the best on exam day.

David Hetherington

David Hetherington, CFA
Vice President and Level III Manager

Kaplan Schweser

Ethics

Topic Weight on Exam	10–15%
SchweserNotes™ Reference	Book 1, Pages 1–60

Study Session 1 – Ethical and Professional Standards

CFA Institute Code of Ethics and Standards of Professional Conduct

Cross-Reference to CFA Institute Assigned Readings #1 & 2

Ethics is covered in Study Sessions 1 and 2. Ethics will comprise 10–15% of the exam and could be tested in two selected response item sets like Level II or a combination of constructed response and item set questions. Read the case, think of the appropriate principles that are most pertinent, and then select the best answer choice. In some cases, an educated guess is the best you can do. Also, be prepared for questions related to compliance issues, the Asset Manager Code of Conduct, and the disciplinary process. The best way to prepare for ethics is to read the CFA material and then work all of our questions plus the CFA end-of-reading questions.

Code of Ethics

Members of CFA Institute, including Chartered Financial Analyst® (CFA®) charterholders, and Candidates for the CFA designation ("Members and Candidates") must:[1]

- Act with integrity, competence, diligence, respect, and in an ethical manner with the public, clients, prospective clients, employers, employees, colleagues in the investment profession, and other participants in the global capital markets.
- Place the integrity of the investment profession and the interests of clients above their own personal interests.
- Use reasonable care and exercise independent professional judgment when conducting investment analysis, making investment recommendations, taking investment actions, and engaging in other professional activities.

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- Practice and encourage others to practice in a professional and ethical manner that will reflect credit on themselves and the profession.
- Promote the integrity and viability of the global capital markets for the ultimate benefit of society.
- Maintain and improve their professional competence and strive to maintain and improve the competence of other investment professionals.

Guidance for Standards I–VII

I. Professionalism

I(A). **Knowledge of the Law.** Members must understand and comply with laws, rules, regulations, and Code and Standards of any authority governing their activities. In the event of a conflict, follow the more strict law, rule, or regulation.

Guidance

Members must know the laws and regulations relating to their professional activities in all countries in which they conduct business. Do not violate Code or Standards even if the activity is otherwise legal. Always adhere to the most strict rules and requirements (law or CFA Institute Standards) that apply.

Dissociate from any ongoing client or employee activity that is illegal or unethical, even if it involves leaving an employer (an extreme case). While a Member may confront the involved individual first, he must approach his supervisor or compliance department. Inaction with continued association may be construed as knowing participation.

Recommendations for Members

- Establish, or encourage employer to establish, procedures to keep employees informed of changes in relevant laws, rules, and regulations.
- Review, or encourage employer to review, the firm's written compliance procedures on a regular basis.
- Maintain, or encourage employer to maintain, copies of current laws, rules, and regulations.
- When in doubt about legality, consult supervisor, compliance personnel, or a lawyer.
- When dissociating from violations, keep records documenting the violations, encourage employer to bring an end to the violations.
- There is no requirement in the Standards to report wrongdoers, but local law may require it; members are "strongly encouraged" to report violations to CFA Institute Professional Conduct Program.

Recommendations for Firms

- Have a code of ethics.
- Provide employees with information on laws, rules, and regulations governing professional activities.
- Have procedures for reporting suspected violations.

I(B). Independence and Objectivity. Use reasonable care to exercise independence and objectivity in professional activities. Do not offer, solicit, or accept any gift, benefit, compensation, or consideration that would compromise independence and objectivity.

Guidance

Do not let the investment process be influenced by any external sources. Modest gifts are permitted. Allocation of shares in oversubscribed IPOs to personal accounts is NOT permitted. Distinguish between gifts from clients and gifts from entities seeking influence to the detriment of any client. Gifts must be disclosed to the Member's employer in any case.

Guidance—Investment-Banking Relationships

Do not be pressured by sell-side firms to issue favorable research on current or prospective investment-banking clients. It is appropriate to have analysts work with investment bankers in "road shows" only when the conflicts are adequately and effectively managed and disclosed. Be sure there are effective "firewalls" between research/investment management and investment banking activities.

Guidance—Public Companies

Analysts should not be pressured to issue favorable research by the companies they follow. Do not confine research to discussions with company management, but rather use a variety of sources, including suppliers, customers, and competitors.

Guidance—Buy-Side Clients

Buy-side clients may try to pressure sell-side analysts. Portfolio managers may have large positions in a particular security, and a rating downgrade may have an effect on the portfolio performance. As a portfolio manager, there is a responsibility to respect and foster intellectual honesty of sell-side research.

Guidance—Issuer-Paid Research

Analysts' compensation for preparing such research should be limited, and the preference is for a flat fee, without regard to conclusions or the report's recommendations.

Recommendations for Members

Members or their firms should pay for their own travel to company events or tours when practicable and limit use of corporate aircraft to trips for which commercial travel is not an alternative.

Recommendations for Firms

- Establish policies requiring every research report to reflect the unbiased opinion of the analyst and align compensation plans to support this principal.
- Establish and review written policies and procedures to assure research is independent and objective.
- Establish restricted lists of securities for which the firm is not willing to issue adverse opinions. Factual information may still be provided.
- Limit gifts from non-clients to token amounts.
- Limit and require prior approval of employee participation in equity IPOs.
- Establish procedures for supervisory review of employee actions.
- Appoint a senior officer to oversee firm compliance and ethics.

I(C). **Misrepresentation.** Do not misrepresent facts regarding investment analysis, recommendations, actions, or other professional activities.

Guidance

Do not make misrepresentations or give false impressions. Misrepresentations include guaranteeing investment performance and plagiarism. Plagiarism encompasses using someone else's work without giving credit.

Recommendations for Members

- Understand the scope and limits of the firm's capabilities to avoid inadvertent misrepresentations.
- Summarize your own qualifications and experience.
- Make reasonable efforts to verify information from third parties that is provided to clients.
- Regularly maintain webpages for accuracy.
- Avoid plagiarism by keeping copies of all research reports and supporting documents and attributing direct quotes, paraphrases, and summaries to their source.

I(D). **Misconduct.** Do not engage in any professional conduct that involves dishonesty, fraud, or deceit. Do not do anything that reflects poorly on your integrity, good reputation, trustworthiness, or professional competence.

Guidance

CFA Institute discourages unethical behavior in all aspects of Members' and Candidates' lives. Do not abuse CFA Institute's Professional Conduct Program by seeking enforcement of this Standard to settle personal, political, or other disputes that are not related to professional ethics.

Recommendations for Firms

- Develop and adopt a code of ethics and make clear that unethical behavior will not be tolerated.
- Give employees a list of potential violations and sanctions, including dismissal.
- Check references of potential employees.

II. Integrity of Capital Markets

II(A). **Material Nonpublic Information.** Members and Candidates in possession of material nonpublic information must not act or induce someone else to act on the information.

Guidance

Information is "material" if its disclosure would impact the price of a security or if reasonable investors would want the information before making an investment decision. Information is "nonpublic" until it has been made available to the marketplace. This Standard does not apply to using material nonpublic information for its intended purpose, such as an investment banker using information from a firm (the client) in order to advise or act for that client in ways that are otherwise ethical.

Guidance—Mosaic Theory

There is no violation when a perceptive analyst reaches an investment conclusion about a corporate action or event through an analysis of public information together with items of *non-material* nonpublic information.

Recommendations for Members

- Make reasonable efforts to achieve public dissemination by the firm of information they possess.
- Encourage their firms to adopt procedures to prevent the misuse of material nonpublic information.

Recommendations for Firms

- Issue press releases prior to analyst meetings to assure public dissemination of any new information.
- Adopt procedures for equitable distribution of information to the market place (e.g., new research opinions and reports to clients).
- Establish firewalls within the organization for who may and may not have access to material nonpublic information. Generally, this includes having the legal or compliance department clear interdepartmental communications, reviewing employee trades, documenting procedures to limit information flow, and carefully reviewing or restricting proprietary trading whenever the firm possesses material nonpublic information on the securities involved.
- Ensure that procedures for proprietary trading are appropriate to the strategies used. A blanket prohibition is not required.
- Develop procedures to enforce firewalls with complexity consistent with the complexity of the firm.
- Physically separate departments.
- Have a compliance (or other) officer review and authorize information flows before sharing.
- Maintain records of information shared.
- Limit personal trading, require that it be reported, and establish a restricted list of securities in which personal trading is not allowed.
- Regularly communicate with and train employees to follow procedures.

II(B). Market Manipulation. Do not engage in any practices intended to mislead market participants through distorted prices or artificially inflated trading volume.

Guidance

This Standard applies to transactions that deceive the market by distorting the price-setting mechanism of financial instruments or by securing a controlling position to manipulate the price of a related derivative and/or the asset itself. Spreading false rumors is also prohibited. Actions that affect price and volume but are not done with misleading intent to deceive are not a violation.

III. Duties to Clients and Prospective Clients

III(A). Loyalty, Prudence, and Care. Members must always act for the benefit of clients and place clients' interests before their employer's or their own interests. Members must be loyal to clients, use reasonable care, and exercise prudent judgment.

Guidance

Client interests always come first.

- Exercise prudence, care, skill, and diligence.
- Manage pools of client assets in accordance with the terms of the governing documents. The client can be a specific individual, group, or even the general investing public.
- Make investment decisions in the context of the total portfolio.
- Advise clients of any limitations on the advice, such as only recommending products of the advisor.
- Vote proxies in an informed and responsible manner. Due to cost benefit considerations, it may not be necessary to vote all proxies.
- Client brokerage, or "soft dollars" or "soft commissions," must be used to benefit the client.

Recommendations for Members

Submit to clients, at least quarterly, itemized statements showing all securities in custody and all debits, credits, and transactions. Disclose where client assets are held and if they are moved. Keep client assets separate from others' assets.

If in doubt as to the appropriate action, what would you do if you were the client? If still in doubt, disclose and seek written client approval.

Encourage firms to address these topics when drafting policies and procedures regarding fiduciary duty:

- Follow applicable rules and laws.
- Establish investment objectives of client.
- Consider suitability of a portfolio relative to the client's needs and circumstances, the investment's basic characteristics, or the basic characteristics of the total portfolio.
- Diversify unless account guidelines dictate otherwise.
- Deal fairly with all clients in regard to investment actions.
- Disclose conflicts of interest.
- Disclose manager compensation arrangements.
- Regularly review actions for consistency with documents.

- Vote proxies in the best interest of clients and ultimate beneficiaries.
- Maintain confidentiality.
- Seek best execution.
- Put client interests first.

III(B). Fair Dealing. Members must deal fairly and objectively with all clients and prospects.

Guidance

Fairly does not mean equally. In the normal course of business, there will be differences in the time emails, faxes, et cetera, are received by different clients. Different service levels are okay, but they must not negatively affect or disadvantage any clients. Disclose the different service levels to all clients and prospects, and make premium levels of service available to all who wish to pay for them.

Give all clients a fair opportunity to act upon every recommendation. Clients who are unaware of a change in a recommendation should be advised before the order is accepted.

Treat all clients fairly in light of their investment objectives and circumstances. Members and Candidates should not take advantage of their position in the industry to disadvantage clients.

Recommendations for Members

- Encourage firms to establish compliance procedures requiring proper dissemination of investment recommendations and fair treatment of all customers and clients.
- Maintain a list of clients and holdings—use to ensure that all holders are treated fairly.

Recommendations for Firms

- Limit the number of people who are aware that a change in recommendation will be made.
- Shorten the time frame between decision and dissemination.
- Publish personnel guidelines for pre-dissemination—have in place guidelines prohibiting personnel who have prior knowledge of a recommendation from discussing it or taking action on the pending recommendation.
- Disseminate new or changed recommendations simultaneously to all clients who have expressed an interest or for whom an investment is suitable.
- Establish systematic account review—ensure that no client is given preferred treatment and that investment actions are consistent with the account's objectives.
- Disclose available levels of service and the associated fees.

- Disclose trade allocation procedures.
- Develop written trade allocation procedures to:
  - Document and time stamp all orders.
  - Bundle orders and then execute on a first come, first fill basis.
  - Allocate partially filled orders.
  - Provide the same net (after costs) execution price to all clients in a block trade.

III(C). Suitability

1. When in an advisory relationship with client or prospect:
   a. Make reasonable inquiry into clients' investment experience, risk and return objectives, and constraints prior to making any recommendations or taking investment action. Reassess information and update regularly.
   b. Be sure recommendations and investments are suitable to a client's financial situation and consistent with client objectives.
   c. Make sure investments are suitable in the context of a client's total portfolio.
2. When managing a portfolio, investment recommendations and actions must be consistent with stated portfolio objectives and constraints.

Guidance

In advisory relationships, gather and maintain relevant client information. If responsible for managing a fund to an index or other stated mandate, be sure investments are consistent with the stated mandate.

If a manager receives an unsolicited trade request from a client and determines the trade is not suitable, discuss the situation with the client. If the request does not have a material effect on the client, the trade may be executed after the discussion. If the trade has a material effect, work with the client to change the IPS or make the trade in a client-directed account.

Recommendations for Members

- Establish a written IPS, considering type of client and account beneficiaries, the objectives, constraints, and the portion of the client's assets managed.
- Review the IPS annually and update for material changes in client and market circumstances.
- Develop policies and procedures to assess suitability of portfolio changes. Consider the impact on diversification, risk, and meeting the client's investment strategy.

III(D). Performance Presentation. Presentations of investment performance information must be fair, accurate, and complete.

Guidance

Avoid misstating performance or misleading clients/prospects about investment performance. Do not misrepresent past performance or reasonably expected performance. Do not state or imply the ability to achieve a rate of return similar to that achieved in the past. Abbreviated presentations must include an offer that full details are available.

Recommendations for Members

- Encourage firms to adhere to Global Investment Performance Standards.
- Consider the sophistication of the audience to whom a performance presentation is addressed.
- Present the performance of a weighted composite of similar portfolios rather than the performance of a single account.
- Include terminated accounts as part of historical performance and clearly state when they were terminated.
- Include all appropriate disclosures to fully explain results (e.g., model results included, gross or net of fees, etc.).
- Maintain data and records used to calculate the performance being presented.

III(E). Preservation of Confidentiality. All information about current and former clients and prospects must be kept confidential unless it pertains to illegal activities and disclosure is required by law, or the client or prospect gives permission for the information to be disclosed.

Guidance

If illegal activities by a client are suspected, Members may have an obligation to report the activities to authorities. The requirements of this Standard are not intended to prevent Members and Candidates from cooperating with a CFA Institute Professional Conduct Program (PCP) investigation.

Recommendations for Members

- Members should avoid disclosing information received from a client except to authorized coworkers who are also working for the client. Consider whether the disclosure is necessary and will benefit the client.
- Members should follow firm procedures for storage of electronic data and recommend adoption of such procedures if they are not in place.
- Assure client information is not accidentally disclosed.

IV. Duties to Employers

IV(A). **Loyalty.** Members and Candidates must place their employer's interest before their own and must not deprive their employer of their skills and abilities, divulge confidential information, or otherwise harm their employer.

Guidance

Members who are employees must not engage in activities that would injure their firm, deprive it of profit, or deprive it of the advantage of employees' skills and abilities. Always place client interests above employer interests. Members who are independent contractors do not owe this presumption of exclusivity to those who hire them for services. Those members must adhere to the terms of their contract(s).

Members must also comply with their employer's policies regarding social media.

Guidance—Independent Practice

Independent practice for compensation is allowed if a notification is provided to the employer fully describing all aspects of the services, including compensation, duration, and the nature of the activities and if the employer consents to all terms of the proposed independent practice before it begins.

Guidance—Leaving an Employer

Members must continue to act in their employer's best interests until resignation is effective. Activities that may constitute a violation include:

- Misappropriation of trade secrets.
- Misuse of confidential information.
- Soliciting employer's clients prior to leaving.
- Self-dealing.
- Misappropriation of client lists.

Once an employee has left a firm, simple knowledge of names and existence of former clients is generally not confidential. Also, there is no prohibition on the use of experience or knowledge gained while with a former employer.

Guidance—Whistleblowing

There may be isolated cases where a duty to one's employer may be violated in order to protect clients or the integrity of the market and not for personal gain.

Recommendations for Members

- Keep personal and professional social media accounts separate. Business-related accounts approved by the firm constitute employer assets.
- Understand and follow the employer's policies regarding competitive activities, termination of employment, whistleblowing, and whether you are considered a full- or part-time employee, or a contractor.

Recommendations for Firms

Employers should not have incentive and compensation systems that encourage unethical behavior.

- Establish codes of conduct and related procedures.

IV(B). Additional Compensation Arrangements. Accept no gifts, benefits, compensation, or consideration that may create a conflict of interest with the employer's interest unless written consent is received from all parties. An offer from a client that is contingent on future performance is a form of compensation and requires the disclosure and approval conditions of this Standard, IV(B). In contrast, an offer from a client that is based on past performance is a gift (not compensation) and must meet the provisions of Standard I(B), maintaining Independence and Objectivity.

Guidance

Compensation includes direct and indirect compensation from a client and other benefits received from third parties. Written consent from a Member's employer includes e-mail communication.

Recommendations for Members

Make an immediate written report to the employer detailing any proposed compensation and services, if additional to that provided by the employer. It should disclose the nature, approximate amount, and duration of compensation.

Members and candidates who are hired to work part time should discuss any arrangements that may compete with their employer's interest at the time they are hired and abide by any limitations their employer identifies.

IV(C). Responsibilities of Supervisors. Members and Candidates must make reasonable efforts to ensure that anyone subject to their supervision or authority complies with applicable laws, rules, regulations, and the Code and Standards.

Guidance

Members must make reasonable efforts to prevent employees from violating laws, rules, regulations, or the Code and Standards, as well as make reasonable efforts to detect violations.

Guidance—Compliance Procedures

An adequate compliance system must meet industry standards, regulatory requirements, and the requirements of the Code and Standards. Members with supervisory responsibilities have an obligation to bring an inadequate compliance system to the attention of firm's management and recommend corrective action.

When a violation is discovered, the supervisor should:

- Respond promptly and investigate thoroughly.
- Supervise the accused closely until the issue is resolved.
- Consider changes to minimize future violations.

Conduct regular ethics and compliance training.

Design incentive compensation plans to support ethical behavior (e.g., don't incent inappropriate risk taking or other actions detrimental to the clients).

Recommendations for Members

A member should recommend that his employer adopt a code of ethics. Members should encourage employers to provide their codes of ethics to clients.

Once the compliance program is instituted, the supervisor should:

- Distribute it to the proper personnel.
- Update it as needed.
- Continually educate staff regarding procedures.
- Issue reminders as necessary.
- Require professional conduct evaluations.
- Review employee actions to monitor compliance and identify violations.
- Respond promptly to violations, investigate thoroughly, increase supervision while investigating the suspected employee, and consider changes to prevent future violations.

Recommendations for Firms

Do not confuse the code with compliance. The code is general principles in plain language. Compliance is detailed procedures to meet the code.

Compliance procedures should:

- Be clearly written.
- Be easy to understand.
- Designate a compliance officer with authority clearly defined.
- Have a system of checks and balances.
- Establish a hierarchy of supervisors.
- Outline the scope of procedures.
- Outline what conduct is permitted.
- Contain procedures for reporting violations and sanctions.

Ethics education will not deter fraud, but it will establish an ethical culture and alert employees to potential ethical and legal pitfalls. Reinforce the culture with incentive compensation plans that align employee incentives with client best interests.

V. Investment Analysis, Recommendations, and Action

V(A). Diligence and Reasonable Basis

1. When analyzing investments, making recommendations, and taking investment actions, use diligence, independence, and thoroughness.
2. Analysis, recommendations, and actions should have a reasonable and adequate basis, supported by research and investigation.

Guidance

The application of this Standard depends on the investment philosophy adhered to, Members' and Candidates' roles in the investment decision-making process, and the resources and support provided by employers. These factors dictate the degree of diligence, thoroughness of research, and the proper level of investigation required.

Guidance—Using Secondary or Third-Party Research

See that the research is sound. Examples of criteria to use to evaluate:

- Review assumptions used.
- How rigorous was the analysis?
- How timely is the research?
- Evaluate objectivity and independence of the recommendations.

Guidance—Group Research and Decision Making

Even if a Member does not agree with the independent and objective view of the group, he does not necessarily have to decline to be identified with the report, as long as there is a reasonable and adequate basis.

Recommendations for Members

Members should *encourage their firms to consider* these policies and procedures supporting this Standard:

- Have a policy requiring that research reports and recommendations have a basis that can be substantiated as reasonable and adequate.
- Have detailed, written guidance for proper research, supervision, and due diligence.
- Have measurable criteria for judging the quality of research, and base analyst compensation on such criteria.
- Have written procedures that provide a minimum acceptable level of scenario testing for computer-based models and include standards for the range of scenarios, model accuracy over time, and a measure of the sensitivity of cash flows to model assumptions and inputs.
- Have a policy for evaluating outside providers of information that addresses the reasonableness and accuracy of the information provided and establishes how often the evaluations should be repeated.
- Adopt a set of standards that provides criteria for evaluating external advisers and states how often a review of external advisers will be performed.

V(B). Communication With Clients and Prospective Clients

1. Disclose to clients and prospective clients the basic format and general principles of the investment processes they use to analyze investments, select securities, and construct portfolios and must promptly disclose any changes that might materially affect those processes.
2. Disclose to clients and prospective clients significant limitations and risks associated with the investment process.
3. Use reasonable judgment in identifying which factors are important to their investment analyses, recommendations, or actions and include those factors in communications with clients and prospective clients.
4. Distinguish between fact and opinion in the presentation of investment analysis and recommendations.

Guidance

Proper communication with clients is critical to provide quality financial services. Distinguish between opinions and facts and always include the basic characteristics of the security being analyzed in a research report.

Members should communicate risk factors specific to non-traditional investments, including potential gains and losses on all investments in terms of total returns. Members are required to communicate significant changes in the risk characteristics of an investment or strategy and to update clients regularly about changes in the investment process.

Members should explain the limitations inherent to an investment and the limitations of the projections from quantitative models and analysis.

Members must illustrate to clients and prospects the investment decision-making process utilized. The suitability of each investment is important in the context of the entire portfolio.

Recommendations for Members

Selection of relevant factors in a report can be a judgment call so members should maintain records indicating the nature of the research, and be able to supply additional information if it is requested by the client or other users of the report.

Encourage the firm to establish a rigorous method of reviewing research work and results.

V(C). **Record Retention**. Maintain all records supporting analysis, recommendations, actions, and all other investment-related communications with clients and prospects.

Guidance

Members must maintain research records that support the reasons for the analyst's conclusions and any investment actions taken. Such records are the property of the firm. If no other regulatory standards are in place, CFA Institute recommends at least a 7-year holding period.

Recommendations for Members

Maintain notes and documents to support all investment communications.

Recommendations for Firms

If no regulatory standards or firm policies are in place, the Standard recommends a seven-year minimum holding period.

VI. Conflicts of Interest

VI(A). Disclosure of Conflicts. Members and Candidates must make full and fair disclosure of all matters that may impair their independence or objectivity or interfere with their duties to employer, clients, and prospects. Disclosures must be prominent, in plain language, and effectively communicate the information.

Guidance—Disclosure to Clients

The requirement allows clients and prospects to judge motives and potential biases for themselves. Disclosure of broker/dealer market-making activities would be included here. Board service is another area of potential conflict. The most common conflict that requires disclosure is actual ownership of stock in companies the Member recommends or clients hold. Incentive compensation plans that may put member and client interests in conflict must be disclosed to clients by their advisors.

Guidance—Disclosure of Conflicts to Employers

Members must promptly report potential conflicts and give the employer enough information to judge the impact of the conflict. Take reasonable steps to avoid conflicts.

Recommendations for Members

Any special compensation arrangements, bonus programs, commissions, performance-based fees, options on the firm's stock, and other incentives should be disclosed to clients. If the firm refuses to allow this disclosure, document the refusal and consider disassociating from the firm.

VI(B). Priority of Transactions. Investment transactions for clients and employers must have priority over those in which a Member or Candidate is a beneficial owner.

Guidance

Client transactions take priority over personal transactions and over transactions made on behalf of the Member's firm. Personal transactions include situations where the Member is a "beneficial owner." Personal transactions may be undertaken only after clients and the Member's employer have had an adequate opportunity to act on a recommendation. Note that family-member accounts that are client accounts should be treated just like any client account; they should not be disadvantaged.

Recommendations for Members

Members should encourage their firms to adopt the procedures listed in the following recommendations for firms and disclose these to clients.

Recommendations for Firms

All firms should have basic procedures in place that address conflicts created by personal investing. The following areas should be included:

- Establish limitations on employee participation in equity IPOs and systematically review such participation.
- Establish restrictions on participation in private placements. Strict limits should be placed on employee acquisition of these securities and proper supervisory procedures should be in place. Participation in these investments raises conflict of interest issues similar to those of IPOs.
- Establish blackout/restricted periods. Employees involved in investment decision making should have blackout periods prior to trading for clients—no front running (i.e., purchase or sale of securities in advance of anticipated client or employer purchases and sales). The size of the firm and the type of security should help dictate how severe the blackout requirement should be.
- Establish reporting procedures, including duplicate trade confirmations, disclosure of personal holdings and beneficial ownership positions, and preclearance procedures.
- Disclose, upon request, the firm's policies regarding personal trading.

VI(C). Referral Fees. Members and Candidates must disclose to their employers, clients, and prospects any compensation consideration or benefit received by, or paid to, others for recommendations of products and services.

Guidance

Members must inform employers, clients, and prospects of any benefit received for referrals of customers and clients, allowing them to evaluate the full cost of the service as well as any potential partiality.

Recommendations for Members

Members should encourage their firms to adopt clear procedures regarding compensation for referrals.

Recommendations for Firms

Have an investment professional advise the clients at least quarterly on the nature and amount of any such compensation.

VII. Responsibilities as a CFA Institute Member or CFA Candidate

VII(A). Conduct as Members and Candidates in the CFA Program. Members and Candidates must not engage in any conduct that compromises the reputation or integrity of CFA Institute or the CFA designation or the integrity, validity, or security of the CFA Institute Programs.

This Standard applies to conduct that includes:

- Revealing anything about either broad or specific topics tested, content of exam questions, or formulas required or not required on the exam.
- Cheating on the CFA Exam or any exam.
- Not following rules and policies of the CFA program.
- Giving confidential information on the CFA program to anyone.
- Improperly using the designation for personal gain.
- Misrepresenting information on the Professional Conduct Statement (PCS) or the CFA Institute Professional Development Program.

Members and Candidates are not precluded from expressing their opinions regarding the exam program or CFA Institute.

VII(B). Reference to CFA Institute, the CFA designation, and the CFA Program. Members and Candidates must not misrepresent or exaggerate the meaning or implications of membership in CFA Institute, holding the CFA designation, or candidacy in the program.

Guidance

Members must not make promotional promises or guarantees tied to the CFA designation. Do not:

- Over-promise individual competence.
- Over-promise investment results in the future.

Guidance—CFA Institute Membership

Members must sign PCS annually and pay CFA Institute membership dues annually. If they fail to do this, they are no longer active Members.

Guidance—Using the CFA Designation

Do not misrepresent or exaggerate the meaning of the designation.

Guidance—Referencing Candidacy in the CFA Program

There is no partial designation. It is acceptable to state that a Candidate successfully completed the program in three years, if in fact the Candidate did, but claiming superior ability because of this is not permitted.

Guidance—Proper Usage of the CFA Marks

The Chartered Financial Analyst and CFA marks must always be used either after a charterholder's name or as adjectives but not as nouns.

Recommendations for Members

Members should be sure that their firms are aware of the proper references to a member's CFA designation or candidacy, as errors in these references are common.

Study Session 2 – Ethical and Professional Standards in Practice

Ethics Cases: The Cases are direct applications of the Standards covered in Study Session 1. Details regarding These specific cases are not tested.

Cross-Reference to CFA Institute Assigned Reading #3

Asset Manager Code of Professional Conduct

Cross-Reference to CFA Institute Assigned Reading #4

There are six components to the (voluntary) Asset Manager Code of Professional Conduct (the "Code"): (1) Loyalty to Clients, (2) Investment Process and Actions, (3) Trading, (4) Risk Management, Compliance, and Support, (5) Performance and Valuation, and (6) Disclosures.[2] Related to these six components are ethical responsibilities:

- Always act ethically and professionally.
- Act in the best interest of the client.
- Act in an objective and independent manner.
- Perform actions using skill, competence, and diligence.
- Communicate accurately with clients on a regular basis.
- Comply with all legal and regulatory requirements.

Details

1. Loyalty to Clients

- Place the client's interests first. Recommendation: Align manager compensation plans with the client's interests.
- Maintain client confidentiality. Recommendation: Create a privacy policy and include an anti-money laundering section if needed.
- Refuse business and gifts that would compromise independence and objectivity. Recommendation: Establish policies and procedures (P&P) setting appropriate limits.

2. Investment Process and Actions

- Act as a professional using reasonable care and judgment for clients.
- Do not manipulate market price and volume with intent to deceive.
- Deal fairly with clients. Different levels of service are allowed if disclosed and available to all clients willing to pay.

2. CFA Institute. Asset Manager Code of Professional Conduct, including Appendix A. CFA Institute, Centre for Financial Market Integrity, 2005.

- Have a reasonable and adequate basis for recommendations and use of third-party research. Managers must be knowledgeable, particularly if using complex strategies, and the strategies must be explained in ways understandable to the clients.
- Portfolios managed to specific styles or strategy must be adequately explained to the client but do not require determining suitability for the client. Recommendation: Disclose any permitted deviations from the strategy and allow client withdrawal without undue penalty if the strategy changes.
- Portfolios managed for a specific client must be suitable for that client. Recommendation: Establish a written IPS. Establish performance benchmarks.

3. Trading

- Do not act or cause others to act on material nonpublic information. Set up suitable P&P. Recommendation: Set up firewalls between those with reasons to have the information and all others.
- Give clients priority over the firm. Establish P&P to limit personal trading by employees and have a compliance officer review the trades. Establish a watch list.
- Use client commissions only for investment uses related to that client. Recommendation: Consider eliminating soft dollars or, if not, follow the CFA Institute Soft Dollar Standards.
- Seek best trade execution. Recommendation: Advise clients who direct trades that this may compromise best execution.
- Establish P&P for fair trade allocation. Recommendations: Group suitable accounts for block trade execution and use prorated allocation for partial trade executions. Address how to handle IPOs and private placements.

4. Risk Management, Compliance, and Support

- Develop detailed P&P to meet the AMC plus all legal and regulatory issues.
- Appoint a suitable compliance officer. Recommendations: The compliance officer is independent of investments and operations. The officer reviews all firm and employee transactions. Require all employees to understand and comply with the AMC.
- Have an independent third party verify that the information provided by the firm to clients is accurate and complete. Verification cannot depend only on internal firm records.
- Maintain records to document investment actions. Recommendations: Retain compliance records. Document violations and corrective actions. Retain records for at least 7 years or as required by law and regulations.
- Employ sufficient, qualified staff to meet the AMC and provide the services promised.
- Establish a business continuity plan.
- Establish a firmwide risk management plan. Recommendations: Outsource if necessary. Be able to explain the process to clients.

5. Performance and Valuation

- Do not misrepresent. Be fair, accurate, relevant, timely, and complete. Recommendation: Adopt GIPS.
- Use fair market price for valuation if available or fair value otherwise. Recommendation: Use independent third parties for valuation.

6. Disclosures

Maintain timely client communication using plain language that is true, accurate, and complete. Include all material facts, including information about the firm. Disclose:

- All conflicts of interest, regulatory and disciplinary actions.
- Investment process, strategy, and risk information.
- All management fee and client cost information.
- All soft dollar and bundled fee information, including what is received in return and the benefit to the client.
- Client account performance with quarterly (within 30 days) reporting recommended.
- Investment valuation methods used.
- P&P for shareholder voting, with particular attention to how controversial votes are handled.
- Trade allocation policies.
- Review and audit results for client funds and accounts.
- Significant firm personnel and organizational changes.
- The firm's risk management process, changes to the process, and what regular communication the client will receive. Regular disclosure of client-specific risk information is recommended.

Behavioral Finance

Topic Weight on Exam	5%
SchweserNotes™ Reference	Book 1, Pages 61–132

Expect behavioral finance to make up approximately 5% of the exam. Item set questions and material integrated into IPS constructed response questions are equally probable. Behavioral Finance concepts are not complicated but there is a lot of overlapping terminology.

The Behavioral Finance Perspective

Cross-Reference to CFA Institute Assigned Readings #5

Behavioral finance (BF) is descriptive of how investors behave. It assumes investors have cognitive limits and emotional biases. Therefore, market prices may not be efficient. The focus of behavioral finance is how to help investors make decisions that more closely approximate the "optimal" decisions of traditional finance in spite of the investor's biases and failings.

Traditional finance (TF) is normative, describing what investors should do. TF assumes investors are rational, risk-averse, apply utility theory to maximize satisfaction, and that market prices are efficient.

Four axioms of utility theory:

1. **Completeness**: Choices and preferences are known.
2. **Transitivity**: Rankings are applied consistently.
3. **Independence**: Utilities are additive and divisible.
4. **Continuity**: Indifference curves are smooth and unbroken.

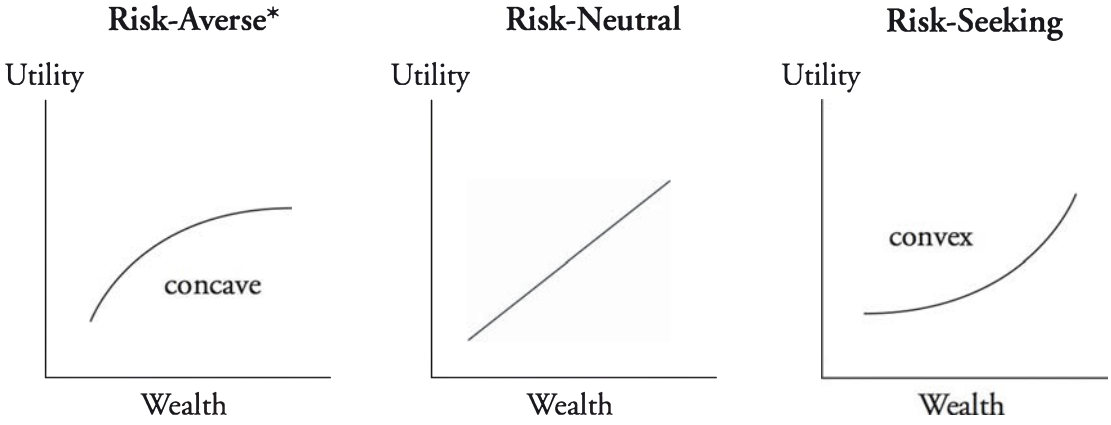
With the receipt of new, relevant information, the rational investor will revise his expectations utilizing a Bayesian framework. Bayes' formula:

$$P(A|B) = \frac{P(B|A)}{P(B)} P(A)$$

Bayes' formula provides analysts with the ability to place a revised probability on a forecast, such as the direction of the market or an individual stock given a revised probability of some event. For example, P(A given B) could be the probability, *P*, that a stock will rise (event A) given a decrease in interest rates (event B). In determining whether the forecast should be revised, the analyst determines a new probability of an increase in the stock using a revised probability of a decrease in interest rates, P(B).

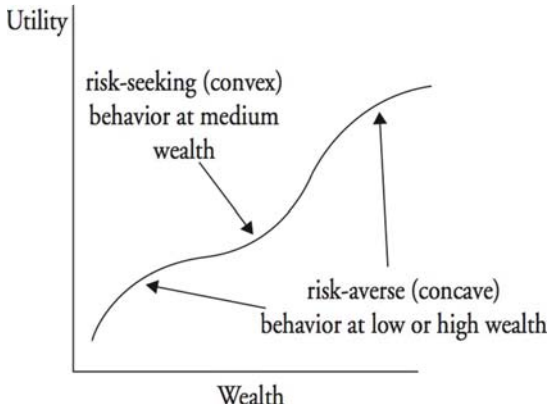
Utility Theory vs. Prospect Theory

Utility theory (and TF) assumes investors are risk averse and feel diminishing marginal utility of wealth. This has two implications. First, an investor's indifference curves will be convex. In order to accept additional equal increments of risk, an investor must expect increasing increments of return. Investors will vary in their risk aversion and those with high risk aversion will select portfolios with lower risk and return while investors with low risk aversion will select portfolios with higher risk and return. Second, investors will have concave utility functions (see the utility function graph). As an investor adds equal increments of wealth, the investor's level of satisfaction (utility) increases but at a diminishing rate.

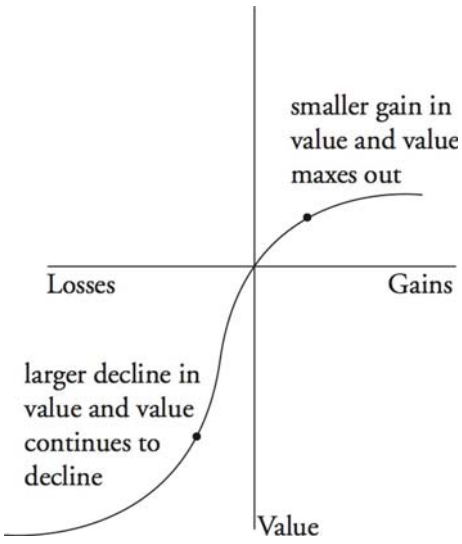


* Generally assumed for Traditional Finance Theory

Behavioral finance assumes investors may at times be risk averse and at other times risk neutral (constant marginal utility of wealth and straight utility function) or risk seeking (increasing marginal utility of wealth and convex utility function). This can produce complex double inflection utility functions.



Double Inflection Utility Function



Prospect Theory Value Function

As an alternative to utility theory and its focus on an investor's level of wealth, BF proposes that prospect theory may better explain investor behavior. Prospect theory assumes:

- Investors focus on perceived gain or loss (changes in wealth), not the level of wealth.
- Perception of gain or loss depends on the reference point used (e.g., year-end price or original cost basis).
- Gain or loss is not "real" until it is realized.
- Subjective decision weights (low probability events are given too much weight) replace objective probability.
- Decisions are made in stages.

The result is that prospect theory assumes investors are risk averse when facing gains (and therefore sell winners too soon) but are loss averse and risk seeking when facing losses (and therefore hold losers too long).

BF Details: Decision Making in Two Phases

- Editing phase includes: Codification, combination, segregation, cancellation, simplification, and dominance. This can lead to an anomaly known as the **isolation effect**, where investors focus on one factor or outcome while unconsciously eliminating or subconsciously ignoring others. As a result, the presentation of the data can affect the decision made even if the underlying economics are the same.

- In the evaluation phase, investors probability weight expected outcomes to determine utility. However, the probabilities are not the simple objective probabilities *p* of TF but adjusted probabilities *wpv*. *w* is an overweighting (underweighting) of low (high) probability outcomes, and *v* is a value function that assigns greater loss in utility for losses in wealth than gains in utility for an equivalent gain in wealth.

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

Bounded Rationality and Satisficing

BF assumes **bounded rationality** investors have limits in their ability to reach optimal decisions. As a result they **satisfice**. They gather enough information and perform enough analysis to reach an acceptable (but not optimal) decision.

Capital Markets and Portfolio Construction

TF leads to the conclusion that markets are efficient:

- **The Price is Right** suggests asset prices reflect all available information and adjust instantaneously to fully incorporate the value of new information. Therefore, the function of the portfolio manager is to allocate an investor's portfolio to asset classes that are consistent with the client's objectives and constraints.
- **No Free Lunch** implies managers cannot generate excess returns (alphas) consistently. All information is instantaneously and accurately incorporated into prices, so whether asset prices change depends on the release of new information. Because information enters the market randomly, changes in prices must also be random, making excess returns impossible to forecast consistently.

Market Efficiency (Efficient Markets Hypothesis, EMH)

- **Weak-form efficiency**: Prices reflect all past price and volume data. Managers cannot consistently generate excess returns using technical analysis.
- **Semi-strong form efficiency**: Prices reflect all public information (includes past price and volume data). New information is immediately reflected in asset prices. Managers cannot consistently generate excess returns using technical or fundamental analysis.
- **Strong-form efficiency**: Prices reflect all information, public and private. No analysis based on inside and/or public information can consistently generate excess returns.

Market Anomalies; Abnormal Returns That Seem to Persist

Anomalies to the EMH exist when investors consistently generate excess return, after adjusting for risk. The empirical evidence generally supports the weak form of the EMH but there are more persistent anomalies to the semi-strong form. These are called fundamental anomalies because they suggest fundamental data can be used to generate excess return. The most well known are the value and small cap biases.

Four Behavioral Finance Models

BF challenges the TF assumption of market efficiency and has proposed four alternatives:

1. **Consumption and Savings.**

   The *behavioral life-cycle model* says that individuals are subject to framing, self-control bias, and mental accounting. Therefore, they will not achieve the optimal balance of short-term consumption and long-term investing.

   - **Framing**: individuals may "frame" income as something they can spend and, therefore, under save for retirement.
   - **Self-control bias**: individuals overvalue the immediate gratification of consumption and, therefore, under save.
   - **Mental accounting**: individuals classify their assets and income into different buckets or tiers. This ignores that all wealth is fungible and is inefficient from a TF perspective, but it may be a rational way to deal with an investor's lack of self-control.

2. **Behavioral Asset Pricing.**

   The required return on an asset is the risk-free rate, plus a fundamental risk premium, plus a sentiment premium. The sentiment premium can be estimated by considering analysts' forecasts. The greater the dispersion of analysts' forecasts, the greater the sentiment premium. If these sentiment premiums are random and unpredictable, they complicate asset allocation.

3. **Behavioral Portfolio Theory (BPT).**

   BPT assumes investors structure their portfolios in **layers** according to their goals. The composition of each layer of the portfolio is determined by the interaction of five factors:

   - If higher return is the goal, more assets are allocated to the higher return layer.
   - The higher return layer will hold higher risk assets.

- Lower risk investors will hold more diversified portfolios.
- Investors with a perceived information advantage will hold more concentrated positions.
- Investors who are highly loss averse will be reluctant to hold risky assets.

BPT portfolios can appear to be diversified and hold many assets but are sub-optimal from a TF perspective because the correlation among asset layers is not considered. However, from a TF perspective, a slightly less efficient portfolio investors can live with is better than an optimal portfolio they abandon during a market setback.

4. The **Adaptive Markets Hypothesis** leads to five important conclusions:
   - Investors make decisions to help them survive (satisfice) rather than to maximize utility (make theoretically optimal decisions).
   - Investors must adapt to survive.
   - Because participants adapt, no investment strategy can continually outperform.
   - Risk premiums will vary over time as (1) the general level of investor risk aversion increases or decreases and (2) the level of competition in the market decreases or increases.
   - Assets can be temporarily mispriced, allowing active management to add value.

The Behavioral Biases of Individuals

Cross-Reference to CFA Institute Assigned Reading #6

Emotional biases are caused by individuals' psychological predispositions. Emotional bias is not deliberate; it is more of a spontaneous reaction and it is more difficult to overcome.

Cognitive errors are the result of mechanical or physical limitations; they result from the inability to analyze all information or from basing decisions on incomplete information. Cognitive errors are easier to overcome than emotional biases and respond to education.

Cognitive errors stemming from **believe perseverance**:

- **Conservatism bias.** A view is formed based on initial information and then maintained.
  - Implications: Investors are to slow to update views and may hold securities too long. To mitigate, seek new information and alternative views.

- **Confirmation bias**. Only information that supports the initial view is sought or considered.
  - Implications: Can lead to under-diversification and over concentration in employer stock. To mitigate, seek out contrary information and alternate methods of analysis.
- **Representativeness bias**. Once a classification is made, the accuracy of the classification is not considered. Base-rate (the assumed probability of the classification) and sample-size (the amount of initial data) neglect are forms of representativeness.
  - Implications: Overemphasizing data covering short time periods and reacting too quickly to new information. To mitigate, understand statistical analysis and develop a suitable long-term strategic asset allocation for the portfolio.
- **Illusion of control bias**. Individuals assume they can influence the outcome even when they cannot.
  - Implications: Trade too quickly and under-diversify. To mitigate, apply probabilistic analysis, consider alternative views and worst case scenarios.
- **Hindsight bias**. Selectively remembering what was known or done in the past.
  - Implications: Taking too much risk or clients who unfairly blame their manager. To mitigate, keep and review records to determine successes and failures. Don't confuse value added with an up market.

Cognitive errors stemming from **processing errors**:

- **Anchoring and adjustment**. Similar to conservatism except changes are made from the initial conclusion point.
  - Implications: Failing to make a large enough adjustment from the initial anchor point. To mitigate; consider what would happen if a new analysis were made instead of starting from the initial anchor.
- **Mental accounting bias**. Funds are categorized and the categorization determines how the funds are treated (the layers in BPT).
  - Implications: Ignores correlation causing risk to be overstated. Incorrectly shifts portfolio focus from total return to income received. To mitigate, look at the total return and risk of the overall portfolio.
- **Framing bias**. How information is presented changes the decision made (perceived gain versus loss).
  - Implications: Short-term trading and sub-optimal asset allocation. To mitigate, focus on expected return and risk, not perceived gain or loss from a past value.
- **Availability bias**. Confusing what is easy to recall with what is important.
  - Implications: Making choices based on irrelevant information and inadequate diversification. To mitigate, follow a disciplined research process and an investment policy statement.

Emotional Biases

- **Loss aversion bias**. See prospect theory. Investors feel the pain of realized losses more than the pleasure of realized gains and are, therefore, likely to sell winners and hold losers. **Myopic loss aversion** postulates that many investors will under invest in riskier equities, keeping equity prices too low and subsequent equity returns too high.
  - Implications: Selling winners may reduce upside and holding losers may increase risk. To mitigate, objectively forecast expected return and risk.
- **Overconfidence bias**. Also referred to as *illusion of knowledge*. People feel they are smarter or know more than they do.
  - Implications: Underestimate risk and overestimate return, under diversify, and trade too much. To mitigate, maintain and review records of what works and what does not.

  Prediction overconfidence is the tendency to overestimate accuracy. *Certainty overconfidence* refers to confidence increasing faster than accuracy. *Self-attribution bias* refers to claiming credit for success and blaming others for failure.

- **Self-control bias**. See consumption and savings model. Lack of self-discipline. Individuals fail to balance the need for short-term satisfaction with long-term goals.
  - Implications: Save too little and then take too much risk in an effort to compensate. Hold too many bonds to generate higher current income. To mitigate, establish and follow a budget and an investment policy statement.
- **Status quo bias**. Feeling comfortable with what currently exists and therefore not making changes.
  - Implications: Inappropriate risk and return. This is a hard bias to overcome; try to educate the client.
- **Endowment bias**. Feeling what is owned is more valuable (better) than what could replace it, leading to status quo bias.
  - Implications: Holding what is owned leading to inappropriate asset allocation. If the bias imperils the ability of the client to meet critical goals, mitigation becomes essential. This may have to be done in stages.
- **Regret-aversion bias**. Do nothing to avoid the mental anguish of making an error of commission, leading to status quo bias.
  - Implications: Portfolios that are too conservative or aggressive. Mitigation requires educating the client on what combinations of return and risk are reasonable.

Investment Policy and Asset Allocation: Behaviorally Modified Asset Allocation

Applying goals-based investing, the investor builds a portfolio one layer at a time. Each layer of the portfolio consists of assets used to meet individual goals or subsets of goals. The bottom layer of the *pyramid* is constructed first and is comprised of assets designated to meet the investor's most important goals. Each successive layer consists of increasingly risky assets used to meet less and less import goals. This allows the investor to see risk more clearly.

The layered portfolio is probably not efficient from a traditional finance perspective, but the investor is comfortable with it and will, thus, be more likely to adhere to the strategy. The construction of the modified portfolio considers the investor's emotional and cognitive behavioral biases and current wealth.

Allowable deviations from a traditional finance efficient portfolio depend on whether the client's biases are more emotional or cognitive and the client's standard of living risk (SLR). Clients with high wealth to needs have low SLR.

- Higher deviations are acceptable for clients with low SLR and emotional biases.
- Lower deviations are necessary and possible for clients with high SLR and cognitive biases.

Behavioral Finance and Investment Processes

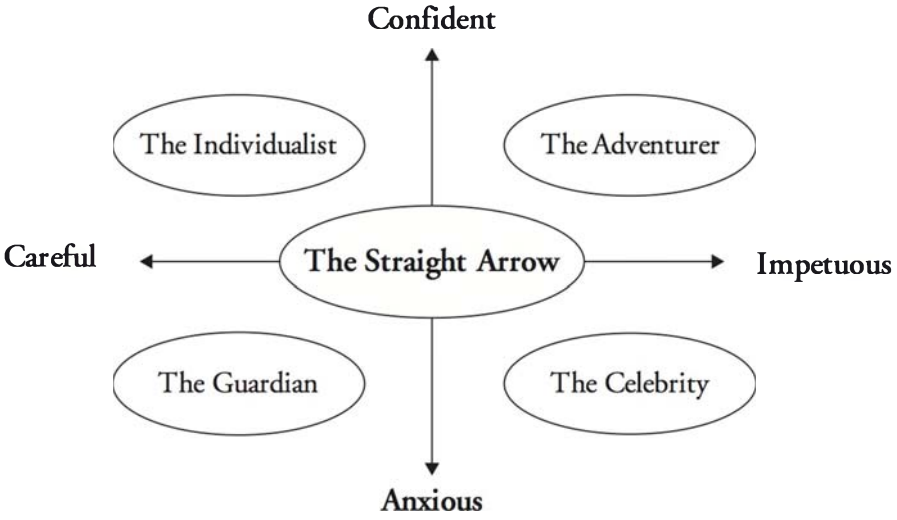
Cross-Reference to CFA Institute Assigned Reading #7

One of the goals of BF is to help managers better understand clients and tailor investment plans in a way the client can understand and stick with. Classifying client characteristics is one tool to assist the manager in understanding the client. Classification models include the following:

1. The **Barnewall two-way behavioral model**[1] classifies investors as passive or active. *Passive investors* have not had to risk their own capital to gain wealth. *Active investors* have risked their own capital to gain wealth and usually take an active role in investing their own money.

1. Barnewall, Marilyn. 1987. "Psychological Characteristics of the Individual Investor." *Asset Allocation for the Individual Investor*. Charlottesville, VA: The Institute of Chartered Financial Analysts.

2. The **Bailard, Biehl, and Kaiser (BB&K) five-way model**[2] classifies investors into five categories along two dimensions, *confidence* (confident is low risk aversion versus anxious is high risk aversion) and *method of action* (bases decisions on thinking versus emotion and feeling).



3. The **Pompian behavioral model**[3] classifies the investor as active (more willing to take risk) or passive (less willing to take risk) and classifies the client's biases as cognitive or emotional to identify four behavioral investor types (BITs):
   - **Passive Preserver**: Emotional biases with higher risk aversion.
   - **Friendly Follower**: Cognitive biases with higher risk aversion.
   - **Independent Individualist**: Cognitive biases with lower risk aversion.
   - **Active Accumulator**: Emotional biases with lower risk aversion.

Limitations of Classifying Investors Into Behavioral Types

1. Individuals may simultaneously display both emotional biases and cognitive errors; the key issue is determining how to help the client accomplish her goals.

2. An individual might display traits of more than one behavioral investor type.

3. As investors age or circumstances change, they will most likely go through behavioral changes resulting in decreased or changing risk tolerance.

2. Bailard, Brad M., David L. Biehl, and Ronald W. Kaiser. 1986. *Personal Money Management, 5th ed.* Chicago: Science Research Associates.
3. Pompian, Michael. 2008. "Using Behavioral Investor Types to Build better Relationships with Your Clients." *Journal of Financial Planning*, October 2008:64-76.

4. Even though two individuals may fall into the same behavioral investor type, the individuals should not be treated the same due to their unique circumstances and psychological traits.

5. Individuals tend to shift unpredictably between rational to irrational behavior.

The Client/Adviser Relationship

Behavioral finance insights help the manager build a stronger business:

1. Understand the "why" behind a client's goals to build a stronger relationship.

2. Applying BF insights allows the manager to present advice the client can accept.

3. Applying BF insights allows the manager to meet and satisfy the client's expectations.

4. A stronger manager/client bond results in better business for the manager.

Risk Tolerance Questionnaires

Questionnaires are often used to classify clients but these questionnaires have limitations:

- The same questionnaire can produce different results if the structure of the questions is changed.
- Investor biases are often ignored.
- Since the client's IPS should be analyzed annually for appropriateness, the questionnaire should also be administered annually.
- Advisers may interpret what the client says too literally; client statements should be indicators.
- Risk tolerance questionnaires are probably better suited to institutional investors, where less interpretation is required.
  - Institutional investors are generally more pragmatic and tend to approach investing from a thinking/cognitive approach with a better understanding of risk and return.

Defined Contribution Plans and Employer Stock

Recognizing participants' lack of investing knowledge and tendency toward a *status quo bias*, many defined contribution pension plans have begun offering *target date funds*. Target date funds, however, do not consider the individual's personal characteristics or assets held outside the plan. Individuals are also likely to utilize *naïve diversification*.

Reasons why employees have a tendency to invest in their company's stock:

1. Familiarity and overconfidence.

2. Representativeness; naïvely extrapolate past good performance into expectations.

3. Framing; employer's contribution in stock instead of cash is seen as an implicit recommendation of the quality of the stock as an investment.

4. Loyalty; hold the stock in an effort to help the company.

5. Financial incentives; tax incentives or allowed to purchase the stock at a discount.

Retail Clients

In contrast to the behavioral traits of DC plan participants, some retail investors trade their brokerage accounts excessively. Excessive trading is thought to be caused by *overconfidence* based on a false sense of insight into the investment's future performance. The typical result is lower overall returns due to trading costs and the *disposition effect*, selling winners too soon and holding losers too long. *Home bias* is the behavioral trait of investors placing a high proportion of their assets in the stocks of firms in their own country.

Analyst Forecasts and Behavioral Finance

There are three primary behavioral biases that can affect analysts' forecasts: overconfidence; the way management presents information; and biased research.

Overconfidence

Overconfidence is undue faith in their own forecasting abilities caused by an inflated opinion of their own knowledge, ability, and access to information. Tend to remember previous forecasts as being more accurate than they really were (a form of hindsight bias).

Factors contributing to overconfidence:

- *Illusion of knowledge bias*: They think they are smarter than they are, and forecasts are more accurate than the evidence indicates. Fueled by collecting a large amount of data.

- *Representativeness*: Incorrectly combining the probability that the information fits a certain information category and the probability that the category of information fits the conclusion.
- *Availability bias*: Undue weight given to more readily accessible, recently recalled data.
- *Ego defense mechanisms*:
  - *Self-attribution bias*. Analysts take credit for their successes and blame others or external factors for failures.
  - *Hindsight bias*. Selectively recall the forecast or reshape it in such a way that it fits the outcome. By making their prior forecasts fit outcomes, they fail to properly recalibrate their models when making future forecasts.

Mitigating overconfidence:

- *Self-calibrate*; analyze forecasts in relation to the actual outcome. Getting prompt feedback through self-evaluations, colleagues, and superiors, combined with a structure that rewards accuracy should lead to better self-calibration.
- Seek at least one *counterargument* for why the forecast may not be accurate. The analyst should also consider *sample size*. Basing forecasts on small samples can lead to unfounded confidence in unreliable models.
- Utilize a Bayesian framework to re-estimate probabilities.

Influence by Company Management

The way a company's management presents (frames) information can influence how analysts interpret it and include it in their forecasts. The problem stems from company managers themselves being susceptible to behavioral biases. There are three cognitive biases exhibited by management when reporting company results:

1. **Framing**: Analysts should be aware that the typical management report presents accomplishments first.

2. **Anchoring and adjustment**: Anchored to the previous forecast; the analyst is not able to fully incorporate the effect of new information.

3. **Availability**: The enthusiasm with which managers report operating results and accomplishments makes the information very easily recalled.

Managers are also susceptible to **self-attribution bias**; inclined to over-emphasize the positive as well as the extent to which their personal actions influenced the operating results. Self-attribution leads to excessive optimism (overconfidence).

Analysts must be wary of restated earnings because management compensation is based largely on operating results. To help avoid the undue influence in management reports, analysts should focus on verifiable quantitative data rather than on subjective information provided by management.

Analyst Biases in Research

- **Overconfidence**: Usually related to collecting too much information, which leads to the illusions of knowledge and control and to representativeness, all of which contribute to overconfidence.
- **Confirmation bias**: Tendency to view new information as confirmation of an original forecast.
- **Gambler's fallacy**: Thinking there will be a reversal to the long-term mean more frequently than actually happens. An example is increasing the odds of heads on the next toss (greater than 50%) because tails has come up several times in a row.
- **Representative bias**: Inaccurately extrapolate past data into the future. For example, classifying a firm as a growth firm based solely on recent high growth.

Preventing Bias in Research

Analysts should be aware of the possibility of *anchoring and adjustment* when they recalibrate forecasts. Take a systematic approach with prepared questions and gather data before forming any opinions or making any conclusions.

The analyst should use a structured process by incorporating new information, sequentially assigning probabilities using Bayes' formula to help avoid conclusions with unlikely scenarios. He should seek contradictory evidence formulating a contradictory opinion instead of seeking more information that proves his initial hypothesis. He should get prompt feedback that allows him to re-evaluate his opinions and gain knowledge for future insight, all along documenting the whole process.

Investment Committees

In a group setting, individual biases can be either diminished or amplified with additional biases being created.

- **Social proof bias**: Following the beliefs of a group (i.e., groupthink). Decision making in a group setting is notoriously poor. Committees do not learn from past experience because feedback from decisions is generally inaccurate and slow; systematic biases are not identified. The remedy is for committees to consist of individuals with diverse backgrounds, members who are not afraid to express their opinion.

Market Behavior

When a pattern emerges in which mispricing seems to persist and even be predictable, we call this an anomaly.

- **Momentum effect**: A pattern of returns that is correlated with the recent past (i.e., trend); caused by investors following others. Forms include the following:
  - **Herding**: Investors trade in the same direction or in the same securities. Makes investors feel more comfortable because they are trading with the consensus of a group. Two behavioral biases associated with herding are the *availability bias*, also known as the *recency bias*, or *recency effect*. Recent information is given more importance because it is most vividly remembered. It is also referred to as the *availability bias*. The recent data is extrapolated by investors into a forecast.
  - **Regret**: The feeling that an opportunity has passed by; a *hindsight bias*. Regret can lead investors to buy investments they wish they had purchased, which in turn fuels a *trend-chasing effect*. Chasing trends can lead to excessive trading, resulting in short-term trends.

Financial Bubbles and Crashes

Unusual positive or negative returns caused by panic buying and selling; a period of prices two standard deviations from their mean. A crash can also be characterized as a fall in asset prices of 30% or more over a period of several months; bubbles usually take longer to form.

Behavior during bubbles:

- **Overconfidence**: Excessive trading, underestimating risk, concentrated portfolios, rejection of contradictory information.
- **Confirmation bias**: Investors acknowledge evidence that confirms their beliefs and ignore evidence that contradicts their beliefs.
- **Self-attribution bias**: Take personal credit for successes without attempting to link performance to strategy.
- **Hindsight bias**: Tendency to see outcomes as expected based on the past; link outcomes to forecasts.
- **Regret aversion**: Investors do not want to miss the gains everyone else is enjoying.
- **Disposition effect**: Investors are more willing to sell winners and hold onto losers, leading to the excessive trading of winning stocks.

As the bubble unwinds in the early stages, investors are anchored to their beliefs, causing them to underreact as they are unwilling to accept losses. As the unwinding continues, the disposition effect dominates as investors hold onto losing stocks in an effort to postpone regret.

Value vs. Growth

Researchers[4] found that value stocks outperformed growth stocks in 12 of 13 markets over a 20-year period from 1975 to 1995. Small-cap stocks outperformed large-caps in 11 of 16 markets. They contend that the relative performance is due to risk exposures of companies with a particular size and book-to-market value being more vulnerable during economic downturns.

In the *halo effect*, the investor transfers favorable company attributes into thinking the stock is a good buy. A company with a good record of growth and share price performance is seen as a good investment with continued high expected returns. This is a form of *representativeness* in which investors extrapolate past performance into future expected returns, leading growth stocks to become overvalued (poor investments relative to value stocks).

The most persistent market anomalies that challenge the efficient market hypothesis are the momentum effect, bubbles, and crashes. Most anomalies start out as individual emotional and cognitive biases causing over- or underreaction, which turns into irrational group behavior.

4. Fama, Eugene F. and Kenneth R. French, 1998. "Value versus Growth: The International Evidence." *Journal of Finance*, vol 53, no. 6:1975–1999.

Private Wealth Management (1, 2)

Topic Weight on Exam	10–20%
SchweserNotes™ Reference	Book 2, Pages 1–169

Study Sessions 4, 5, and 6 are central to the portfolio management process and, therefore, to the Level III material. Study Sessions 4 and 5 lay out the basics of constructing and using an IPS for individuals. Study Session 6 builds on this for institutional portfolios. This material is commonly tested as part of longer, multi-part constructed response questions, and may be integrated with other topics; all of which is a decent reflection of real-world reality. These sessions also include substantive readings on the investment implications of taxation approaches, low-cost basis concentrated positions, and an introduction to asset allocation issues.

Candidates regularly report frustration with the individual IPS material and questions. Inappropriate study habits are a regular hindrance in this section. A common shortcut that served many candidates well at Levels I and II was to learn the material through practice questions. **From behavioral finance, you know that mental shortcuts are a sometimes an appropriate way to deal with overload. You also know they fail in more complex situations**. IPS material often falls in the latter category due to the variety of individual situations and subtle details as well as the "fuzzy non-mathematical nature" of some critical data.

Candidates regularly underestimate the importance of practicing how to write out effective constructed response answers under exam conditions. It turns out there is a big difference between looking at and knowing the answer versus being able to write it down. Answers must be based on the *specific question* asked, all of the *relevant case facts* given, and the *most relevant taught material.* Mechanically repeating what you saw as the answer to a different question will generally demonstrate to the grader that you do not know how to answer the question. Use our Class Discussion Questions, Practice and Mock Exams, and old CFA exams to gain experience with constructed response questions.

In reality, the exam questions are in aggregate not very hard if you approach them as expected. About 25,000 exams must be consistently graded. The questions are solvable if you apply appropriate technique. Do not "fight" the material and do not persist in bad habits. Base your approach on the prominently taught material, not the occasional outliers or personal opinion.

Managing Individual Investor Portfolios[1]

Cross-Reference to CFA Institute Assigned Reading #8

The investment policy statement is a center point for organizing and then processing relevant portfolio information. The objectives and constraints are the focus of the IPS for the portfolio manager. The objectives are risk and return. The constraints are time horizon, taxes, liquidity, legal/regulatory, and unique circumstances.

While a finished (not exam day) IPS is often presented as return, risk, and constraints; that is not the typical development process you are expected to apply. The beginning point is assessing the client situation:

Useful Tools in Assessing the Client

Source of wealth: Active wealth accumulation through personal risk taking can indicate greater *willingness* to take risk. Passive wealth accumulation through saving or windfalls does not.

Measures of wealth: Clients who *perceive* themselves as wealthy may have greater *willingness* to take risk.

Level of wealth: The *factual relationship* of the individual's wealth to needs affects *ability* to bear risk. Greater wealth in relation to needs lowers standard of living risk and increases *ability* to bear risk.

Stage of life can affect *ability* to bear risk, largely through its effect on time horizon and liquidity needs. One model of stages is foundation, accumulation, maintenance, and distribution. In this progression, remaining time horizon is typically declining and liquidity needs may be increasing, both of which decrease *ability* to bear risk.

Situational and psychological profiling can assist in understanding the client. Client personality type is often based on two dimensions: (1) higher or lower *willingness* to bear risk and (2) type of client biases (cognitive biases will be easier to deal with than emotional issues).

1 Much of the terminology in this section is convention as presented in *Managing Investment Portfolios: A Dynamic Process, Third Edition,* by Maginn, Tuttle, Pinto, and McLeavey.

Constructing an IPS

An IPS is based on the specific circumstances presented in the case. It is not determined by what was said in another IPS question. However, there is a common thought process behind each IPS:

- A significant portion of the IPS is documenting and organizing facts and client information. If you don't write it down, it indicates you did not know it matters and the information is lost.
- The five constraints have a significant affect on the risk objective. In particular, shorter time horizons and higher liquidity needs reduce the ability to bear risk.
- The risk objective should consider the more objective facts that determine *ability* to bear risk as well as the more emotional considerations that determine *willingness* to bear risk. Conflicts between ability and willingness need to be documented. Generally, the more conservative of the two determines the overall risk objective, if that is asked.
- A complete return objective starts with a written statement of what the client wants. The beginning funds available for investment and investment needs are quantified. A percentage return is calculated. A question may ask for pre- or after-tax and real or nominal returns.
- Each question and case is unique. The general process (discussed here) has to be tailored to address the specific facts and question.

The Constraints

Time horizon refers to the period of time over which the portfolio is expected to exist and meet client objectives. A longer time horizon can increase ability to bear risk. If there is information that clearly indicates a known material future change in client circumstances or objectives, that denotes a stage in the time horizon.

The **taxes** constraint is generally a factual recording of tax rates and other client tax information. More detailed tax issues (as covered elsewhere in the curriculum) would be specifically asked and are not really the issue within the tax constraint of the IPS. This is not the place to show off personal knowledge or opinions regarding taxation issues.

The **liquidity** constraint is often material as higher liquidity needs generally decrease ability to bear risk. However, liquidity covers a range of issues with differing implications for the IPS and portfolio. The typical situations include:

- A need for ongoing (repetitive) distributions is primarily a return objective. It must be earned over time. Mentioning the need to meet the distributions under the liquidity constraint is reasonable and we recommend doing so. Note that answers to past CFA exams have been erratic in doing so.

- A one-time distribution need should be listed under the liquidity constraint and included in the asset allocation as cash equivalents. If the distribution is near term, it can be "removed" from investable assets before calculating the percent return requirement.
- A one-time expected receipt can be listed under liquidity as an inflow and, if significant, may well trigger a stage in the time horizon.
- The desire for a liquidity reserve is recorded under the liquidity constraint and held in the asset allocation. With no plan to distribute it, the funds would remain part of the investable assets, as cash equivalents.
- Illiquid, low-cost basis or restricted positions can be listed here if not already discussed in tax or legal.
- Liquidity can also be defined as a differential between in- and out-flows. That analysis may be needed to project the investable asset base for a return calculation.

Legal/regulatory is (like taxes) typically a recording of the relevant facts provided, unless there happens to be an issue directly covered elsewhere in the curriculum. More typically, such an issue would be covered in its own question.

Unique is essentially the catch-all to record relevant information that did not readily fit elsewhere.

Modern exam questions rarely ask for all five constraints because most cases will not involve all five in a material way. Instead the questions will focus on specific issues. The overall process still matters to making the right decisions, but you must directly answer what is asked using what was taught.

Risk and Return Objectives

The **risk objective** can be broken down into the more factual ability and psychological willingness assessment as already discussed.

The **return objective** can include stating the client's (portfolio) objectives and quantifying the investable asset base and needs. Then calculate the required return. Total return typically needs to cover the distribution rate and future inflation. Two broad situations are common:

- Project the investable assets as of a specified time and the need for the subsequent year. Need / base = required distribution. Then add the future inflation rate for the return that will fund distributions *and* maintain real portfolio value.

- The second approach is an IRR approach over a specified period of years. There will be enough information to quantify a PV (beginning investable base), a FV (terminal required value), and a periodic PMT (differential between in- and out-flows).
- **Multiple variations exist in both types of return calculations so work practice questions.**

Miscellaneous

The **process of elimination** is a practical way to select the best portfolio from a limited set of possible portfolios.

- Eliminate portfolios that directly violate constraints or objectives. If none remain, the process cannot be used.
- If more than one remains, higher return to risk ranking is preferable. A Sharpe or (Roy's) safety-first ratio is often specified.
- 60/40 equity/fixed is often regarded as an appropriate asset allocation baseline for an average individual; therefore, scale the equity up/down for higher/lower risk.

Monte Carlo simulation is a useful tool to simulate how an asset mix is likely to perform in a given client situation over time. It turns out to be particularly useful in retirement planning for individuals.

- Multiple simulations of one asset mix can be ranked to assess the probability of meeting objectives.
- Path dependency issues, such as how a prior distribution affects starting portfolio value for the next period, can be incorporated.
- Client-friendly displays can be generated and used to shift the focus to meeting distribution needs and probability of ruin analysis (running out of money).
    - Analysis shifts from more abstract volatility and standard deviation.

Taxes and Private Wealth Management in a Global Context[2]

Cross-Reference to CFA Institute Assigned Reading #9

Global Taxation Regimes

Approaches to taxation vary widely around the globe with three primary categories of taxes:

- Taxes on income.
- Wealth-based taxes (which can be periodic like an annual property tax or once like a gift or estate tax).
- Taxes on consumption.

2. Many of the terms and phrases in this topic review are industry convention as presented in *Taxes and Private Wealth Management in a Global Context* by Stephen M. Horan and Thomas R. Robinson, CFA Institute 2017 Level III curriculum.

Approaches also vary by:

- Level of tax rates from heavy (higher) to light (lower).
- Progressive (progressively higher rates on incremental income) to flat (one constant rate).
- Favorable (lower) or unfavorable (higher) rates on various income sources.

Accrual Taxes

If t_i is the annual tax rate on investment income, r is the before-tax investment return, and n is the number of investment periods, the *future value interest factor* after investment income tax ($FVIF_{AT}$) is:

$$\text{FVIF}_{\text{AT}} = [1 + \text{r}(1 - \text{t}_\text{i})]^{\text{n}}$$

$FVIF_{AT}$ is nothing more than a time value of money factor, which shows the future, after-tax value of each unit of currency invested for n periods and earning a return of r. You will note that with accrual taxes, the effective return earned each period [r(1 – t)] is the nominal return reduced by the tax rate.

Compounding of accrual (annual) taxes makes their effect stated as a percent of total gain **greater than the tax rate**. The gain lost to taxes, stated as a currency or as a percentage, is referred to as **tax drag**.

For accrual taxes:

- If n > 1, tax drag percentage > t.
- As n and/or r increase, tax drag percentage and amount increase.

Deferred Capital Gains Taxes

Using t_{cg} as the tax rate on capital gains, the after-tax future value interest factor for deferred capital gains ($FVIF_{CGT}$) is:

$$\text{FVIF}_{\text{AT}} = [(1 + \text{r})^{\text{n}}(1 - \text{t}_{\text{cg}}) + \text{t}_{\text{cg}}]$$

The first term in brackets, $(1 + r)^n(1 - t_{cg})$, calculates the after-tax future value of the investment account, including the initial investment. Assuming the initial investment is made from after-tax dollars and is, thus, not subject to further taxation, we add t_{cg} to add back that tax.

Cost Basis

All else equal, reducing the cost basis increases the realized capital gain, increases the amount of capital gains taxes due, and reduces the net selling price. Thus, we modify our deferred capital gains tax formula to account for the basis (*B*):

$$FVIF_{AT,MV \neq basis} = [(1+r)^n(1-t_{cg})] + t_{cg}B$$

For deferred capital gains taxes:

- As *n* and/or *r* increase, tax drag amount increases.
  - If B = 1.0, tax drag percentage = t.
  - If B < 1.0, tax drag percentage > t.
  - If B > 1.0, tax drag percentage < t.

Wealth-Based Taxes

Continuing the notation from before except that t_w is the wealth-based tax rate, the future value interest factor after the wealth-based tax ($FVIF_{AT}$) is:

$$FVIF_{AT} = [(1+r)(1-t_w)]^n$$

Notice that the formula differs from the previous formulas because the tax is applied to both the principal and investment return (i.e., total account value).

For annual wealth taxes:

- Tax effects are more onerous as the tax rate applies to total value, not just return.
- As *n* increases, tax drag percentage and amount increase.
- But as *r* increases, tax drag percentage decreases even as amount increases.
- Tax drag percentage is lowest at moderate time horizon and return.

Blended Taxation

A sequence of calculations can be used to calculate FV after-tax if the portions of return coming from and taxed as interest (p_i), dividends (p_d), realized, and deferred capital gains (p_{cg} and $p_{deferred\ cg}$) are constant over the analysis period, n.

- Weighted annual realized tax rate: $wartr = p_i t_i + p_d t_d + p_{cg} t_{cg}$
- Return after realized taxes: $r^* = r[1 - (p_i t_i + p_d t_d + p_{cg} t_{cg})] = r(1 - wartr)$
- Effective capital gains tax rate: $T^* = t_{cg}[p_{deferred\ cg} / (1 - wartr)]$
- Future value of the investment: $FVIF_{AT} = (1 + r^*)^n(1 - T^*) + T^* - (1 - B)t_{cg}$

Accrual Equivalent After-Tax Returns

An **accrual equivalent after-tax return** is the annual return that produces the same terminal value as the taxable portfolio.

$$R_{AE} = \left(\frac{FV_{AT}}{\text{initial investment}}\right)^{\frac{1}{n}} - 1$$

Accrual Equivalent Tax Rates

The **accrual equivalent tax rate** (T_{AE}) is the tax rate that makes the pre-tax return (r) equal to the accrual equivalent after-tax return (R_{AE}). Think of it as the overall effective tax rate on the account, considering both accrual and deferred taxes:

$$R_{AE} = r(1 - T_{AE}) \quad \Rightarrow \quad T_{AE} = 1 - \frac{R_{AE}}{r}$$

Tax-Advantaged Accounts

The returns in a TDA accrue tax-free and are taxed when withdrawn at the existing tax rate, t_n.

$$FVIF_{AT} = (1 + r)^n (1 - t_n)$$

Withdrawals from tax-exempt accounts are not subject to taxes and returns accrue tax-free. So the future value interest factor for a tax-exempt account (TEA) requires no consideration of taxes:

$$FVIF_{AT} = (1 + r)^n$$

Tax-Deferred Accounts vs. Tax-Exempt Accounts

Contributions to a tax-exempt account are made with *after-tax* funds. That is, any funds contributed to a tax-exempt account are first subject to the current income tax, t_0. On the other hand, funds contributed to a tax-deferred account are not taxed.

The only potential difference between accumulations in the two accounts depends on whether the current and future tax rates are equal. With a TDA, no taxes are taken out of the contribution but the future value is taxed, while the contribution to the TEA is in after-tax dollars and the future value is untaxed.

To determine which account will have the higher future value (FV) after incorporating the tax treatment of the contribution, the comparison is quite simple:

$$\text{If } t_0 > t_n \Rightarrow FV_{TDA} > FV_{TEA}$$
$$\text{If } t_0 = t_n \Rightarrow FV_{TDA} = FV_{TEA}$$
$$\text{If } t_0 < t_n \Rightarrow FV_{TDA} < FV_{TEA}$$

Taxes and Investment Risk

The government's share of the investment each year is t_I, the tax rate on investment income, multiplied by the annual value of returns. If returns are high, the government receives more in taxes than when returns are low. In other words, part of the total variability of the investment is absorbed by the government. The result is that, if investment returns are taxed solely as income at the rate of t_I and the pre-tax standard deviation of returns is σ, the investor's after-tax risk is $\sigma(1 - t_I)$.

If the investment is held in a tax-exempt account, such that the government has no stake in the investment, the investor bears all the investment risk. This is also true for TDAs prior to withdrawal, because annual returns are not subject to taxes.

The Tax Effects of Trading Behavior

We can delineate four types of **equity investors:**

1. **Traders**—due to frequent trading, traders forgo the tax advantages associated with equity. All gains are short-term and are, thus, taxed on an annual basis.

2. **Active investors**—active investors trade less frequently than traders so that many of their gains are longer-term in nature and taxed at lower rates.

3. **Passive investors**—passive investors buy and hold equity so that gains are deferred long-term and taxed at preferential rates.

4. **Exempt investors**—exempt investors hold all their stock in tax-exempt accounts, thereby avoiding taxation altogether.

Tax Loss Harvesting and HIFO Tax Lot Accounting

Tax loss harvesting is the practice of using investment losses to offset investment gains or income and thus avoid the associated taxes. It is sometimes the case that current losses can be applied against past or future gains. Note, however, that governments may place limits on the amount of losses that can be recognized or the type of gains that can be offset.

Over time, investors often accumulate large positions in single securities by purchasing several lots (e.g., 1,000 shares at a time) at different prices. When taxing authorities allow **HIFO** accounting, investors can generate significant tax savings by first liquidating lots with the highest cost bases.

As with tax loss harvesting, the total taxes over time are unchanged with HIFO accounting, assuming a constant tax rate. But also like tax loss harvesting, HIFO allows the tax savings to be reinvested earlier, creating a *tax alpha* that compounds through time.

Taxes and Mean-Variance Optimization

Ideally, the efficient frontier of portfolios should be constructed on an after-tax basis. Accrual equivalent after-tax returns would be substituted for before-tax returns and risk on an after-tax basis would be substituted for before-tax risk.

Estate Planning in a Global Context

Cross-Reference to CFA Institute Assigned Reading #10

Estate Planning

Estate planning is the planning process associated with transferring your estate to others during your lifetime or at death so that the assets go to the individuals or entities you intend and in the most efficient way.

The most common tool used to transfer assets is a **will** (also known as a **testament**). The person transferring assets through a will is known as the **testator**.

Probate is a legal process that takes place at death, during which a court determines the validity of the decedent's will, inventories the decedent's property, resolves any claims against the decedent, and distributes remaining property according to the will.

Wealth Transfer Taxes

The two primary means of transferring assets are through **gifts** and **bequests**. Gifts are referred to as **lifetime gratuitous transfers** or **inter vivos** transfers and may be subject to **gift taxes**. Whether the gift is taxed and who pays the tax is determined by the taxing authorities involved. Assets transferred through bequests are referred to as **testamentary gratuitous transfers** and can be subject to **estate taxes**, paid by the grantor (i.e., transferor), or **inheritance taxes**, paid by the recipient. Many jurisdictions that impose gift taxes also provide exclusions. A **civil law** system is

based on old Roman law. In this system laws are handed down (i.e., a top-down system) by a legislative body.

Common law systems, based primarily on old English law, are more bottom-up. Judges play very important roles in common law systems by refining any existing laws to meet particular situations. Once made by a judge, the decisions become *precedent* to be applied in future cases.

Ownership Rights

If the system has **forced heirship** rules, children could have a right to a portion of a parent's estate, regardless of the location of the child visa vie the parent, the relationship that exists between the parent and child, or even the relationship between the parents.

Knowing the situation could arise, wealthy individuals might try to avoid forced heirship rules by gifting assets or moving them "off-shore" into a trust where they fall under a different taxing authority with no forced heirship rule. Recognizing this, many regimes apply **claw-back** provisions that add the values back to the decedent's estate before calculating the child's share. If the estate isn't sufficient to meet the child's entitlement, the child may in some cases legally seek the difference from those who received the gifts.

In addition to marital rights provided under forced heirship rules, spouses can also have marital property rights according to the type of marriage they have. Under a **community property rights** regime, each spouse is entitled to one-half of the estate *earned during* the marriage. Gifts and inheritances received before or during the marriage may be held separately from marital assets. Assets not distributed under community property rights are distributed according to the will.

Under a **separate property rights** regime, which is common in civil law countries, spouses own and control their own property, separate from each other. Each spouse may, barring the presence of other forced heirship rules, bequeath assets as desired.

Core Capital

On an individual's balance sheet, assets consist of the financial and other assets currently held by the individual plus the *present value* of net employment income expected to be generated over the lifetime, referred to as **human capital** or **net employment capital**. (The portion of human capital attributable to future employment is also known as *implied assets*.)

The individual's liabilities on the balance sheet are the present values of all current and future costs necessary to sustain a given lifestyle. These consist of any explicit liabilities, such as mortgage or other loan payments, and *implicit liabilities*, such as living expenses. Just as with a financial balance sheet, then, the individual's **excess capital** (i.e., equity capital) is the difference between total assets and total liabilities.

The amount of assets necessary to just meet all the individual's liabilities is considered the individual's (or family's) **core capital**. It's the amount that must be maintained to meet all present and future liabilities as described above. Any amount above core capital is considered excess capital and can be used for other purposes.

Mortality Probabilities

To estimate an individual's remaining expected life, statisticians developed **mortality tables**. Mortality tables show an individual's expected remaining years based on attaining a given age. For example, one of these tables might show that a male who has reached the age of 80 has approximately an 87% probability of living one more year and a 16% probability of living to age 93.

Calculating Core Capital Using a Mortality Table

$$\begin{aligned}\text{prob}(\text{joint survival}) &= \text{prob}(\text{husband survives}) + \text{prob}(\text{wife survives}) \\ &\quad - \text{prob}(\text{husband survives}) \times \text{prob}(\text{wife survives})\end{aligned}$$

The amount of core capital required for *n* years is:

$$\text{core capital}_{\text{n years}} = \sum_{t=1}^{n} \frac{P(\text{surv}_t)(\text{spending}_t)}{(1+r)^t};\ r = \text{real risk-free rate}$$

Excess capital is any amount above the core capital requirement.

Safety Reserve

When using mortality tables, you should incorporate a **safety reserve** into your calculations.

Relative After-Tax Value of Gifts

If it is determined an individual has excess capital, tax law may favor either making a gift now or waiting and making a bequest (which is a gift at death). Because this is excess capital, the decision criterion becomes *maximizing after-tax value to the recipient at a future date*, the assumed date of death for the giver. A relative value (RV) ratio compares the FV of a dollar to the recipient of gifting now versus a bequest at death. RV above 1 indicates gift now and below 1 indicates bequest at death. There are four tax scenarios:

No gift or estate tax is owed:

$$RV_{\text{tax-free gift}} = \frac{\left[1 + r_g\left(1 - t_{ig}\right)\right]^n}{\left[1 + r_e\left(1 - t_{ie}\right)\right]^n\left(1 - T_e\right)}$$

Gift tax owed and paid by receiver, in which case \$1 given is \$(1 – Tg) received:

$$RV_{\text{taxable gift}} = \frac{FV_{\text{taxable gift}}}{FV_{\text{bequest}}} = \frac{\left(1 - T_g\right)\left[1 + r_g\left(1 - t_{ig}\right)\right]^n}{\left[1 + r_e\left(1 - t_{ie}\right)\right]^n\left(1 - T_e\right)}$$

Estate tax owed and paid from giver's estate at giver's death, which creates an additional benefit to the receiver equal to the cross product of the gift and estate tax rates:

$$RV_{\text{taxable gift}} = \frac{\left(1 - T_g + T_g T_e\right)\left[1 + r_g\left(1 - t_{ig}\right)\right]^n}{\left[1 + r_e\left(1 - t_{ie}\right)\right]^n\left(1 - T_e\right)}$$

The final scenario is making a gift to a charity (a tax- deductible gift to a tax-exempt recipient). This strongly favors gifting now because the receiver can invest tax free plus the giver can take a tax deduction equal to full market value of the gift. The tax savings created by the deduction is treated as being invested and then given as a bequest at death:

$$RV_{\text{charitable donation}} = \frac{\left(1 + r_g\right)^n + T_{oi}\left[1 + r_e\left(1 - t_{ie}\right)\right]^n\left(1 - T_e\right)}{\left[1 + r_e\left(1 - t_{ie}\right)\right]^n\left(1 - T_e\right)}$$

In the above formulas:

- r_g and t_{ig} are pre-tax return and applicable tax rate on return of gift receiver.

- r_e and t_{ie} are pre-tax return and applicable tax rate on return of gift giver.
- T_{oi} is the tax rate on ordinary income of the gift giver.
- T_e is the estate tax rate paid from the giver's estate.
- T_g is the gift tax rate.

Estate Planning Strategies

Generation Skipping

In the absence of generation-skipping transfer taxes, transferring assets directly to a third generation avoids possible double taxation. When the first (i.e., oldest) generation transfers assets to the second generation, the transfer is typically subject to taxes. Then when the second generation transfers the assets to the third generation, the assets are taxed again.

Spousal Exemptions

Many countries allow tax-free transfers of estates between spouses. Whether or not this is optimal from a tax perspective depends upon other possible gift and inheritance exclusions.

Valuation Discounts

Assets, such as marketable securities, have readily-determined fair market values, but valuing ownership claims in partnerships and other privately held interests can be difficult. Since valuation discounts can reduce the value of wealth transfers and the associated transfer taxes, high net worth individuals will utilize them whenever possible by, for example, transferring interest in a family business.

Charitable Gifts (Charitable Gratuitous Transfers)

Rather than taking valuation discounts, the testator wants to *maximize* the value of assets transferred to non-profit and charitable organizations. This is because most jurisdictions do not tax gifts to these organizations, and the donor is allowed to take a **tax deduction** (in calculating personal income taxes) in the amount of the gift.

Trusts

Trusts are a means by which a **grantor** (or **settlor**) can transfer assets to beneficiaries outside of the probate process. The trustee holds the assets and manages them in the best interests of the beneficiaries according to the constraints of the trust documents.

In a **revocable trust**, the settlor can rescind (i.e., revoke) the trust and resume ownership of the assets. The settlor is considered the legal owner of the assets for tax and reporting purposes, and creditors, divorcing spouses, et cetera can make claims against the trust assets.

In an **irrevocable trust**, the settlor relinquishes ownership and control. The trustee is considered the owner of the assets for tax purposes and is responsible for reporting and paying taxes on income generated by the trust. The irrevocable trust protects the trust assets from claims against the settlor.

Life Insurance

As the only assets transferred by the grantor (policy owner) are the premiums paid, life insurance policies represent a very efficient means for transferring assets or even helping beneficiaries pay inheritance taxes. In most jurisdictions, life insurance proceeds pass to beneficiaries without tax consequences, and, depending on jurisdiction, the policy might provide tax-free accumulation of wealth and/or loans to the policyholder on beneficial terms.

Tax Jurisdiction

Income Taxes

- Under **source jurisdiction** (a.k.a. **territorial tax system**) a country levies taxes on all income generated within its borders, whether by citizens or foreigners.
- Under **residence jurisdiction**, a country taxes the income of its residents, whether generated inside or outside the country.

Wealth Transfer Taxes

- Under **source jurisdiction,** transfer taxes are levied on assets located within (e.g., real estate) or transferred within a country, whether by citizens or foreigners.
- Under **residence jurisdiction,** citizens and residents pay transfer taxes, regardless of the worldwide location of the assets.

Relief from Double Taxation

In a **residence-residence conflict**, two countries claim residence for the same individual. In a **source-source conflict**, two countries claim authority over the same income. In a **residence-source conflict**, an individual is subject to residence jurisdiction and receives income on assets in a foreign country with source jurisdiction.

Tax treaties may partially or fully resolve the double taxation of residence-source conflicts. The income is taxed by the source country and then:

- Exemption method: Not taxed by the residence country.
- Credit method: The tax owed to the residence country is computed, and a credit for taxes paid to the source country is applied:
  - If more is owed the residence country, the difference is paid.
  - If less is owed the residence country, the bill is zero.
- Deduction method: Taxes owed the source country reduce the taxable income in (and thereby partial reduce the tax owed to) the residence country.

International Transparency

Tax avoidance is legal. Any tax-paying entity or individual would be expected to minimize the amount of taxes paid through various legal tax-reduction strategies. **Tax evasion**, on the other hand, is hiding, misrepresenting, or otherwise not recognizing income so as to *illegally* avoid taxation.

Concentrated Single Asset Positions

Cross-Reference to CFA Institute Assigned Reading #11

In addition to its unrealized gain, low cost basis and concentrated positions pose additional challenges for portfolio managers and investors. Like any risky asset the position has:

- Systematic or market risk that cannot be diversified away (and still earn a risky asset return).
- Nonsystematic risk that can be diversified away. For a company this can be called company-specific risk and for real estate it can be called property-specific risk. The low-basis investment can significantly increase the nonsystematic risk in the portfolio because: (1) the investment itself can be quite risky and (2) it can be a large percentage of the portfolio.

The common objectives in managing the concentrated position are: (1) reduce the risk, (2) generate liquidity for diversification or other spending purposes, and (3) minimize taxation and maximize after-tax wealth.

Special considerations that commonly arise with concentrated positions are: (1) a desire to maintain the concentrated position to build wealth, (2) other practical or psychological reasons to maintain the position, and (3) legal restrictions.

Monetization

Monetization is a broadly defined concept referring to accessing the benefits of selling the assets (access to cash and diversification) without the tax or loss of control that a sale would trigger. Many forms of monetization require the use of OTC derivatives. However, dealers face institutional and capital market constraints. The dealer needs sufficient trading history for the underlying position and derivative instruments which will allow the dealer to hedge the risks being assumed by the dealer. Without the trading data and underlying derivatives, the dealer will not support monetization techniques.

Goal-based planning is a useful tool in managing concentrated positions. The investor should have sufficient low-risk assets in a "personal risk bucket" and marketable stock and bond investments in a "market risk bucket" to maintain the investor's standard of living. Any remaining surplus capital can be allocated to high-risk assets in an "aspirational risk bucket." Concentrated positions will generally fall in the aspirational bucket and if they leave insufficient funds in the first two "primary capital" buckets, sale or monetization of the concentrated position is needed.

Concentrated Stock Position Management Techniques

Selecting the optimal strategy depends on the client's need for cash, need to retain control, and the specific tax laws and regulations that apply. The goals are generally to minimize initial cost, maximize upside potential and downside protection, minimize taxes, and meet other client-specific objectives and constraints.

Tax analysis should consider any tax mismatch in character. A prime example is option premiums received being taxed at higher rates while option premiums paid increase the tax basis of the underlying, which potentially reduces future gains taxed at a lower rate.

A perfect hedge to eliminate all downside risk and upside potential is generally not appropriate because it will be deemed equivalent to sale and trigger any tax liability. A cross hedge seeks to retain enough nonsystematic risk to avoid being deemed a sale for tax purposes.

Strategies to consider include:

Sell the asset: Losing control of the asset and triggering any tax liability.

Asset location: Holding the asset in a tax exempt or tax deferred account can reduce taxation.

Estate tax freeze: Restructure the asset into voting preferred stock with most of the initial asset value held by the existing owner and non-voting common with minimal initial value. Gift the non-voting common to another party who then captures future appreciation in the asset and tax liability. The initial owner retains control and any initial tax liability. No tax is currently due.

Gift the asset to charity: Take a tax deduction for full market value. All taxes are avoided but the resulting tax savings is only a fraction of the asset's value and the owner losses control of the asset.

Limited partnership plus gifting and valuation discounts: Existing owner serves as the general partner to retain control over the asset and gifts the limited partnership interests (LPS) to others. The LPS are valued and taxed at less than market value because they lack control of the asset and marketability. The LPS assume the tax liability and capture future appreciation.

Short sale against the box: Borrow and then short the asset owned to obtain funds for spending or diversification. Upside and downside of the underlying asset are hedged.

Forward sale: Similar result as short sale.

Forward conversion with options: Sell a call and buy a put with the same strike price. Similar results as short sale.

Total return equity swap: Pay the return of the asset and receive LIBOR or a desired index return. Similar results as short sale.

Buy an at-the-money (ATM) protective put: No downside below the option strike price and upside is retained. Generally the most expensive initial cost.

Buy an out-of-the money (OTM) protective put: Lower initial cost but with less downside protection. Or buy a put with a shorter term to expiration or exotic features such as knock-in or knock-out provisions which lower the protection and initial cost of the put.

Buy an ATM put and sell an OTM put: Downside protection is only between the two put strike prices.

Buy an OTM put and sell an OTM call: Downside protection from the below market price of the put strike but no upside beyond the call strike price.

Prepaid variable forward: "Sell" the asset forward, receiving cash at initiation. Pay off the forward at expiration by delivering the underlying asset. The number of shares to deliver declines if the asset value rises allowing some upside potential to be retained.

Exchange fund: Owners of different concentrated positions each contribute their asset to a fund. Each initial owner now holds a prorate share of the resulting portfolio with a tax basis equal to that of his initially contributed position.

Cash received from a monetization strategy or other sources can be used for:

- **Index tracking with active tax management**: invest funds in an index fund that is tilted to favor investments subject to lower tax rates. The goal is to match the index on a pre-tax basis but outperform on an after-tax basis.
- A **completion portfolio**: holdings are added to complement the concentrate position in such a way that the overall portfolio best tracks the desired target benchmark.

Privately Held Businesses

Owners of private businesses frequently have additional issues to consider when managing the concentrated position: (1) They feel psychologically attached to the business. (2) They have valid financial reasons to maintain control of the underlying business. (3) How to exit the non-marketable position and what it is worth must be determined. (4) Because the owner is often the senior manager running the company, the exit strategy has to address who manages the company when the initial owner leaves.

Beyond the strategies discussed for marketable positions, additional strategies include:

Sale to a strategic or financial buyer: Strategic buyers have an underlying business reason for the acquisition and typically offer a higher price.

Recapitalization: The existing owner retains a significant ownership role and position but sells a portion of her initial holding back to the company or to another entity such as a private equity investor.

Management buyout or sale to employees: Typically the buyers lack financial resources and require the existing owner to accept promissory notes for some or all of the sale price.

Divestiture or sale of noncore business assets: Proceeds are used to pay the existing owner a special dividend, repurchase his shares, or make him a loan.

Personal line of credit secured by the owner's shares: The company can directly make the loan to the owner. Alternatively, the loan can be made by a third party, in which case the company often provides additional guarantees of loan repayment to secure better terms for the owner.

Sale or gift to family members: Keeps the business in the family.

Sale to an ESOP: May receive favorable tax treatment in some countries.

Sale through an initial public offering: May have the advantage of converting any stock retained by the owner into marketable public shares.

Real Estate

Additional considerations in managing concentrated positions in real estate include:

> High loan-to-value **mortgage financing** can be used to raise cash. A **nonrecourse loan** is effectively equivalent to a protective put. If the value of the property declines below the loan amount, the borrower can default on the loan and allow the lender to seize the property.
>
> In a **sale and lease back**, the property owner can sell the property for cash but lease it back to retain the use of the property.
>
> In a **donor-advised fund or charitable trust** the owner gifts the property to a charity (with all the benefits of a charitable gift) but structures the gift to retain same degree of influence.

Candidate hints: This section has extensive terminology that overlaps with other readings.

- Expect questions that combine strategies. To correctly solve the question, ask yourself:
  - What funds are received?
  - What diversification is created?
  - What tax is triggered?
  - Is control retained?
  - Does this accomplish what was asked for?
- Then solve the question. If taxation or legal details are needed, they will be given in the question.

Risk Management for Individuals

Cross-Reference to CFA Institute Assigned Reading #12

Human Capital and Financial Capital

The holistic balance sheet is superior to the traditional balance sheet in planning lifetime consumption and bequests for individuals. For assets, the holistic balance sheet adds human capital (HC) to the financial capital (FC) used on the traditional balance sheet. It adds the PV of planned future expenditures and bequests to the explicit liabilities (debts) shown on the traditional balance sheet.

- HC is the PV of expected future labor income. It is the sum of each year's projected year-end salary weighted by the probability of life, discounted at the risk-free rate plus a risk premium related to the riskiness of the labor income. (Treating salary as year-end is the convention used in the reading).
- Future labor income can be projected in real values (and discounted starting with real r_f), or projected in nominal values (and discounted starting with nominal r_f).
- FC is all assets other than the individual's HC, including the PV of defined-benefit (DB) plan benefits.
- The drawback of the holistic balance sheet is that the additional assets and liabilities that are included are more difficult to estimate.

Financial Stages of Life

Generally HC is highest in the early career stage and then declines until retirement as total remaining future labor income to be earned declines. FC is likely to be increasing as the individual saves for retirement. Any such progression can be disrupted by life events. The general stages of life are:

- Education as the skills to earn HC are acquired.
- Early career when low-cost term life insurance plus disability and property insurance may be needed.
- Career development with increases in savings and FC accumulation.
- Peak accumulation as savings and FC accumulation accelerate. Portfolio risk reduction may begin.
- Preretirement when portfolio risk reduction may continue along with planning for retirement.
- Early and then late retirement when practical issues must be considered, such as expenditures initial increase to enjoy retirement, unexpected health issues, and declining cognitive functions.

The Role of Insurance

Insurance can be used to manage risks that are not addressed by traditional portfolio tools, such as portfolio diversification. Insurance is risk sharing among the users, not a wealth building tool for the individual. It should be used for risks that are infrequent and severe.

The insurance is priced by the insurance company to reflect morality estimates of when death and payouts will occur, a ROI of what the company will earn on the insurance premiums (price charged for the insurance), and a load that covers costs and expected profit for the company.

While there are many types of insurance, the focus here is on life insurance and annuities:

- Life insurance hedges mortality risk (dying sooner than expected) and should be sufficient to meet needs of the insured that would have been met in the absence of the insured's premature death. The beneficiaries receive the policy payout at death of the insured.
- Annuities hedge longevity risk (outliving FC) and are the economic opposite of life insurance.
- Other types of risk and insurance include:
  - Premature job loss, use disability insurance.
  - Property risk, use property insurance, such as auto and home insurance.
  - Liability risk, use liability insurance.
  - Risks to health, use health and medical insurance.

Multiple permutations of life insurance and annuities exist. As features are added, it increases the cost of the product and makes policy comparisons more difficult.

For life insurance, the greater the probability of death of the insured, the sooner the payout occurs. Therefore, the higher the premium cost the company must charge (or the lower the amount of insurance payout provided). In generally increasing order of complexity, life insurance can be classified as:

- Temporary (term) with a premium paid for one year of insurance. The policy may include guaranteed annual renewal and/or guaranteed level premium for a specified number of periods.
- Whole life for the insured's lifetime with premiums paid every year and including a build-up of cash value that can be withdrawn or borrowed against.
- Universal life that provides a choice among investment options and premium flexibility.

For annuities (and in contrast to life insurance), the lower the probability of death, the more payouts the company will make, lowering the periodic payout amount or

increasing the premium cost. For the standard annuity, one premium payment is made at purchase and then payouts are made to the annuitant. Variations include payouts for:

- a finite period (which does not insure against mortality risk).
- the life or joint life of two individuals.
- starting at a deferred future date.

Mortality credits: Insurance companies price the product based on expected *aggregate* payouts. Some individuals will live longer and others will have shorter lives, resulting in both individual winners and losers. The winner is collecting a mortality credit from the loser.

- The beneficiaries of a life insurance policy earn a mortality credit if the insured dies earlier than expected. They collect the face amount sooner (making its PV higher).
- Annuitants collect mortality credits if they live longer than expected. They collect more total payments.

  Life insurance policy costs can be compared using various methods, two of which are presented in the reading. Both are based on:

  1. FV of premiums paid (calculated as an annuity due).
  2. FV of any dividends received (calculated as an ordinary annuity).
  3. Terminal cash value (if any).

- The Net Payment Cost Index assumes death and policy payout at the end of an analysis period. Calculate the FV of all net cost as #1 – #2.
- The Net Surrender Cost Index assumes termination of policy and cash value payoff at the end of an analysis period. Calculate the FV of all net cost as #1 – #2 – #3.

In both cases, this net FV cost can be "annuitized" as an annuity due PMT amount. That PMT can be divided by the number of thousands (,000) of insurance for the periodic cost per thousand of insurance. If all other features of two policies are the same, a lower PMT amount is a lower cost of insurance.

Fixed vs. Variable Annuities

In general, a fixed annuity will provide a higher initial payout with the payout amount largely determined by the initial level of interest rates. The higher initial payout makes fixed annuities better suited to more risk-averse investors, though these policies are less likely to allow additional early cash withdrawals.

Variable annuities shift more risk to the annuitant as payouts are linked to future returns earned. The initial payout will be lower but the potential lifetime payout

can be higher. Generally, the annuitant can choose among specified investment alternatives and early withdrawal features are more likely (though there may be fees to exercise the early withdrawal rights). Such policies are more complex and harder to analyze with less competitive (higher) pricing.

Total Risk Management

Systematic risk can be managed with traditional portfolio management tools and diversification. Portfolio diversification can be extended to TW asset allocation by considering the correlation of the individual's HC to FC. Within the desired overall asset allocation target, higher risk or more equity like HC tilts the FC toward bonds. Lower risk or more fixed income like HC tilts the FC toward equity. The point is the nature of the individuals HC is largely set while the FC allocation can be shifted.

Insurance can then be used to manage infrequent and severe unsystematic risks in ways beyond traditional diversification. For:

- risk of premature job loss, use disability insurance.
- premature death risk, use life insurance.
- longevity risk, use annuities.
- property risk, use property insurance.
- liability risk, use liability insurance.
- health risk, use health and medical insurance.

Not all risks should be insured. Severe, regularly occurring risks should be avoided. Not severe, but regularly occurring risks should be reduced. Not severe and infrequent risks can be retained and accepted, sometimes called self-insurance. Severe, in this case, is something that would jeopardize standard of living and lifestyle.

Portfolio Management for Institutional Investors

Study Session 6

Topic Weight on Exam	10–20%
SchweserNotes™ Reference	Book 2, Pages 170–219

Study Session 6 draws heavily on individual portfolio management concepts covered in Study Sessions 4 and 5.

- The basic IPS construction process of TTLLU drives risk and return continues, with specific nuances by institutional type. In general:
  - Institutions are assumed to be more knowledgeable and objective clients for whom willingness to bear risk is not a factor, unless indicated otherwise in the case.
  - Legal/regulatory issues are material for some institutional types.
- The earlier discussions regarding use of annuities, life, and other insurance products are useful background to understanding the insurance company portfolio management issues covered here.

Managing Institutional Investor Portfolios

Cross-Reference to CFA Institute Assigned Reading #13

The primary portfolio types covered are DB pension plans; foundations and endowments; life and non-life insurance; plus banks. Like the individual IPS, the questions are case specific. You must understand the underlying material in depth to be able to apply it successfully.

Types of Pension Plans, Introduction

Sponsor (often a company) provided retirement plans represent a form of deferred employee compensation. The sponsor typically makes periodic contributions to a portfolio that is invested to fund promised distributions.

In a **defined-benefit (DB) plan**, the employer (plan sponsor) promises a retirement benefit to plan participants. Benefits (liabilities of the plan) are typically based

on years of service, rate of pay, or a combination of both. Actuaries provide the projected the FV and PV of these liabilities.

- Contributions are typically made by the sponsor and invested to meet the FVL.
- Investment risk is borne by the sponsor and additional funds must be contributed as needed to pay the benefits.
- Plan participants are subject to early termination risk and loss of any expected (but not yet vested) benefits.

In a **defined-contribution (DC) plan**, the plan sponsor is required to make contractual contributions to participants' retirement portfolios. The contributions are invested and the participants receive their share.

- Investment risk (the FV of the assets) is borne by the participants.
- The sponsor typically provides a list of eligible investment funds, limited investment information, and each participant then selects their portfolio. (There are exceptions where the sponsor directs the investments).

A **cash balance plan** is a hybrid. Like a DB plan, the sponsor is responsible to make future payouts. Like a DC plan, account records are maintained on an individual participant basis. The plan is often unfunded and "earns" a specified crediting rate each period, making the benefits a general liability of the sponsor.

A **profit sharing plan** is a type of defined-contribution plan in which the sponsor's contributions are based on the profitability of the firm.

An **employee stock option plan (ESOP)** is a type of defined-contribution plan investing all or a majority of plan assets in the sponsor's stock.

DB Plans in Detail

DB plans have definable liabilities, making ALM and management of the surplus the more appropriate approach. Surplus (S) is the PV of the plan assets (their market value) – the PV of the plan liabilities.

Time horizon (TH): Legally the plan may be perpetual, but portfolio management TH is largely determined by the duration of the liabilities. Some portfolios are split between active participants with a longer TH and retired lives with a shorter TH.

Taxes: These portfolios are tax exempt unless specifically indicated otherwise.

Liquidity: Needs are increased by a larger portion of retired to active lives, a lower level of sponsor contributions to disbursements, and all other features such as lump sum payout of benefits or early retirement provisions that increase liquidity needs.

Legal/regulatory: Generally presumes management with the skill of an investment professional acting for the sole benefit of the plan participants (not the plan sponsor).

Unique: Often none but pay attention to the case facts.

Return objective: The minimum return objective is usually determined by the actuarial discount rate used to calculate the PVL. A somewhat higher (e.g., 1% or 2%) objective is not unusual and would improve the plan surplus and/or reduce the need for future contributions by the sponsor.

Risk objective: Is lower or moderate (compared to foundations and endowments) because higher risk and return (if successful) primarily benefit the sponsor and do not contribute to increased benefits for the participants. Risk tolerance is increased if the plan can absorb disappointing results without jeopardizing benefits of the participants. Key factors reducing risk tolerance are:

- An underfunded portfolio (i.e., negative plan surplus; S = PVA – PVL).
- A financially weaker plan sponsor.
- Higher + correlation between plan asset return with plan sponsor financial status.
- Plan features that increase liquidity needs and/or decrease time horizon.
- Workforce (plan participant) characteristics that increase liquidity needs and/or decrease time horizon.

Foundations and Endowments (F&E)

F&E in some form exist in many countries. They hold portfolios that are invested and support various social purposes through portfolio distributions. Due to their support of the "public good," investment returns and contributions to F&E often have tax-advantaged status. For IPS and investment management issues, F&E are functionally the same. They lack the contractually defined liabilities of DB and typically use asset-only management approaches.

The typical return objective includes maintaining the real, inflation-adjusted value of assets and distributions. This is consistent with the normally long or perpetual time horizon and the need to maintain *intergenerational neutrality*. If real portfolio and distribution value are not maintained, future generations effectively receive less than the current generation. Multiplicative (geometric) return calculations are preferred and covering plan expenses is common [e.g., 5% distribution, 3% inflation for plan distributions, and 50bp expense ratio would be (1.05)(1.03)(1.005) – 1].

Failing to meet the distribution requirement can, in some cases, jeopardize the fund's tax-exempt status. In the short run, distributions can be made from any source and are a (self-evident) liquidity need. The more important issue is that, in the long run, the distribution needs must be covered by the plan's return or they become unsustainable.

A simple *distribution rule* would take the form of distribute Y% of beginning market value. Because market value is volatile, this makes cash flow planning for the plan recipients difficult. *Smoothing rules* can be adopted to simplify cash flow planning for the recipient and take two broad forms.

- A rolling average rule: distribute Y% of the past X years' average beginning market values. (The simple distribution rule is the same thing where X is 1 year).
- A geometric smoothing rule: combines the above with a second calculation based on inflation, such as distribute the sum of:
  - 50% of Y% of the past X years' average beginning market values.
  - 50% of the last distribution amount increased by inflation. (Because inflation tends to be more stable than market value, this portion of the calculation tends to be more stable).

Time horizon: These are presumed to be perpetual unless directed otherwise by the case facts.

Taxes: These are presumed to be tax exempt. Do watch for disclosed issues such as unrelated business income, which is subject to tax.

Liquidity: Needs are usually low but again watch for case-specific exceptions such as a desire for a liquidity reserve or a need for a one-time special distribution. Mentioning the need to meet ongoing distributions is reasonable and recommended. (Because this is self-evident, past answers may omit it).

Legal/regulatory: Is relatively limited compared to other institutions and varies by country and legal jurisdiction. U.S. law classifies some foundations as independent, company-sponsored, operating, or community with varying rules regarding minimum distribution requirements.

Unique issues: These are rare, but watch for concentrated holdings, socially responsible investing requirements, board of director biases and opinions, prohibited investments, special tax issues, and inadequate resources for due diligence on complex investments. As always, read and respond to the case-specific information.

Return objective: Meeting long-term distribution requirements and maintaining real value (to maintain intergenerational neutrality) are the typical objectives. A

multiplicative calculation is preferred over additive due to the long time horizon and, therefore, greater exposure to path dependency issues. The return target typically includes investment management fees as well as the distribution rate and the future inflation rate relevant to the recipient.

Risk objective: Risk tolerance is often the highest of the institutions covered here due to the perpetual time horizon, lack of contractual liabilities, and payout requirements, plus the need to cover future inflation and maintain purchasing power. If the recipients are less/more dependent on the distributions that increases/decreases risk tolerance.

Insurance Companies

Insurance companies provide policies that allow risk sharing. Policyholders purchase a policy with a payment(s) that the insurance company invests. The company then makes the contracted benefit payout(s) to the policy beneficiaries, when and if the event defined in the policy occurs. While life and non-life [primarily property and casualty companies (P&C) are covered here] have many similarities there also specific differences. Both have reasonably definable liabilities and use ALM.

Time horizon: Is largely determined by the duration of the liabilities. Traditionally, portfolios of life companies had longer duration but in reality there is wide variation in policy characteristics and D_L. Portfolios of non-life companies generally have relatively shorter D_L. For both it is not unusual to segment the portfolio by line of business to better match the asset characteristics to each business line's liability characteristics.

Taxes: Taxation is complex and varies by jurisdiction. The return up to the crediting rate is generally tax exempt.

Liquidity: Needs are determined by policy payout requirements.

- Liquidity needs for non-life companies are generally higher and less predictable in amount and timing. Most P&C policies are for a year or less but there can be a *long tail* due to a portion of claims that enter litigation with less certain and delayed payout. Some policies insure replacement value of property, making future payout needs higher and less predictable. The portfolio emphasis is on liquid, shorter-term assets with duration matching of any anticipated deferred future policy payouts.

- Life insurance companies face *disintermediation risk* if policies include a provision allowing policyholders to make withdrawals or borrow at a bargain interest rate. In such cases, liquidity needs are likely to increase in periods of higher interest rates as policyholders can cash out and invest elsewhere at higher rates. The higher rates and liquidity needs are also likely to be associated with depressed asset market values.

Legal/regulatory: Regulation of life companies is extensive and varies widely by regulatory jurisdiction. Minimum capital requirements and asset quality rules are common. Specific requirements for asset valuation are common, often a form of book value rather that market value accounting. Other than the surplus, the portfolio is predominately investment-grade fixed income. Non-life companies are generally less regulated.

Unique: If any, they will be case specific.

Return objective: The minimum required return is the crediting rate determined by the actuaries as necessary to meet policy obligations. A higher desired target return would increase the surplus. An increase in the surplus is desirable as it allows the company to take more risk, if desired. The surplus may be invested more aggressively (in equities), which then increases expected asset return. Higher asset return allows premiums (the price of the insurance product) to be reduced and potentially increase the company's market share. The investment portfolio is often segmented by line of business (e.g., life insurance versus annuities) if different business lines have different liability characteristics.

The return objectives of non-life companies are often more varied than for life because regulation is less stringent and product mix, liability duration, tax situations, plus company capital adequacy and surplus vary considerably. Non-life companies (in the United States) often face an *underwriting/tax/profitability cycle* due to the competitive nature of the business and resulting swings between profit and loss. When profitable ($t > 0$) companies may invest in higher tax-equivalent yielding (yield after 0 tax) tax-free municipal bonds. However, the typically steeper yield curve for these instruments creates an incentive to increase D_A beyond D_L. Profitability also encourages lowering policy prices to sell more policies and gain market share. This can, in time, lead to losses on the expanded business and profits turn to loss and a 0 tax rate. The portfolio is shifted to taxable bonds where the yield curve is generally less steep. With less incentive to extend D_A, matching D_L is more likely.

Risk objective: Risk tolerance is low for life insurance companies. Investment of funds is treated as a quasi-fiduciary responsibility. In both insurance types, more

surplus increases risk tolerance. Asset holdings are mostly investment-grade fixed income. Any equity is usually limited to the surplus.

- Theoretically, risk tolerance is higher for non-life due to less regulation, but the erratic timing and amount of liability payments may offset this. Less regulation does make these companies more willing to use active fixed income management with mismatching asset and liability duration. Policies may insure replacement value, creating inflation risk.
- Life companies often face significant reinvestment risk because payouts are in the distant future and reinvestment rates on cash flow received have a significant effect on the eventual realized return. Disintermediation risk is a factor for some life companies.

Bank Securities Portfolio

Banks are the most regulated and conservative of the institutions covered. The securities portfolio is a **residual use** of funds after meeting reserve requirements and loan demand. Investment decisions are made in relation to the effect on the total balance sheet. ALM is the approach. The objectives in the securities portfolio are:

1. Manage interest rate risk—shorter duration to offset longer loan asset duration.

2. Provide asset liquidity—mostly shorter-term government securities to offset less liquid loans.

3. Produce income.

4. Diversify credit risk of riskier loan assets.

The return objective is to contribute to positive interest spread (interest earned on assets less paid on liabilities). Risk tolerance is low and focused on maintaining the surplus.

Legal and regulatory restrictions are extensive, with limits on holdings of riskier securities and risk-based capital requirements. Regulators specify measures such as VaR and LADG (which measures divergence between asset and liability duration).

Liquidity needs are driven by the need to meet deposit withdrawals and are a key focus of regulators.

Time horizon is shorter and the focus is balancing total asset versus liability duration.

Taxation is complex, with realized gains and losses typically flowing directly into operating income, creating an incentive to hold losers (avoiding realized losses).

Linking Pension Liabilities to Assets

Cross-Reference to CFA Institute Assigned Reading #14

The **asset only approach** maximizes expected asset return for the standard deviation of asset return that is acceptable. Generally this leads to a higher allocation to equities for higher return and shorter duration bonds for lower risk, compared to a liability relative approach.

The **asset-liability approach** maximizes surplus (PV of assets – PV of liabilities) growth for the standard deviation of surplus growth that is acceptable. Matching the duration of assets and liabilities minimizes that variability of the surplus.

Liability-Relative Approach

The **liability-relative approach** (LRA) refines basic ALM to more closely analyze the liabilities and control the variability of the surplus. LRA typically leads to higher allocations to real rate and longer duration bonds than the asset only approach. Liability exposure is decomposed into three market risks:

- **Term structure**: The PV of fixed future benefits is vulnerable to changes in the level of interest rates (the term structure of rates). Liabilities linked only to term structure risk should be funded with nominal (fixed rate) bonds to minimize surplus risk. These are accrued benefit liabilities due to past service earned by inactive participants, frozen benefits, and fixed benefits for active participants.
- **Inflation**: The PV of future benefits indexed to inflation is also exposed to changes in inflation rates and should be funded with a combination of nominal (fixed rate) bonds and bonds with payouts indexed to inflation [called real rate or real return bonds (e.g. TIPS in the U.S.)] to minimize surplus risk. These are accrued benefit liabilities linked to inflation.
- **Economic growth**: The PV of future benefits linked to future wages is also exposed to changes in those wages. Wage growth will correlate with changes in productivity, corporate profits, and, therefore, stock market returns. These liabilities should be funded with a combination of nominal (fixed rate) bonds, bonds with payouts indexed to inflation, and equities to minimize surplus risk. These are future benefit liabilities linked to future service and wages.

Future plan liabilities for future plan participants should be excluded from the analysis. These liabilities should be funded by future contributions to the plan.

Zero surplus variability is generally not possible due to non-market risks called liability noise. Changing plan demographics and model uncertainty (the inability to determine the precise probability of future events) will leave some uncertainty in the PVL and surplus.

Applications of Economic Analysis to Portfolio Management

Study Session 7

Topic Weight on Exam	Approximately 5–15%
SchweserNotes™ Reference	Book 3, Pages 1–83

Expect Study Session 7 to be 5 to 15% of the exam and more likely to appear in item set questions. Expect some questions related to concepts and calculations.

Capital Market Expectations

Cross-Reference to CFA Institute Assigned Reading #15

To formulate capital market expectations, the analyst should use the following **seven-step process**.

Step 1: Determine the specific capital market expectations needed according to the investor's tax status, allowable asset classes, and time horizon.
Step 2: Investigate assets' historical performance as well as the determinants of (i.e., factor affecting) their performance.
Step 3: Identify the valuation model used and its requirements.
Step 4: Collect the best data possible.
Step 5: Use experience and judgment to interpret current investment conditions.
Step 6: Formulate capital market expectations.
Step 7: Monitor performance and use it to refine the process.

Problems in Forecasting

Nine problems encountered in producing forecasts are: (1) limitations to using economic data; (2) data measurement error and bias; (3) limitations of historical estimates; (4) the use of ex post risk and return measures; (5) non-repeating data patterns; (6) failing to account for conditioning information; (7) misinterpretation of correlations; (8) psychological traps; and (9) model and input uncertainty.

Analysts are susceptible to six **psychological traps**:

1. Anchoring trap.

2. Status quo trap.

3. Confirming evidence trap.

4. Overconfidence trap.

5. Prudence trap.

6. Recallability trap.

Statistical Forecasting Tools

Projecting historical data is the most straightforward statistical tool. Here the analyst projects the historical mean return, standard deviation, and correlations for a data set into the future.

Shrinkage estimators reduce (shrink) the influence of historical outliers through a weighting process. The mean return and covariance are the parameters most often adjusted with shrinkage estimators. This tool is most useful when the data set is so small that historical values are not reliable estimates of future parameters.

Time series analysis forecasts a variable using previous values of itself and sometimes previous values of other variables. These models can be used to forecast means as well as variances. In the latter case, assets such as foreign exchange, stocks, and futures, have been shown to exhibit **volatility clustering**. Volatility in the current period, σ_t^2, can be stated as a weighted average of the previous period volatility, σ_{t-1}^2, and a random error, ε_t^2:

$$\sigma_t^2 = \theta\sigma_{t-1}^2 + (1-\theta)\varepsilon_t^2$$

Multifactor models are used to forecast returns. They can also be used to forecast covariances. The advantage of using them to forecast covariances is that the model can simplify the forecasting procedure by reducing the forecast to a common set of factors. This modeling also eliminates the noise present in a sample of data and ensures consistent forecasts given a consistent covariance matrix.

Discounted Cash Flow Models

The advantage of these models is their correct emphasis on the future cash flows of an asset and the ability to back out a required return. Their disadvantage is that they do not account for current market conditions, so they are viewed as being more suitable for long-term valuation.

The most common discounted cash flow model is the Gordon growth model or constant growth model. It is most useful to value mature markets growing at a constant rate:

$$P_0 = \frac{Div_1}{\hat{R}_i - g} \Rightarrow \hat{R}_i = \frac{Div_1}{P_0} + g$$

Grinold and Kroner (2002)[1] take this model one step further by including a variable that adjusts for stock repurchases and changes in market valuations as represented by the price-earnings (P/E) ratio:

$$\hat{R}_i = \frac{Div_1}{P_0} + i + g - \Delta S + \Delta\left(\frac{P}{E}\right)$$

Risk Premium Approach

To determine the expected return for equities, the analyst would start with the yield to maturity on a long-term government bond and add an equity risk premium. This approach is referred to as the *bond yield plus risk premium* approach.

To determine the expected return for bonds, $\hat{R}_B$, using this approach, the analyst uses the real risk-free rate and risk premiums as follows:

$$\hat{R}_B = \text{real risk-free rate} + \text{inflation risk premium} + \text{default risk premium} + \text{liquidity risk premium} + \text{maturity risk premium} + \text{tax premium}$$

Financial Equilibrium Models

The equation for the ICAPM is:

$$\hat{R}_i = R_F + \beta_i\left(\hat{R}_M - R_F\right)$$

1. Richard Grinold and Kenneth Kroner, "The Equity Risk Premium," *Investment Insights* (Barclay's Global Investors, July 2002).

We can manipulate this formula to solve for the equity risk premium. Restating the ICAPM and referring to the equity risk premium as ERP:

$$\hat{R}_i = R_F + \beta_i\left(\hat{R}_M - R_F\right)$$

$$\hat{R}_i = R_F + \rho_{i,M}\frac{\sigma_i}{\sigma_M}\left(\hat{R}_M - R_F\right)$$

$$\hat{R}_i - R_F = \rho_{i,M}\frac{\sigma_i}{\sigma_M}\left(\hat{R}_M - R_F\right)$$

$$ERP_i = \rho_{i,M}\frac{\sigma_i}{\sigma_M}ERP_M$$

$$ERP_i = \rho_{i,M}\sigma_i\left(\frac{ERP_M}{\sigma_M}\right)$$

Aside: note that $\left(\frac{ERP_M}{\sigma_M}\right) = \left(\frac{\hat{R}_M - R_F}{\sigma_M}\right)$

The Singer and Terhaar analysis adjusts the ICAPM for market imperfections, such as illiquidity and market segmentation. The more illiquid an asset is, the greater the liquidity risk premium should be. Liquidity is not a concern for developed world capital markets but is a concern for assets such as direct real estate and venture capital. In the case of private equity, an investment may not become liquid until the lock-up period expires.

To estimate the size of the liquidity risk premium, we estimate the *multi-period Sharpe ratio* for the investment over the time until it is liquid and compare it to the estimated multi-period Sharpe ratio for the market. The Sharpe ratio for the illiquid asset must be at least as high as that for the market.

When markets are segmented, capital does not flow freely across borders; in integrated markets, capital flows freely. If markets are segmented, two assets with the same risk can have different expected returns because capital cannot flow to the higher return asset. The presence of investment barriers increases the risk premium for securities in segmented markets.

Capital Market Expectations

Capital market expectations can be formed using **surveys**. In this method, a poll is taken of market participants such as economists and analysts as to what their expectations are regarding the economy or capital market. If the group polled is fairly constant over time, this method is referred to as a **panel method**.

Judgment can also be applied to project capital market expectations. Although quantitative models provide objective numerical forecasts, there are times when an analyst must adjust those expectations using their experience and insight to improve upon those forecasts.

The Inventory and Business Cycle

In general, economic growth can be partitioned into two components: (1) cyclical and (2) trend-growth components. Within cyclical analysis, there are two components: (1) the inventory cycle and (2) the business cycle. The former typically lasts two to four years whereas the latter has a typical duration of nine to eleven years. These cycles vary in duration and are hard to predict because wars and other events can disrupt them.

The output gap is the difference between the current GDP and GDP based on a long-term trend line (i.e., potential GDP). When the trend line is higher than the current GDP, the economy has slowed and inflationary pressures have weakened. When it is lower, economic activity is strong as are inflationary pressures. The third measure of economic activity, a *recession*, is defined as negative growth in GDP over two consecutive quarters.

The **inventory cycle** is often measured using the inventory to sales ratio. The measure increases when businesses gain confidence in the future of the economy and add to their inventories in anticipation of increasing demand for their output. As a result, employment increases with subsequent increases in economic growth. This continues until some precipitating factor such as a tightening in the growth of the money supply intervenes. At this point inventories decrease, employment declines, and economic growth slows.

The longer-term **business cycle** is characterized by five phases: (1) the initial recovery, (2) early expansion, (3) late expansion, (4) slowdown, and (5) recession. We discuss the business cycle in greater detail later when we examine its effect on asset returns.

Inflation

Aggregate inflation is measured most frequently by consumer price indices. Inflation peaks in the latter stages of economic expansion and falls during a recession and the initial stages of recovery.

Deflation, periods of decreasing prices, reduces the ability of the central bank to stimulate the economy. Deflation results in interest rates near zero, so the central bank cannot lower rates any further to stimulate the economy. For this reason, central banks prefer a low level of inflation to the prospect of deflation.

Consumer and Business Spending

As a percentage of GDP, consumer spending is much larger than business spending. Consumer spending is usually gauged through the use of retail sales and consumer consumption data. The data has a seasonal pattern, with sales increasing near holidays. In turn, the primary driver of consumer spending is after-tax income, which in the United States is gauged using non-farm payroll data and new unemployment claims. Employment data is important to markets because it is usually quite timely.

Given that spending is income net of savings, savings data are also important for predicting consumer spending. Saving rates are influenced by consumer confidence and changes in the investment environment. Specifically, consumer confidence increases as the economy begins to recover from a recession, and consumers begin to spend more.

Monetary Policy

The latter stages of an economic expansion are often characterized by increased inflation. As a result, central banks usually resort to restrictive policies towards the latter part of an expansion.

To spur growth, a central bank will cut short-term interest rates. This results in greater consumer spending, greater business spending, higher stock prices, and higher bond prices. Lower real interest rates also usually result in a lower value of the domestic currency, which is thought to increase exports. The equilibrium interest rate in a country (the rate that produces a balance between growth and inflation) is referred to as the *neutral rate*.

Fiscal Policy

If the government wants to stimulate the economy, it can decrease taxes and/or increase spending, thereby increasing the budget deficit. If they want to rein in growth, the government does the opposite.

There are two important aspects to fiscal policy. First, it is not the level of the budget deficit that matters, it is the change in the deficit. For example, a deficit by itself does not stimulate the economy, but increases in the deficit are required to stimulate the economy. Second, changes in the deficit that occur naturally over the course of the business cycle are not stimulative or restrictive.

The Business Cycle and Asset Returns

General characteristics for phases of the business cycle:

Initial Recovery

- Duration of a few months.
- Business confidence is rising.
- Government stimulation is provided by low interest rates and/or budget deficits.
- Falling inflation.
- Large output gap.
- Low or falling short-term interest rates.
- Bond yields are bottoming out.
- Rising stock prices.
- Cyclical, riskier assets such as small-cap stocks and high yield bonds do well.

Early Upswing

- Duration of a year to several years.
- Increasing growth with low inflation.
- Increasing confidence.
- Increasing inventories.
- Rising short-term interest rates.
- Output gap is narrowing.
- Flat or rising bond yields.
- Rising stock prices.

Late Upswing

- Confidence and employment are high.
- Output gap eliminated and economy at risk of overheating.
- Inflation increases.
- Central bank limits the growth of the money supply.
- Rising short-term interest rates.
- Rising bond yields.
- Rising/peaking stock prices with increased risk and volatility.

Slowdown

- Duration of a few months to a year or longer.
- Declining confidence.
- Inflation is still rising.
- Falling inventory levels.
- Short-term interest rates are at a peak.
- Bond yields have peaked and may be falling, resulting in rising bond prices.
- Yield curve may invert.
- Falling stock prices.

Recession

- Duration of six months to a year.
- Large declines in inventory.
- Declining confidence and profits.
- Increase in unemployment and bankruptcies.
- Inflation tops out.
- Falling short-term interest rates.
- Falling bond yields, rising prices.
- Stock prices increase during the latter stages anticipating the end of the recession.

The Taylor Rule

The Taylor rule determines the target interest rate using the neutral rate, expected GDP relative to its long-term trend, and expected inflation relative to its targeted amount. It can be formalized as follows:

$$r_{target} = r_{neutral} + \left[0.5\left(GDP_{expected} - GDP_{trend}\right) + 0.5\left(i_{expected} - i_{target}\right)\right]$$

The Yield Curve

When both fiscal and monetary policies are expansive, the yield curve is sharply upward sloping (i.e., short-term rates are lower than long-term rates), and the economy is likely to expand in the future. When fiscal and monetary policies are restrictive, the yield curve is downward sloping (i.e., it is *inverted* as short-term rates are higher than long-term rates), and the economy is likely to contract in the future.

When fiscal and monetary policies are in disagreement, the shape of the yield curve is less definitively shaped. If monetary policy is expansive while fiscal policy is restrictive, the yield curve will be upward sloping, though it will be less steep than when both policies are expansive. If monetary policy is restrictive while fiscal policy is expansive, the yield curve will be more or less flat.

Economic Growth Trends

A country's long-term economic growth rate can be decomposed into two main components: (1) **changes in employment levels** and (2) **changes in productivity**. Essentially, the two together measure how many people are working and what each person's output is. The former component can be further broken down into **population growth** and the **rate of labor force participation**.

The productivity component can be broken down into subcomponents as well: **spending on new capital inputs** and **total factor productivity growth**. The latter results from more efficient use of inputs and better technology. The former component accounts for much of the fast growth in Asia, as much has been spent there on new equipment.

Emerging Market Economies

There are six questions potential investors should ask themselves before committing funds to emerging markets.

1. **Does the country have responsible fiscal and monetary policies?** To gauge fiscal policy, most analysts examine the deficit to GDP ratio. Ratios greater than 4% indicate substantial credit risk.

2. **What is the expected growth?** To compensate for the higher risk in these countries, investors should expect a growth rate of at least 4%.

3. **Does the country have reasonable currency values and current account deficits?** A volatile currency discourages needed foreign investment, and an overvalued currency may encourage excessive borrowing by the emerging market government. Current account deficits greater than 4% of GDP can be problematic.

4. **Is the country too highly levered?** Too much debt can eventually lead to a financial crisis if foreign capital flees the country. Crises are accompanied by currency devaluations and declines in emerging market asset values. Foreign debt levels greater than 50% of GDP indicate that the country may be overlevered. Debt levels greater than 200% of the current account receipts also indicate high risk.

5. **What is the level of foreign exchange reserves?** The investor should beware of countries where the foreign exchange reserves are less than the foreign debt that must be paid off within one year.

6. **Does the government support structural reform?**

Links Between Economies

Macroeconomic links refer to similarities in business cycles across countries. Economies are linked by both international trade and capital flows so that a recession in one country dampens exports and investment in a second country, thereby creating a slowdown in the second country.

Another link between economies results from **exchange rates**. The benefit of a peg is that currency volatility is reduced and inflation can be brought under control. Countries are not always successful in maintaining a peg, however, because the weaker country in the peg usually abandons it, devaluing their currency. For this reason, interest rates between the two countries will often reflect a risk premium, with the weaker country having higher interest rates.

Interest rate differentials between countries can also reflect differences in economic growth, monetary policy, and fiscal policy. It is theorized that real interest rate differentials between countries should not exist and over time exchange rates will equalize differences. Countries with high *real interest rates* should see the value of their currency increase.

Economic Conditions and Asset Class Returns

Cash Instruments

Cash typically refers to short-term debt (e.g., commercial paper) with a maturity of one year or less. Cash managers adjust the maturity and creditworthiness of their cash investments depending on their forecasts for interest rates and the economy.

The interest rate for overnight loans among U.S. banks is the Federal Funds rate and is set by the Federal Reserve through their purchases and sales of government debt. This rate is fairly stable except during periods of unusual market volatility. In the European Union, the European Central Bank targets the repo rate.

Credit Risk-Free Bonds

The most common type of credit risk-free bonds are those issued by governments in developed countries. The yield on these bonds is composed of a real yield and the expected inflation over the investment horizon. Based on historical data, the real yield on an ex-ante basis should be roughly 2% to 4%.

Credit Risky Bonds

The most common type of credit risky bonds are corporate bonds. During a recession, the credit risk premium increases because default becomes more likely. At the same time, the credit offered by banks and the commercial paper market also dries up so that corporations have to offer higher yields to attract investors. More favorable economic conditions result in lower credit risk premiums.

Emerging Market Government Bonds

The currency of emerging market bonds is usually a hard currency (e.g., dollars, euros, etc.), thus the emerging market government must obtain a hard currency to pay back the principal and interest. The default risk for emerging market debt is appropriately higher. To assess this risk, analysts use country risk analysis, which focuses on the economic and political environment in a country.

Inflation Indexed Bonds

An example is U.S. Treasury Inflation Protected Securities (TIPS). These bonds are both credit risk and inflation risk free. Their yields still vary, however, as economic conditions change and as the supply and demand for these instruments vary. If inflation starts rising, the yields for these bonds will actually fall as investors seek out their inflation protection.

Common Stock

For stocks, both the cash flows (earnings) and discount rate (risk-adjusted required return) are important. Earnings are commonly used to value the stock market because they should be reflected in both the cash paid out as dividends and as capital gains. Aggregate earnings depend primarily on the trended rate of growth in an economy, which in turn depends on the growth in the labor force, new capital inputs, and total factor productivity growth.

Shorter-term growth is affected by the business cycle. In a recession, sales and earnings decrease. Noncyclical or defensive stocks (e.g., utilities) are less affected by the business cycle and will have lower risk premiums and higher valuations than cyclical stocks (e.g., technology firms). Cyclical stocks are characterized by high business risk (sensitivity to the business cycle) and/or high fixed costs (operating leverage).

Emerging Market Stocks

Historical returns for emerging market stocks are higher and more variable than those in the developed world, and seem to be positively correlated with business cycles in the developed world. This correlation is due to trade flows and capital flows.

Real Estate

Real estate assets are affected by interest rates, inflation, the shape of the yield curve, and consumption. Interest rates affect both the supply of and demand for properties through mortgage financing rates. They also determine the capitalization rate (i.e., discount rate) used to value cash flows.

Forecasting Exchange Rates

Purchasing Power Parity (PPP). PPP states that differences in inflation between two countries will be reflected in changes in the exchange rate between them. Specifically, the country with higher inflation will see their currency value decline.

PPP does not hold in the short term or medium term but holds approximately in the long term (five years or more). PPP is given attention by governments and forecasters, but its influence on exchange rates may be swamped by other factors such as trade deficits.

Relative economic strength approach. A favorable investment climate will attract investors, which will increase the demand for the domestic currency, which will increase its value. Investors may be attracted by short-term interest rates or by the economic growth in a country. High short-term interest rates will attract investors who bid up the currency value over the short term. Low short-term interest rates will result in borrowing in the currency. After the borrowers take out their loan, they sell the currency for another, thereby putting downward pressure on the low interest rate currency.

Capital flows approach. This approach focuses primarily on long-term capital flows such as those into equity investments or foreign direct investments. For example, the strength of the U.S. dollar in the later 1990s was thought to be due to the strength of the U.S. stock market.

Savings-investment imbalances approach. This approach is not readily implemented for forecasting but explains why currencies may diverge from equilibrium values for extended periods. This approach starts with the concept that an economy must fund investment through savings. If investment is greater than domestic savings, then capital must flow into the country from abroad to finance the investment.

Equity Market Valuation

Cross-Reference to CFA Institute Assigned Reading #16

The **Cobb-Douglas production function (CD)** uses the country's labor input and capital stock to estimate the total real economic output.

$$Y = AK^{\alpha} L^{\beta}$$

where:
α = output elasticity of capital
β = output elasticity of labor
$\alpha + \beta = 1.0$

Each of the inputs, as well as the output, can be stated in terms of growth (i.e., percentage change):

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

Percentage changes in capital and labor can be obtained from national accounts, and α and β, the output elasticities of capital and labor, vary from country to country. The change in TFP (i.e., $\%\Delta A$) is the **Solow residual** and can be determined by rearranging the equation:

$$\text{Solow residual} = \%\Delta TFP = \%\Delta Y - \alpha(\%\Delta K) - (1-\alpha)\%\Delta L$$

An economy's TFP can change over time due to the following:

- Changing technology.
- Changing restrictions on capital flows and labor mobility.
- Changing trade restrictions.
- Changing laws.
- Changing division of labor.
- Depleting/discovering natural resources.

Also, some factors might have only a short-term effect on economic output, while others can have longer-lasting effects. For example, one-time costs incurred to meet increased environmental restrictions by replacing outdated equipment will have a short-term dampening effect. Once the retooling is completed, the economy would be expected to return to its long-term average growth rate. Factors, such as import restrictions, however, could have a longer-lasting impact on economic growth, depending on how quickly (and if) domestic replacements can be established.

The **H-model** is typically used to value less developed or emerging markets that are experiencing an initial period of high growth.

$$P_0 = \frac{D_0}{r - g_L}\left[(1 + g_L) + \frac{N}{2}(g_S - g_L)\right]$$

Top-down and bottom-up approaches to earnings forecasts can yield different results. The differences can reveal potential investment opportunity.

- Top-down forecasts provide an aggregate market forecast based on macroeconomic variables, but are typically based on historical relationships and are slow to reflect structural changes in the economy or markets.
- Bottom-up forecasts by company can be aggregated to a market forecast, but bottom-up aggregation of an individual analyst's forecasts tends to be *overly emotional*, too optimistic in an expansion and too pessimistic in a recession.

Relative Equity Market Valuation

The **Fed model** assumes that the expected operating earnings yield on the S&P 500 should be the same as the yield on long-term U.S. Treasuries:

$$\text{Fed model ratio} = \frac{\text{S\&P earnings yield}}{\text{10-year Treasury yield}}$$

If the S&P 500 earnings yield is higher than the treasury yield, the interpretation is that the index value is too low relative to earnings. Likewise, if the earnings yield is lower than the treasury yield, the index is considered too high for the level of earnings. Equities are over-valued and should fall.

The Fed model is easy to understand and is consistent with discounted cash flow analysis, (higher discount rates lead to lower values). The model is criticized for: (1) including no equity risk premium, (2) ignoring earnings growth, and (3) comparing a real variable (earnings yield) with a nominal variable (bond yield).

The **Yardeni model** for estimating the equilibrium earnings yield (i.e., the fair earnings yield) is based on a variation of the constant growth dividend discount model in which investors value total earnings rather than dividends.

The Yardeni model addresses some of the criticisms of the Fed model. It uses a corporate bond yield as a proxy for the riskiness of equities. It includes a five-year growth forecast. The model produces a "fair" earnings yield, which can be compared to actual earnings yield. If the actual yield is above fair, the market is undervalued. *d* is an arbitrary scaling factor, often assumed to be about 0.10.

$$\frac{E_1}{P_0} = Y_B - d(\text{LTEG}) = \text{fair earnings yield}$$

Or the model can be rearranged to solve for theoretical fair value of the market:

$$\frac{E_1}{P_0} = Y_B - d(\text{LTEG}) \Rightarrow V_0 = \frac{E_1}{Y_B - d(\text{LTEG})}$$

The criticisms of the model are: (1) it ignores true equity risk premiums, (2) it is sensitive to a mis-estimate of earnings growth, (3) d is an arbitrary assumed number, and (4) it implicitly assumes a constant discount rate. Neither the Fed nor Yardeni model work consistently in the short run.

The **P/10-year MA(E)** is computed as the price of the S&P 500 divided by the average of its previous 10 years' reported earnings. Both numbers are adjusted for inflation using the consumer price index. Similar to a trailing P/E ratio, the P/10-year MA(E) compares the inflation adjusted price of the market at a point in time to the market's average real earnings over the previous ten years. The advantages of the model are: (1) it adjusts for inflation and the business cycle and (2) it tends to work over the long run. The criticisms are: (1) it does not consider accounting changes, (2) other approaches to calculating past earnings may work better, and (3) it does not work consistently in the short run.

Tobin's q compares the current market value of a company to the replacement cost of its assets. **Equity q** is very similar and compares the market value of equity to the replacement cost of assets less replacement cost of liabilities. Both q ratios assume 1.0 indicates fair value for equity. Both are supported by economic theory and tend to work in the long run. The criticisms are replacement value is hard to estimate and the models do not work well in the short run.

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

$$\text{equity q} = \frac{\text{market value of equity}}{\text{replacement value of net worth}}$$

$$= \frac{\text{market value of equity}}{\text{replacement value of assets} - \text{replacement value of liabilities}}$$

Asset Allocation and Related Decisions in Portfolio Management (1, 2)

Study Sessions 8 and 9

Topic Weight on Exam	15–20%
SchweserNotes™ Reference	Book 3, Pages 84–199

These Study Sessions apply the output of the previous Study Session to the asset allocation process. There are substantial concepts, calculations, and terminology. Item set is the most likely question format. You should recognize some of this material overlaps with earlier sessions.

Asset Allocation

Cross-Reference to CFA Institute Assigned Reading #17

Strategic asset allocation combines capital market expectations and the investor's IPS and is long term in nature. Studies have shown that portfolio returns can be attributed primarily to the strategic asset allocation.

Tactical asset allocation (TAA) involves short-term deviations from the strategic asset allocation in an attempt to capitalize on capital market disequilibria (mispricing).

Asset-Only and Asset/Liability Management (ALM)

ALM strategic asset allocation is determined in conjunction with modeling the liabilities of the investor. Asset allocation is tailored to meet liabilities and to maximize the surplus given an acceptable level of risk.

In *asset-only strategic asset allocation*, the focus is on earning the highest level of return for a given (acceptable) level of risk.

Dynamic asset allocation takes a multi-period view of the investment horizon. **Static asset allocation** ignores the link between optimal asset allocations across different time periods.

Specifying Risk and Return Objectives

The **return objective** for an individual's or institution's portfolio is based upon the size of the portfolio, long-term spending (liquidity) needs, the time horizon, et cetera, and maintenance of the principal.

Investors can be placed into *numerical categories of risk aversion* using a rough approximation or through answers to questionnaires.

We can determine the *utility-adjusted* return the investor will realize from the portfolio:

$$U_p = \hat{R}_P - 0.005(A)(\sigma_P^2)$$

Downside Risk

Shortfall risk is the risk of exceeding a maximum acceptable dollar loss. **Semivariance** is the "bottom half" of the variance (i.e., the variance calculated using only the returns below the expected return). **Target semivariance** is the semivariance using some target minimum return, such as zero.

Roy's Safety-First Measure is one of the oldest and most cited measures of downside risk.

$$RSF = \frac{\hat{R}_P - MAR}{\sigma_P}$$

Adding Asset Classes to a Portfolio

Asset classes are appropriately specified if:

1. Assets within a class are homogeneous with high positive correlation.
2. Asset classes are mutually exclusive.
3. Asset classes are diversifying with low correlation.
4. The classes include most of the world's investable assets.
5. Asset classes are sufficiently liquid to allow investment.

A short cut to mean-variance analysis can be used to determine if adding an asset class can increase the portfolio's Sharpe ratio. Compare the product of the current portfolio's Sharpe ratio times the correlation of the proposed addition to the Sharpe ratio of the proposed new addition.

Add the asset class if:

$$[E(R_P) - R_F]/\sigma_P \times \rho_{new,P} < [E(R_{new}) - R_F]/\sigma_{new}$$

And the new asset class is permitted by the investor's IPS

Adding international markets to the portfolio of a developed market investor can increase expected return. While the international market's standalone risk may be higher, its low correlation may provide a diversification benefit and lower total portfolio risk.

Unfortunately, there is a tendency for correlations to rise during market crises, reducing the diversification benefit when it is most needed. This can be called **contagion**. An argument has been made that it is standard deviations that rise during crises and not correlations. After correcting for rising risk, the evidence still indicates that there is a rise in correlations during crises.

Adding emerging markets to a portfolio further increases expected return and stand-alone risk. As that emerging market integrates with the world market, diversification becomes possible and standalone risk can be diversified. As more investors buy the emerging market securities, the stock prices rise and expected future returns decline to reflect the higher starting prices and lower future risk. The cost of capital declines, which facilitates the future economic growth of the emerging market.

Approaches to Asset Allocation

1. Mean Variance Analysis or Optimization (MVO)

Mean variance analysis uses expected returns, standard deviations, and correlations of asset classes to generate an efficient frontier (EF) of portfolios. MVO also generates an asset allocation of risky assets for each portfolio on the EF. Analysis is

typically constrained to allow only positive asset class weights, no short sales. The weakness of MVO are:

- Must specify expected returns and the other inputs for all asset classes.
  - Can lead to input bias.
  - Can be overwhelming.
- Can yield allocations that are not well diversified (i.e., heavily concentrated allocations).
- **Instability of the asset allocation output** is a serious problem with MVO. Small changes in the inputs (particularly the expected return estimates) can produce dramatic shifts in the asset class weights.
  - The inputs cannot be known with certainty.
  - The changes in input are statistically insignificant.
  - Following the asset class weighting changes will increase transaction costs.

Resampling and **Black-Litterman** techniques address the instability problem.

2. Resampling requires several steps:

- The initial estimates of E(R), σ, and ρ by asset class determine the **efficient frontier** (EF). Consider this data set 1 and output 1.
- Monte Carlo or other techniques are used to create a set of random input data around the initial estimates of E(R), σ, and ρ. A new **resampled efficient frontier** is generated. Consider this data set 2 and output 2.
- This process is repeated many times, generating a "cloud" of possible input data for E(R), σ, and ρ around the initial best estimates used in data set 1.
- Each data set and output provides a different resampled efficient frontier and optimal asset allocations.
- The optimal asset allocation for a single **resampled efficient portfolio** is the average of its possible asset allocations.

Resampling is intended to address the inherent inability to know the true input values and produce a more stable asset allocation, constrained for no short selling. Its weaknesses are there is no statistical rationale for the process and historical initial data may not be indicative of future values for the inputs.

3. Black-Litterman (BL)

Black-Litterman is another approach to the instability problem with better theoretical justification. It is typically implemented on a constrained basis. The manager:

- Inputs global asset class weights along with covariances and reverse optimizes for implied returns by asset class.
- Then "view adjust" these implied returns up or down based on the manager's expectations and confidence in those expectations.

- The manager can then arbitrarily hold more than the market weight for asset classes where his view is more optimistic or, more typically, the manager inputs his adjusted return expectations along with market consensus estimates for all other inputs back into an MVO model, and use MVO analysis to determine the optimal asset allocation.

The benefits of BL are that it starts with and therefore tends to result in highly diversified portfolios (many asset classes) with less input bias. The criticisms are that it is complex and typically depends on historically based volatility estimates.

4. Monte Carlo Simulation (MCS)

MCS is a complement to the previous tools designed to project and analyze the expected performance of a particular asset allocation over time. It can generate multiple potential outcomes, which can be probability ranked. It can incorporate path dependency issues such as the interaction of inflation, distributions, taxes, and market value. The criticisms are that it is complex, can be expensive, and the output is only as good as the inputs.

5. Asset-Liability Management (ALM)

All of the previous techniques can be applied to analyze the surplus, rather than the asset value. The same benefits and criticisms will apply.

6. Experience-Based Techniques

This is the same process presented in Study Session 4 as the process of elimination. It can also be referred to as heuristic or rules of thumb. While it is simplistic and may not work in more complex cases, the basic conclusions are supported by the other more technical approaches. The basic insights are:

- Long time horizons allow for higher risk.
- A 60/40 allocation of equity/bonds is a good starting point for an average investor.

Mean-Variance Optimization (MVO) and Corner Portfolios (CP)

The mean variance optimizer can be programed to identify selected points on the efficient frontier (EF) called corner portfolios (CP). Once identified, the two adjacent CPs and linear interpolation can be used to determine the actual asset allocation of any portfolio on the EF and to (closely) approximate its standard deviation. In addition, the CP with the highest Sharpe ratio will approximate the tangent portfolio (TP) to construct the optimal capital allocation line (CAL) to the EF. The MVO is constrained to only allow + weights, no short selling.

A CP must be on the EF:

- The left most (lowest risk and return) CP is the global minimum variance portfolio (GMVP).
- The right most CP is the highest return asset class. (Theoretically it could be a blend if two asset classes have the same and highest returns).
- Moving from right to left a CP occurs when an asset class weight shifts from + to 0 or 0 to +.

While CPs overestimate risk (correlation between CPs is treated as being 1.0 and no diversification between the CPs), they simplify other calculations. (Remember the MVO instability problem; any lost mathematical accuracy is based on an illusion of precisely predicting the future returns of risky asset classes).

When a risk-free asset class (0 standard deviation and correlation to all other asset classes) is introduced, a tangent line between the risk-free asset and the EF identifies the CAL with the highest Sharpe ratio, which is why the CP with the highest Sharpe approximates the tangency portfolio (TP).

If a portfolio can borrow or lend at the risk-free rate, the CAL is superior to all points on the EF except for the TP:

- Leveraging by borrowing at the risk-free rate extends the line from the TP to higher-risk portfolios and would be optimal for higher-risk investors.
- Investing at the risk-free rate extends the line from the TP to lower-risk portfolios and would be optimal for lower-risk investors.

However, a true risk-free asset (with zero standard deviation and correlation to other assets over ongoing time periods) rarely exists. Instead portfolios should be constructed from the EF (and CPs) unless directed otherwise.

Currency Management: An Introduction

Cross-Reference to CFA Assigned Reading #18

Foreign Investments: Risk and Return

A domestic investor in a foreign asset is exposed to:

- The return on the foreign asset (R_{FC}) that would have been earned by an investor in that country and its standard deviation [$\sigma(R_{FC})$].
- The return on the foreign currency (change in value of the foreign currency, R_{FX}) and its standard deviation [$\sigma(R_{FX})$].

The return to a domestic investor (R_{DC}) is:

$$R_{DC} = (1 + R_{FC})(1 + R_{FX}) - 1$$

$$= R_{FC} + R_{FX} + (R_{FC})(R_{FX})$$
$$\approx R_{FC} + R_{FX}$$

Like any investment, R_{DC} can also be calculated as ending value divided by beginning value – 1, if the values are already measured in the investor's DC.

The standard deviation of return to a domestic investor is the square root of the variance, where:

$$\sigma^2(R_{DC}) \approx \sigma^2(R_{FC}) + \sigma^2(R_{FX}) + 2\sigma(R_{FC})\sigma(R_{FX})\rho(R_{FC},R_{FX})$$

The standard deviation of a risk-free asset is a special case:

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

Managing the Currency Exposure

Neither academic theory nor empirical evidence provides clear support for the optimal approach to currency management:

Do nothing:

- Avoid the time and cost of currency trading.
- A zero-sum game, if one currency appreciates, then another depreciates.
- In the long run, currencies are fairly valued.

Do something:

- In the short run, currency movements can be extreme.
- Misvaluations of currency value caused by central banks and international trade can be exploited.

Passive: Match the currency exposure of the portfolio's benchmark to minimize value added and risk due to currency.

Discretionary: Focus on risk reduction but allow small deviations from the benchmark to add modest value.

Active: Focus on value added and allow wider deviations.

Overlay: Use a separate manager for currency management. Potentially allow the manager to treat currency as an asset class and take positions independent of the securities in the portfolio, a pure value added approach.

Factors that favor the low risk passive approach are shorter-term investment objectives, higher risk aversion, higher short-term income and liquidity needs, fixed-income assets, low hedging costs, and a client skeptical of the manager's ability to add value and/or a manager with no views.

Active currency management strategies to vary from the benchmark's currency exposure can be based on:

1. **Economic fundamentals**: In the long run, currency value will be based on economic fundamentals such as purchasing power parity. In the short run, appreciating currencies are associated with greater undervaluation relative to long-term value, a faster rate of increase in long-term value, lower relative inflation, higher real (and nominal) interest rates, and a decreasing currency risk premium.

2. **Technical rules** such as overbought or oversold markets will mean revert, prices will reverse at support or resistance levels (unless they pierce the level in which case they will continue in the same direction), and a shorter-term moving average moving above (below) a longer-term moving average signals prices will rise (fall).

3. **The carry trade**: Borrow in the lower interest rate (developed market) currency to convert to and invest in the higher interest rate (emerging market) currency. The carry trade assumes the forward exchange rate calculated by uncovered interest rate parity (UCIRP) is a biased prediction of the spot exchange rate.

   $$F_{P/B} = S_{P/B}[(1 + i_P)/(1 + i_B)] \Rightarrow S_T$$

   The bias is that generally the higher interest rate currency will either appreciate or depreciate less than predicted by UCIRP. Thus, the carry trade is trading the forward rate bias. It is usually profitable but has generated large losses during market crises when volatility spikes upward.

Candidate note: This reading has extensive discussion of option based strategies. Throughout this section, I will use *L* for long, *S* for short, *C* for call, *P* for put, and *h*, *m*, or *l* for higher, medium, or lower strike price. Thus LCm is a long call with a medium strike price. In addition, it is assumed the currency being referred to is the base currency (B) in any P/B quote unless clearly indicated otherwise.

4. Volatility Trading or Vol. Trading is designed to profit from changes in volatility. It uses delta hedging to take a delta-neutral position, the value of the position should be unaffected by changes in value of the currency.
   - Long call and short put positions have +delta (the position increases in value when the underlying currency rises).

- Short call and long put positions have –delta (the position decreases in value when the underlying currency rises).
- Thus a LC and LP pair or a SC and SP pair would have offsetting deltas.
- Recall that both calls and puts increase in absolute value with rising volatility.

Summary of Currency Trading Rules:

If volatility is expected to increase:

- Use a long straddle: Buy at-the-money calls and puts on the currency.
- Use a long strangle: Buy out-of-the-money calls and puts on the currency (reduces initial cost and upside).

If volatility is expected to decrease:

- Use a short straddle: Sell at-the-money calls and puts on the currency.
- Use a short strangle: Sell out-of-the-money calls and puts on the currency (lower premium inflow and risk).

If volatility is expected to be low, use the carry trade.

If volatility is expected to spike in a market crisis, discontinue the carry trade.

If a currency is expected to show:

- Relative appreciation, reduce the hedge on or increase the long position in the currency.
- Relative depreciation, increase the hedge on or decrease the long position in the currency.

A call on currency B is a put on the pricing currency P and a put on currency B is a call on the pricing currency P.

Currency Hedging Techniques:

Static hedges are held to expiration and dynamic hedges are adjusted as circumstances change.

- Shorter-term contracts or dynamic hedges improve the hedge results but increase cost.
- Rolling shorter-term contracts creates interim cash flows.
- Higher risk aversion suggests more frequent rebalancing.
- Lower risk aversion and strong manager views suggests discretionary hedging.

Roll Yield and Hedging Costs

Roll yield or roll return is the change in forward minus change in spot price:

$$(F_t - F_0) - (S_t - S_0)$$

At contract expiration $F_t = S_t$ (therefore at contract expiration), roll yield and percent roll yield are:

$$S_0 - F_0 \text{ and } (S_0 - F_0) / S_0$$

Roll yield can be considered a cost of hedging. If the hedge is held to contract expiration, the hedge locks in the differential between S_0 and F_0.

Candidate Note: While the formulas for roll yield just presented are the most common way to express them, they are not always followed. For example, an author or question may well refer to roll as $F_0 - S_0$. You are expected to grasp the next section discussing the interpretation and implications of the calculated value. The case will provide sufficient information to make a correct determination and answer to the question asked.

If $F_{P/B} > S_{P/B}$, then $i_B < i_P$ and the forward price curve is upward-sloping.

- A short forward position in B earns positive roll yield, decreasing hedging cost and encouraging hedging.
- A long forward position in B earns negative roll yield, increasing hedging cost and discouraging hedging.

If $F_{P/B} < S_{P/B}$, then $i_B > i_P$ and the forward price curve is downward-sloping:

- A short forward position in B earns negative roll yield, increasing hedging cost and discouraging hedging.
- A long forward position in B earns positive roll yield, decreasing hedging cost and encouraging hedging.

Trading Strategies:

Hedging with forward contracts has no initial explicit cost. A perfect hedge would lock in F_0 as the ending exchange rate for the position. It symmetrically modifies risk and return. It has high opportunity cost by eliminating upside potential.

Discretionary hedging allows the manager to hedge more of the currency if it is expected to depreciate or hedge less of the currency if it is expected to appreciate.

Option based hedging strategies will have an initial cost but can selectively modify downside protection or upside potential:

- **Buy ATM put options**, LPm: Removes all downside risk below strike m and retains all upside potential; highest initial cost.
- **Buy OTM put options**, LPl: Removes downside risk below the lower strike price l and retains all upside potential; lower initial cost.
- **Buy a higher strike price and sell a lower strike price put option** (a put spread) LPm and SPl: Provides downside protection only between the two strike prices m and l while retaining all upside potential; lower initial cost. Downside risk below l remains.
- **Buy a put option and sell a call option** (a risk reversal or collar) LPl and SCh: Provides downside protection below the put strike price and retains upside potential to the call strike price; lower initial cost. Called a zero-cost collar if the two option premiums are equal. It is equivalent to a forward sale at the strike price if the two strike prices are equal.
- **Buy a higher strike price and sell a lower strike price put option, plus sell an OTM call option (a seagull spread)** LPm, SPl, and SCh: Provides downside protection between the two put strike prices and upside potential to the call strike price; lower initial cost.

Other modifications to lower initial cost include: mismatch the size of the option position (e.g., buy fewer puts and sell more calls and puts), use exotic options such as knock-in or knock-out options or binary options that pay a fixed amount or nothing.

Other Currency Hedging Issues

A **perfect direct hedge of the currency risk** in a risky foreign investment is generally impossible. It requires selling forward the ending value of a risky investment, a value that cannot be known in advance.

Cross hedges introduce additional risk to the hedge because the hedged item and hedging vehicle are different. They are highly—but not perfectly—correlated and the correlation can change.

Macro hedges are a kind of cross hedge designed to hedge portfolio-wide risk as opposed to a single currency risk. Shorting a basket of currencies that is similar to the currency exposures in the portfolio is an imperfect macro hedge but may be less expensive than hedging each exposure directly.

A **minimum variance hedge ratio** (MVHR) is a regression-based approach to determine the hedge ratio that will minimize risk. It is a cross hedge and a macro hedge. One form of MVHR uses the slope coefficient found by regressing the

portfolio's unhedged return measured in investor's currency (R_{DC}) versus R_{FX}. It considers the interaction of R_{FC} and R_{FX}:

- Positive correlation between R_{FC} and R_{FX}, increases the volatility of R_{DC} resulting in a MVHR > 1.
- Negative correlation between R_{FC} and R_{FX}, decreases the volatility of R_{DC}, resulting in a MVHR < 1.

Hedging emerging market currencies poses additional challenges: (1) bid-asked spreads are larger and can expand during crises, (2) return distributions tend to have negative skew and fat tails, (3) contagion is a problem as correlations rise during crisis, (4) tail risk is common as governments artificially support their currency's value for long periods followed by severe currency value correction, and (5) emerging market (EM) governments may restrict flows of their currency, making cash settlement of swaps and forwards impossible.

- Nondeliverable forwards (NDFs) can be used to address this last issue. Instead of settling with delivery of an EM currency versus a developed market currency, the NDF settles the net gain or loss on the trade in the developed market currency.

Market Indexes and Benchmarks

Cross-Reference CFA Assigned Reading #19

Benchmarks vs. Indexes

Benchmark: A reference point for evaluating portfolio performance.

Index: An index represents the performance of a specified group of securities.

The distinction between the two is that an index may or may not be a valid benchmark to evaluate the performance of a specific portfolio. A valid benchmark will be:

1. *Specified in advance.* The benchmark is known to both the investment manager and the fund sponsor. It is specified at the start of an evaluation period.

2. *Appropriate.* The benchmark is consistent with the manager's investment approach and style as well as the portfolio's objectives and constraints.

3. *Measurable.* Its value and return can be determined on a reasonably frequent basis.

4. *Unambiguous.* Clearly defined identities and weights of securities constituting the benchmark.

5. *Reflective of the manager's current investment opinions.* The manager has current knowledge and expertise of the securities within the benchmark.

6. *Accountable.* The manager(s) should accept the applicability of the benchmark and agree to accept differences in performance between the portfolio and benchmark as reflecting active management.

7. *Investable.* It is possible to invest in the benchmark as an alternative to active management.

Investment Uses of Benchmarks

- A reference point for portions of a sponsor's portfolio (e.g., comparing a sponsor's large-cap U.S. equity asset allocation to the S&P 500 Index).
- Communication between the plan sponsor, manager, and consultants. The benchmark selection tells the manager what return and risk they will be compared to.
- Communicating to others how a manager wishes to be viewed. A management firm comparing its performance to small-cap U.S. value stocks allows investors to determine if they have any interest in the manager.
- Clearly specifying risk exposures.
- Performance attribution.
- Manager selection. The benchmark a manager selects indicates where he believes his skills lie, allowing a potential investor to qualitatively assess whether the manager has the resources and skills to likely repeat past performance.
- Marketing. GIPS® requires that where a suitable benchmark exists, it be named and results provided, allowing investors to compare manager's performance to the benchmark.
- Compliance, laws, and regulation (like GIPS) often mandate that comparison benchmark data be provided.

Types of Benchmarks

Asset–based benchmarks

Absolute return: Specify a minimum return such as 6% or a minimum spread such as LIBOR +60bp.

Manager universe or peer group: Outperform the median manager in a specified peer group.

Broad market index: Outperform the U.S. Wilshire 5000 Index.

Investment style: Outperform the U.S. Wilshire 5000 Large-Cap Value Index.

Factor-based models: Portfolio return is related to a set of factors and factor weights.

$$R_P = a_p + b_1F_1 + b_2F_2 + ... + b_KF_K + \varepsilon$$

where:
R_P = periodic return on an account
a_P = "zero factor" term, representing the expected value of R_P if all factor values were zero
F_i = factors that have a systematic effect on the portfolio's performance, i = 1 to K
b_i = sensitivity of the returns on the account to the returns generated from factor *i*
ε = error term; portfolio return not explained by the factor model

Return based: A factor-based model in which the factors are various subgroups of asset return, and the sensitivities (b) are found by regressing these subgroup returns versus a portfolio's returns.

Custom: Build a benchmark from securities weighted to reflect the manager's style. Reflecting the manager's style, it could be called the manager's **strategy benchmark.**

Asset-based benchmarks focus on return of the assets and the ability of managers to meet or exceed the benchmark return (i.e., adding value). **Liability-based** benchmarks are more appropriate when the objective is to fund a stream of liability payments at relatively low risk. Matching the duration of the assets to the duration of the liabilities leads the two to fluctuate in sync and stabilize the surplus. A defined benefit pension fund benchmark may consist of nominal bonds, real rate bonds, and equities to best mimic the characteristics of the plan liabilities.

Use of Market Indexes

In rough order, the sequence in which a plan sponsor may uses indexes includes:

1. Asset allocation proxies: Historical index return data can provide return, risk, and correlation by asset class for asset allocation models.

2. Investment management mandates: Specifying a benchmark communicates (ex ante) expected return and risk characteristics to a manager. Generally, the assets selected by the manager will be similar to those in the benchmark with an active manager seeking to outperform and a passive manager seeking to match the benchmark.

3. Performance benchmarks: Ex post the manager's return can be compared to the benchmark return to calculate value added.

4. Portfolio analysis: More detailed ex post analysis can determine sources of value added (e.g., from security selection vs. from over/under-weighting sectors).

Other use of indexes includes:

- Gauging market sentiment: Index returns are used to summarize overall market direction, movement, and volatility.
- As an investment: Modern portfolio theory postulates and empirical evidence supports that it is difficult for active managers to outperform the market.

Index Construction

An index is constructed from a set of rules. The rules define the criteria for selecting the securities to include in the index, how to weight the securities, and how to maintain the index. The construction will require tradeoffs.

Completeness versus investability: A complete index will include all securities that meet the benchmark criteria and provide complete coverage and greater diversification. The tradeoff is the inclusion of smaller-cap and less liquid securities that are difficult or costly to purchase. Global portfolios may face additional investabilty issues with liquid assets but restrictions on ownership by foreign investors. This tradeoff is more significant for managers who experience larger and more frequent withdrawals and admissions of funds.

Reconstitution and rebalancing (R&R) frequency vs. turnover: Reconstitution is the process of adding and deleting securities, while rebalancing is adjusting the weighting of existing securities in an index. Frequent R&R theoretically means the index better reflects the intended characteristics. The tradeoff is increased turnover and transaction costs.

Objective and transparent (O&T) rules vs. judgment: Changes to the composition of the index may be based on objective rules that are publically disclosed or on subjective judgments of some defined group. O&T rules allow those who replicate or base holdings around the index holdings to anticipate and plan for changes in the index, thus, lowering costs.

The Pros and Cons of Approaches to Index Weighting

Capitalization-weighted (market-value weighted, value weighted, market-cap weighting, or cap weighted) is the most common form of index construction. The weight of each security is based on its price multiplied by shares outstanding. In

some cases free float is used, and shares that are not available to trade are excluded from the calculation. The performance of such indexes is most heavily influenced by the securities with the largest market cap.

Advantages

- Based on an objective measure (the market price) of what every security is worth.
- *Macro consistent* because all securities are owned and, therefore, the aggregate portfolio of all investors must be market-capitalization weighted. A float-adjusted, cap-weighted index reflects what is available for investors to own.
- Under the assumptions of the capital asset pricing model, it is the only efficient portfolio of risky assets.
- Does not require rebalancing for stock splits and stock dividends.

Disadvantages

- Exposed to market bubbles because it most heavily weights the largest market cap securities, which may also be the most overvalued securities.
- Weighting by market cap can lead to overconcentration in a few securities and less diversification.
- May be unsuited as a benchmark for active managers who take substantially different risk exposures than the market.

Price-weighted indexes reflect initially owning one share of each stock. Their performance is most heavily influenced by the securities with the highest price.

Advantages

- Easy to construct.
- Long price histories are available.

Disadvantages

- Market cap better reflects a company's economic importance.
- Stocks that appreciate are more likely to split, and the reduced post split price diminishes the impact of that security on the index. The method effectively tends to reduce the weighting of the more successful companies.
- Does not reflect typical portfolio construction. Most portfolios are not built with an equal number of shares in each security.

Equal-weighted indexes reflect the same initial investment in each security.

Advantages

- Compared to market-cap weighting, it places more emphasis on smaller-cap securities, which (1) may offer a return advantage and (2) provides greater diversification (instead of concentrating in higher market cap assets).
- Some argue it better reflects how the market did because it reflects the average return of each security in the index.

Disadvantages

- Biased to the performance of smaller issuers (when compared to market-cap weighted).
- Requires constant rebalancing to maintain equal weight and will result in selling stronger performers and buying weaker performers.
- The emphasis on smaller can lead to increased liquidity problems and higher transaction costs.

Conclusions

Cap-weighted, float-adjusted construction dominates. Because this method reflects what can be done in aggregate, it generally provides superior benchmarks. As benchmarks it is:

- Widely used, understood, and readily available.
- Easy to measure, unambiguous, specified in advance, and generally investable.
- Appropriate if it reflects the securities used by and style of the manager.

It also has drawbacks if:

- It does not reflect the manager's investment approach.
- The index construction rules and the rebalancing process are not transparent. The costs of rebalancing and the ability to track the index decline.

Non-cap weighting may be used to seek improved risk adjusted return, reflect a particular manager's style, or to better reflect client characteristics.

Fixed-Income Portfolio Management (1, 2)

Study Sessions 10 and 11

Topic Weight on Exam	10–20%
SchweserNotes™ Reference	Book 3, Pages 200–303

Fixed Income Portfolio Management, Study Sessions 10 and 11, often become intertwined with the derivatives, currency, and asset-liability management material in earlier and later study sessions.

Fixed-Income Portfolio Management—Part 1[1]

Cross-Reference to CFA Institute Assigned Reading #20

Bond Indexing Strategies

Bond (and equity) portfolio management strategies form a continuum from an almost do-nothing approach (i.e., pure bond indexing) to a do-almost-anything approach (i.e., full blown active management) as demonstrated graphically in Figure 1.

Figure 1: Increasing Degrees of Active Bond Portfolio Management

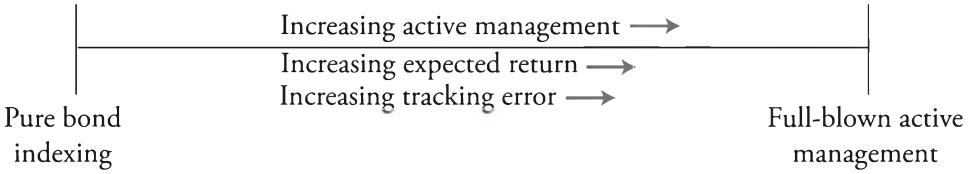


Figure 2 is a summary of the advantages and disadvantages of the bond portfolio strategies.

1. Much of the terminology utilized throughout this topic review is industry convention as presented in Reading 20 of the 2017 Level III CFA curriculum.

Figure 2: Advantages and Disadvantages of Bond Portfolio Management Strategies

Strategy	*Advantages*	*Disadvantages*
Pure bond indexing (PBI)	• Tracks the index (zero or very low tracking error) • Same risk factor exposures as the index • Low advisory and administrative fees	• Costly and difficult to implement • Lower expected return than the index
Enhanced indexing by matching primary risk factors (sampling)	• Less costly to implement • Increased expected return • Maintains exposure to the index's primary risk factors	• Increased management fees • Lowered ability to track the index (i.e., increased tracking error) • Lower expected return than the index
Enhanced indexing by small risk factor mismatches	• Same duration as index • Increased expected return • Reduced manager restrictions	• Increased risk • Increased tracking error • Increased management fees
Active management by larger risk factor mismatches	• Slight difference in duration as compared to index • Increased expected return • Reduced manager restrictions	• Increased risk • Increased tracking error • Increased management fees
Full blown active management	• Increased expected return • Few if any manager restrictions • No limits on duration	• Increased risk • Increased tracking error • Increased management fees

Selecting a Bond Index

Regardless of the strategy employed, the manager should be judged against a benchmark, and the benchmark should match the characteristics of the portfolio. Among others, there are four primary considerations when selecting a benchmark: (1) *market value risk,* (2) *income risk,* (3) *credit risk,* and (4) *liability framework risk.*

1. *Market value risk* varies directly with maturity. The greater the risk aversion, the lower the acceptable market risk, and the shorter the benchmark maturity.

2. *Income risk* varies indirectly with maturity. The more dependent the client is upon a reliable income stream, the longer the maturity of the benchmark.

3. *Credit risk*. The credit risk of the benchmark should closely match the credit risk of the portfolio.

4. *Liability framework risk* is applicable only to portfolios managed according to a liability structure and should always be minimized.

A valid benchmark should be investable in order to provide a valid alternative to hiring a manager. If the index is not investable, it is not a valid benchmark. The bond market provides several challenges to this requirement.

First, bond market securities are more heterogeneous and illiquid. Issues are unique with differences in maturity, seniority, and other features compared to stocks, which are generally issued as one type of stock. Compounding the problem, many issues do not trade regularly, pricing data is frequently based on appraisals, and trades are often not publicly reported.

Second, the resulting indexes from various vendors can appear similar but be quite different in characteristics.

Third, the risk characteristics can change quickly over time as new issues of bonds are added and those approaching maturity are deleted from the index.

Fourth is the "bums" problem as capitalized-weighted indexes may carry increased exposure to credit downgrades. Large issuance by an issuer leads to greater index weight, but large issuance is also related to excessive leverage and subsequent credit problems.

Lastly, it can be difficult for investors to find an index that matches their risk profile. For example, if long-term interest rates are historically low, bond issuers will finance debt longer term resulting in a higher duration in the index, whereas an investor may have a shorter duration time horizon.

The result is many active investors create custom benchmarks from a composite of indexes and sub-indexes to match the characteristics of a particular manager. Passive investors use sampling to replicate an index, and ALM portfolios use the liabilities as the benchmark.

Aligning Risk Exposures

To avoid the costs associated with purchasing every bond in the index yet maintain the same risk exposures, the manager will usually hold a sample of the bonds in the index. One sampling technique often utilized is **stratified sampling** (a.k.a. *cell-matching*). Constructing a portfolio with risk exposures identical to the index,

however, does not require the composition of the portfolio (i.e., the bonds held) to be representative of the index. A portfolio can be constructed with exactly the same risk factor exposures as the index but with different securities utilizing a **multifactor model**. However, the manager must determine the risk profile of the index. Risk profiling the index requires measuring the index's exposure to factors including duration, key rate duration, cash flow distribution, sector and quality weights, and duration contribution, et cetera.

Duration. Effective duration (a.k.a. option-adjusted or adjusted duration), which is used to estimate the change in the value of a portfolio given a small parallel shift in the yield curve, is probably the most obvious risk factor to be measured. Due to the linear nature of duration, which makes it overestimate the increase or decrease in the value of the portfolio, the convexity effect is also considered.

Key rate duration measures the portfolio's sensitivity to twists in the yield curve.

The manager should also consider the **present value distribution of cash flows** (PVD) of the index used as the portfolio benchmark. PVD measures the proportion of the index's total duration attributable to cash flows falling within selected time periods.

The present value (i.e., the market value) of all cash flows from the index that fall in each period is divided by the present value of all cash flows (i.e., the benchmark market value) to determine the percentage of the total market value that is attributable to cash flows falling in each period.

Next, the manager multiplies the duration of a given period by the percentage of cash flows falling in that period to arrive at the duration contribution for that period. Dividing the duration contribution for each time period by the benchmark duration yields PVD. If the manager duplicates the benchmark PVD, the portfolio and the benchmark will have the same sensitivity to both shifts and twists in the yield curve.

Sector and quality percent. The manager should match the weights of both the sectors and qualities in the index.

Sector duration contributions. The manager should match the proportion of the index duration that is contributed by each sector in the index.

Quality spread duration contribution. The manager should match the proportion of the index duration that is contributed by each quality in the index, where quality refers to categories of bonds by rating.

Sector/coupon/maturity cell weights. Convexity is difficult to measure for callable bonds. To mimic the *callability* of bonds in the index (i.e., the sensitivity of their prices to interest rate changes) the manager is better off matching their sector, coupon, and maturity weights in the index.

Issuer exposure. The final risk factor considered is issuer exposure, which is a measure of the index's *event exposure*. In mimicking the index, the manager should use a sufficient number of securities in the portfolio so that the event risk attributable to any individual issuer is minimized.

Classical Immunization

Interest rate risk has two components: price risk and reinvestment rate risk. *Price risk* refers to the decrease (increase) in bond prices as interest rates rise (fall). *Reinvestment rate risk* refers to the increase (decrease) in investment income as interest rates rise (fall). It is important to note that price risk and reinvestment rate risk cause opposite effects.

Classic immunization is the process of structuring a bond portfolio that balances any change in the value of the portfolio with the return from the reinvestment of the coupon and principal payments received throughout the investment period. The goal of classical immunization is to form a portfolio so that:

- If interest rates increase, the gain in reinvestment income ≥ loss in portfolio value.
- If interest rates decrease, the gain in portfolio value ≥ loss in reinvestment income.

To effectively immunize a single liability:

- *Select* a bond (or bond portfolio) with an effective duration equal to the duration of the liability.
- Set the present value of the bond (or bond portfolio) equal to the present value of the liability.

Without rebalancing, classical immunization only works for a 1-time instantaneous change in interest rates. Portfolios cease to be immunized for a single liability when:

- Interest rates fluctuate more than once.
- Time passes.

Rebalancing frequency is a cost-benefit trade-off. Transaction costs associated with rebalancing must be weighed against the possible extent to which the terminal value of the portfolio may fall short of its target liability.

Immunization Against Non-Parallel Shifts

Equating the duration of the portfolio with the duration of the liability does not guarantee immunization. *Immunization risk* can be thought of as a measure of the extent to which the terminal value of an immunized portfolio falls short of its target value as a result of arbitrary (nonparallel) changes in interest rates. Immunized portfolios with cash flows that are concentrated around the investment horizon have the lowest immunization risk.

Adjusting Dollar Duration

Two primary steps:

1. Calculate the new dollar duration of the portfolio.

2. Calculate the **rebalancing ratio** and use it to determine the required percentage change in the value of each bond in the portfolio.

$$\text{rebalancing ratio} = \frac{\text{target DD}}{\text{new DD}}$$

$$\%\Delta = \text{rebalancing ratio} - 1$$

Spread Duration

Spread duration measures the sensitivity of non-Treasury issues to a change in their spread above Treasuries of the same maturity. The spread is a function of perceived risk as well as market risk aversion.

Extensions to Classical Immunization

When the goal is to immunize against a liability, we must consider the ability to combine indexing (immunization) strategies with active portfolio management strategies. Note that since active management exposes the portfolio to additional risks, immunization strategies are also *risk-minimizing strategies.*

The first modification or extension to classical immunization theory is the use of **multifunctional duration** (a.k.a. **key rate duration**). The manager focuses on certain key interest rate maturities.

The second extension is **multiple liability immunization**. The goal of multiple liability immunization is ensuring that the portfolio contains sufficient liquid assets to meet each of the liabilities as it comes due.

The third extension is allowing for **increased risk**, or otherwise relaxing the minimum risk requirement of classical immunization. As long as the manager does not jeopardize meeting the liability structure, he can pursue increased risk strategies that could lead to excess portfolio value (i.e., a terminal portfolio value greater than the liability).

Contingent immunization is the combination of active management strategies and passive management techniques (immunization). As long as the rate of return on the portfolio exceeds a prespecified *safety net return*, the portfolio is managed actively. If the portfolio return declines to the safety net return, the immunization mode is triggered to "lock in" the safety net return. The safety net return is the minimum acceptable return as designated by the client.

Immunization Risks

Interest rate risk is the primary concern when managing a fixed income portfolio, whether against a liability structure or a benchmark.

Contingent claim risk (a.k.a. call risk or prepayment risk). Callable bonds are typically called only after interest rates have fallen. This means that the manager not only loses the higher stream of coupons that were originally incorporated into the immunization strategy, she is faced with reinvesting the principal at a reduced rate of return.

Cap risk. If any of the bonds in the portfolio have floating rates, they may be subject to *cap risk*. As used here, cap risk refers to a cap on the floating rate adjustment to the coupon on a floating rate security. If the bonds are subject to caps when interest rates rise, they might not fully adjust and thus would affect the immunization capability of the portfolio.

Immunizing Single Liabilities, Multiple Liabilities, and General Cash Flows

If a manager could invest in a zero-coupon Treasury with a maturity equal to the liability horizon, he has constructed an immunization strategy with no risk. Since this is rarely the case, however, the manager must take steps to *minimize risk*.

To reduce the risk associated with uncertain **reinvestment rates**, the manager should minimize the *distribution* of the maturities of the bonds in the portfolio around the (single) liability date. Concentrating the maturities of the bonds around the liability date is known as a **bullet strategy**. Think of a strategy employing two bonds. One bond matures one year before the liability date and the other matures one year after the liability date. When the first matures, the proceeds must be reinvested for only one year. At the date of the liability, the maturity of the other

is only one year off. Thus the reinvestment rate on the first will have a minimal impact on the terminal value of the portfolio and the value of the second is only minimally sensitive to interest rates.

Now consider a **barbell strategy** where the first bond matures several years before the liability date and the other several years after the liability date. The face value of the first must be reinvested when it matures, so the manager must be concerned with both the reinvestment rate and, since the new bond will have several years until maturity, all the other risk factors associated with such a bond. The second bond, since it matures several years after the liability date, is subject to significant interest rate risk. That is, the value of the bond at the liability date is determined by interest rates at that date.

As the maturities of the bonds used in the bullet strategy move away from the liability due date and the maturities of the barbell move toward the liability due date, the distinction between the two will begin to blur. Rather than base the strategy on subjective judgment, therefore, the manager can minimize M^2 (a.k.a. maturity variance).

Maturity variance is the variance of the differences in the maturities of the bonds used in the immunization strategy and the maturity date of the liability. For example, if all the bonds have the same maturity date as the liability, M^2 is zero. As the dispersion of the maturity dates increases, M^2 increases.

Multiple Liabilities

Multiple liability immunization is possible if the following three conditions are satisfied (*assuming parallel rate shifts*):

1. Assets and liabilities have the same present values.

2. Assets and liabilities have the same aggregate durations.

3. The range of the distribution of durations of individual assets in the portfolio exceeds the distribution of liabilities. This is a necessary condition in order to be able to use cash flows generated from our assets (which will include principal payments from maturing bonds) to sufficiently meet each of our cash outflow needs.

Conditions for Cash Flow Matching

The following points describe the process:

- Select a bond with a maturity date equal to that of the last liability payment date.
- Buy enough in par value of this bond such that its principal and final coupon fully fund the last liability.
- Using a recursive procedure (i.e., working backwards), choose another bond that fully funds the second-to-last liability payment and continue until all liability payments have been addressed.

General Cash Flows

General cash flows in this case refers to using cash as part of an immunization strategy even though the cash has not yet been received. For example, expecting a cash flow in six months, the portfolio manager does not put the entire amount required for immunization into the portfolio today. Instead he looks at the expected cash flows as a zero and incorporates its payoff and duration into the immunization strategy.

Risk Minimization vs. Return Maximization

Return maximization is the concept behind *contingent immunization*. Consider the manager who has the ability to lock in an immunized rate of return equal to or greater than the required safety net return. As long as that manager feels he can generate even greater returns, he should pursue active management in hopes of generating excess value.

The following are the differences between cash flow matching and multi-liability immunization:

- Cash flow matching depends upon all the cash flows of the portfolio, so managers must use conservative reinvestment assumptions for all cash flows. This tends to increase the overall value of the required immunizing portfolio. An immunized portfolio is essentially fully invested at the duration of the remaining horizon, so only the average reinvestment ratio over the entire investment horizon must be considered.
- Owing to the exact matching problem, only asset flows from a cash-flow-matched portfolio that occur prior to the liability may be used to meet the obligation. An immunized portfolio is only required to have sufficient value on the date of each liability because funding is achieved through portfolio rebalancing.

Combination matching, also known as *horizon matching*, is a combination of multiple liability immunization and cash flow matching that can be used to address the asset cash flow/liability matching problem. This strategy creates a portfolio that is *duration* matched. During the first few years, the portfolio would also be cash flow matched in order to make sure that assets were properly dispersed to meet the near-term obligations.

Combination matching offers the following *advantages* over multiple liability immunization:

- Provides liquidity in the initial period.
- Reduces the risk associated with nonparallel shifts in the yield curve which usually take place in the early years.

The primary *disadvantage* of combination matching is that it tends to be more expensive than multiple liability immunization.

Relative-Value Methodologies for Global Credit Bond Portfolio Management[2]

Cross-Reference to CFA Institute Assigned Reading #21

In relative value analysis, assets are compared along readily identifiable characteristics and value measures. In comparing firms, for example, we can use measures such as P/E ratios for ranking. With bonds, some of the characteristics used include sector, issue, and structure, which are used to rank the bonds across and within categories by expected performance. You are familiar with two of these methodologies:

- In the **top-down approach**, the manager uses economy-wide projections to first allocate funds to different countries or currencies. The analyst then determines what industries or sectors are expected to outperform and selects individual securities within those industries.
- The **bottom-up approach** starts at the "bottom." The analyst selects undervalued issues.

Any bond analysis should focus on total return. The analyst performs a detailed study of how past total returns for markets or individual securities were affected by macroeconomic events, such as interest rate changes and general economic performance. Any trends detected are used to estimate future total returns, based upon predictions for those same macro-trends.

2. The terminology presented in this topic review follows industry convention as presented in Reading 21 of the 2017 Level III CFA exam curriculum.

Cyclical and Secular Changes

Cyclical changes are changes in the number of new bond issues. Increases in the number of new bond issues are sometimes associated with narrower spreads and relatively strong returns. Corporate bonds often perform best during periods of heavy supply.

Secular changes. In all but the high-yield market, intermediate-term bullets dominate the corporate bond market. Bullet maturities are not callable, putable, or sinkable. Callable issues still dominate the high-yield segment.

There are at least three implications associated with these product structures:

1. Securities with embedded options will trade at premium prices due to their scarcity value.

2. Credit managers seeking longer durations will pay a premium price for longer duration securities because of the tendency toward intermediate maturities.

3. Credit-based derivatives will be increasingly used to take advantage of return and/or diversification benefits across sectors, structures, and so forth.

Liquidity

There is generally a positive relationship between liquidity and bond prices. As liquidity decreases, investors are willing to pay less (increasing yields), and as liquidity increases, investors are willing to pay more (decreasing yields).

The corporate debt market has shown variable liquidity over time, influenced to a great extent by macro shocks (i.e., a variety of economic conditions). And while some investors are willing to give up additional return by investing in issues that possess greater liquidity (e.g., larger-sized issues and government issues), other investors are willing to sacrifice liquidity for issues which offer a greater yield (e.g., smaller-sized issues and private placements). The move in debt markets has been toward increased liquidity (i.e., faster and cheaper trading) mainly due to trading innovations and competition among portfolio managers.

Rationales for Secondary Bond Trades

The following are some of the reasons why managers actively trade in the secondary bond markets, rather than simply hold their portfolios. In all cases, the manager must determine whether trading will produce returns greater than the associated costs or not.

- Yield/spread pickup trades.
- Credit-upside trades.
- Credit-defense trades.
- New issue swaps.
- Sector-rotation trades.
- Yield curve-adjustment trades.
- Structure trades.
- Cash flow reinvestment trades.

Assessing Relative Value Methodologies

Rationales for not trading include:

- Trading constraints.
- Story disagreement.
- Buy and hold.
- Seasonality.

Spread Analysis

Mean-reversion analysis. The presumption with mean reversion is that spreads between sectors tend to revert toward their historical means.

- If the current spread is significantly greater than the historic mean, buy the sector or issue.
- If the current spread is significantly less than the historic mean, sell the sector or issue.
- Statistical analysis, using standard deviations and t-scores (for determining significance), can be used to determine if the current spread is significantly different from the mean.

Quality-spread analysis. Quality-spread analysis is based on the spread differential between low and high quality credits.

Percentage yield spread analysis. Percentage yield spread analysis *divides* the yields on corporate bonds by the yields on treasuries with the same duration. If the ratio is higher than justified by the historical ratio, the spread is expected to fall, making corporate bond prices rise.

Bond structures

Bullet Structures

Short-term bullets have maturities of one to five years and are used on the short end of a barbell strategy. As opposed to using short-term Treasuries, corporate securities are used at the front end of the yield curve with long-term Treasuries at the long end of the yield curve.

Medium-term bullets (maturities of 5 to 12 years) are the most popular sector in the United States and Europe. When the yield curve is positively sloped, 20-year structures are often attractive, because they offer higher yields than 10- or 15-year structures but lower duration than 30-year securities.

Long-term bullets (30-year maturities) are the most commonly used long-term security in the global corporate bond market. They offer managers and investors additional positive convexity at the cost of increased effective duration.

Early Retirement Provisions

Due to the *negative convexity* caused by the embedded option, *callable* bonds:

- **Underperform** non-callables when interest rates fall (relative to the coupon rate) due to their negative convexity.
- **Outperform** non-callables in bear bond markets with rising rates as the probability of call falls. (When the current rate is lower than the coupon rate, their negative convexity makes callables respond less to increasing rates.)
- When yields are very high, relative to coupon rates, the callable bond will behave much the same as the non-callable (i.e., the call option has little or no value).

Sinking funds. Sinking fund structures priced at a discount to par have historically retained upside price potential during interest rate declines as long as the bonds remain priced at a discount to par (and the firm can call the bonds at par). Furthermore, given that the issuer is usually required to repurchase part of the issue each year, the price of sinking fund structures does not fall as much relative to callable and bullet structures when interest rates rise.

Credit Analysis

Credit analysis involves examining financial statements, bond documents, and trends in credit ratings. It provides an analytic framework in assessing key information in sector selection:

- Capacity to pay is the key factor in corporate credit analysis.
- The quality of the collateral and the servicer are important in the analysis of asset-backed securities.
- The ability to assess and collect taxes is the key consideration for municipal bonds.
- Sovereign credit analysis requires an assessment of the country's ability to pay (economic risk) and willingness to pay (political risk).

Fixed-Income Portfolio Management—Part II

Cross-Reference to CFA Institute Assigned Reading #22

Leveraged Portfolio Return

$$R_P = R_i + [(B / E) \times (R_i - c)]$$

where:
R_P = return on portfolio
R_i = return on invested assets
B = amount on leverage
E = amount on equity invested
c = cost of borrowed funds

The formula says to add the return on the investment (the first component) to the net levered return (the second component in brackets).

Leveraged Duration

$$D_p = \frac{D_i I - D_B B}{E}$$

where:
D_p = duration of portfolio
D_i = duration of invested assets
D_B = duration of borrowings
I = amount of invested funds
B = amount of leverage
E = amount of equity invested

Repurchase Agreements

In a *repurchase agreement* or repo, the borrower (seller of the security) agrees to repurchase it from the buyer on an agreed upon date at an agreed upon price (repurchase price).

Although it is legally a sale and subsequent purchase of securities, a repurchase agreement is essentially a collateralized loan, where the difference between the sale and repurchase prices is the interest on the loan. The rate of interest on the repo is referred to as the *repo rate*.

The Repo Rate

- The repo rate increases as the **credit risk** of the borrower increases (when delivery is not required).
- As the **quality** of the collateral increases, the repo rate declines.
- As the **term** of the repo increases, the repo rate increases.
- **Delivery**. If collateral is physically delivered, then the repo rate will be lower. If the repo is held by the borrower's bank, the rate will be higher. If no delivery takes place, the rate will be even higher.
- **Collateral**. If the availability of the collateral is limited, the repo rate will be lower.
- The higher the **federal funds rate**, the higher the repo rate.
- As the demand for funds at financial institutions changes due to **seasonal factors**, so will the repo rate.

Bond Risk Measures

Standard Deviation

The problems with standard deviation and variance are as follows:

- Bond returns are often not normally distributed around the mean.
- The number of inputs (e.g., variances and covariances) increases significantly with larger portfolios.
- Historically calculated risk measures may not represent the risk measures that will be observed in the future.

Semivariance

Drawbacks of semivariance include the following:

- It is difficult to compute for a large bond portfolio.
- If investment returns are symmetric, the semivariance yields the same rankings as the variance and the variance is better understood.

- If investment returns are not symmetric, it can be quite difficult to forecast downside risk and the semivariance may not be a good indicator of future risk.
- Because the semivariance is estimated with only half the distribution, it is estimated with less accuracy.

Shortfall Risk

Shortfall risk measures the *probability* that the actual return will be less than the target return.

The primary criticism of the shortfall risk measure is:

- Shortfall risk does not consider the impact of outliers so the magnitude (dollar amount) of the shortfall below the target return is ignored.

Value at Risk

The primary criticism of VAR is:

- As in the shortfall risk measure, VAR does not provide the magnitude of losses that exceed that specified by VAR.

Advantages of Interest Rate Futures

Compared to cash market instruments, futures:

1. Are more liquid.
2. Are less expensive.
3. Make short positions more readily obtainable, because the contracts can be more easily shorted than an actual bond.

Hedging with Interest Rate Futures

To **increase** duration → **buy** futures contracts.

To **decrease** duration → **sell** futures contracts.

The number of contracts can be calculated as:

$$\text{number of contracts} = \frac{(D_T - D_P)P_P}{D_{CTD}P_{CTD}}(\text{CTD conversion factor})(\text{yield beta})$$

A less commonly used formula works from dollar durations (DD) and will reach the same result if all data is correctly presented. On the exam use the formula for which the necessary data is given.

$$\text{number of contracts} = \frac{DD_T - DD_P}{DD_f}$$

where DD is:

DD = (Δvalue) = –(effective duration)(decimal change in interest rates)(value)

A change in interest rates of 100bp (1.00%) is assumed unless otherwise specified.

Hedging Issues

Basis Risk and Cross Hedging

Basis is the difference between the spot and forward price of an asset at any one point in time. **Basis risk** is used in its most technical sense to refer to an unexpected change in the basis. If a hedge is held to expiration of a contract, there will be no basis risk because convergence dictates the spot and forward price will be equal and the basis will be known; it will be zero. This means that hedges held to expiration will be less risky than other hedges.

However, basis risk is also used in a more general sense to mean any risk in the hedge. Under this definition, even hedges held to expiration can have basis risk. In a **cross hedge**, the item being hedged and the item underlying the hedging vehicle are not the same. They are highly, but not perfectly, correlated. If their relative price movement is not as modeled, then the cross hedge will not perform as expected. Fixed income hedging using Treasury contracts will always have cross hedge risk because both the relationship between the contract and CTD bond can change and the relationship of the CTD and the item being hedged can change.

Evaluating Hedging Effectiveness

There are three basic sources of hedging error.

There can be an error in the:

1. Forecast of the basis at the time the hedge is lifted.
2. Estimated durations.
3. Estimated yield beta.

Managing Default Risk, Credit Spread Risk, and Downgrade Risk With Derivatives

Types of Credit Risk

There are three principal credit-related risks that can be addressed with credit derivative instruments:

1. **Default risk** is the risk that the issuer will not meet the obligations of the issue (i.e., pay interest and/or principal when due). This risk is unique in the sense that it results from a potential action—failure to pay—of the debt issuer.

2. **Credit spread risk** is the risk of an increase in the yield spread on an asset.

3. **Downgrade risk** is the possibility that the credit rating of an asset/issuer is downgraded by a major credit-rating organization, such as Moody's.

Types of Credit Derivative Instruments

Credit options. Credit options provide protection from adverse price movements related to credit events or changes in the underlying reference asset's spread over a risk-free rate. When the payoff is based on the underlying asset's price, the option is known as a binary credit option. When the payoff is based on the underlying asset's yield spread, the option is known as a credit spread option.

Binary credit options. A binary credit put option on price will provide protection if a specific credit event occurs, and if the value of the underlying asset is less than the option strike price. The option value (OV) or payoff is:

$$OV = \max [(\text{strike} - \text{value}), 0]$$

Credit spread options. A credit spread call option on price will provide protection if the reference asset's spread over the relevant risk-free benchmark increases beyond the strike spread. The increase in the spread beyond the strike spread (i.e., the option being in the money) constitutes an identifiable credit event, in and of itself. The option value (OV) or payoff is:

$$OV = \max [(\text{actual spread} - \text{strike spread}) \times \text{notional} \times \text{risk factor}, 0]$$

Credit spread forwards. Credit spread forwards are forward contracts wherein the payment at settlement is a function of the credit spread over the benchmark at the

time the contract matures. The value (FV) or payoff to the buyer of a credit spread forward is:

$$FV = (\text{spread at maturity} - \text{contract spread}) \times \text{notional} \times \text{risk factor}$$

Credit swaps. Credit swaps describe a category of products in the swap family, all of which provide some form of credit risk transfer. Our focus here will be on **credit default swaps** which can be viewed as protection, or insurance, against default on an underlying credit instrument (called the reference asset or reference entity when referring to the issuer).

To obtain the requisite insurance, the protection buyer agrees to pay the protection seller a periodic fee in exchange for a commitment to stand behind an underlying bond or loan should its issuer experience a credit event, such as default. A credit default swap agreement will contain a list of credit events that apply to the agreement.

The terms of a credit swap are custom-designed to meet the needs of the counterparties. They can be cash settled or there can be physical delivery, which generally means the buyer of the swap delivers the reference asset to the counterparty for a cash payment.

International Bond Excess Returns

Six of the potential sources of excess return on international bonds are: (1) market selection; (2) currency selection; (3) duration management; (4) sector selection; (5) credit analysis; and (6) markets outside the benchmark.

Market selection involves selecting appropriate national bond markets.

Currency selection. The manager must determine the amount of active currency management versus the amount of currency hedging he will employ. Due to the complexities and required expertise, currency management is often treated as a separately-managed function.

Duration management. Once the manager has determined what sectors (i.e., countries) will be held, she must determine the optimal maturities. Limited maturity offerings in some markets can be overcome by employing fixed income derivatives.

Sector selection. This is directly analogous to domestic bond portfolio management. Due to increasing ranges of maturities, ratings, and bond types (e.g., corporate, government), the international bond portfolio manager is now able to add value through credit analysis of entire sectors.

Credit analysis refers to recognizing value-added opportunities through credit analysis of individual securities.

Markets outside the benchmark. Large foreign bond indices are usually composed of sovereign (government) issues. With the increasing availability of corporate issues, the manager may try to add value through enhanced indexing by adding corporates to an indexed foreign bond portfolio.

International Bond Durations

To estimate the sensitivity of the prices of foreign bonds to changes in the domestic interest rate, the manager must measure the *correlations* between changes in their yields and changes in the domestic interest rate.

Assuming there is a relationship (i.e., correlation) between yields on the domestic and foreign bonds, the manager can regress the yield on the foreign bond against the yield on a domestic bond of similar risk and maturity:

$$\Delta \text{yield}_{\text{foreign}} = \beta_{\text{yield}} (\Delta \text{yield}_{\text{domestic}}) + e$$

In the regression, β is the *country beta* or *yield beta*, which measures the sensitivity of the yield on the foreign bond to changes in the yield on the domestic bond. Multiplying the country beta times the change in the domestic rate gives the manager the estimated change in the foreign yield.

Duration Contribution of a Foreign Bond

The duration of a foreign bond must also be adjusted when we calculate its *contribution* to the portfolio duration. The contribution of a domestic bond to the duration of a domestic portfolio is the bond's weight in the portfolio multiplied by its duration. The duration contribution of a foreign bond to a domestic portfolio is its weight in the portfolio multiplied by its (foreign) duration and its country beta.

The Hedging Decision

Interest Rate Parity

The IRP formula summarizes this arbitrage-free relationship:

$$F = S_0\left(\frac{1+c_d}{1+c_f}\right)$$

We can *approximate* the forward premium or discount (i.e., the *currency differential*) as the difference in short-term rates:

$$f_{d,f} = \frac{(F - S_0)}{S_0} \approx c_d - c_f$$

Covered Interest Arbitrage

Covered interest arbitrage forces interest rates toward *parity*, because risk-free rates must be the same across borders when forward exchange rates exist. If the nominal domestic interest rate is low relative to the nominal foreign interest rate, the foreign currency *must* trade at a forward discount (this relationship is forced by arbitrage). Alternatively, if the nominal home interest rate is high relative to the nominal foreign interest rate, the foreign currency must trade at a forward premium.

We can check for an arbitrage opportunity by using the covered interest differential. The covered interest differential says that the domestic interest rate should be the same as the *hedged* foreign interest rate. More specifically, the difference between the domestic interest rate and the hedged foreign rate should be zero.

The covered interest differential can be viewed by rewriting IRP in the following way:

$$(1+c_d) = (1+c_f)\left(\frac{F}{S_0}\right)$$

The left-hand side of the equation is the domestic interest rate, while the right-hand side is the hedged foreign rate (the foreign rate expressed in domestic terms). Arbitrage will prevent this relationship from getting out of balance. To preclude arbitrage, the left-hand side minus the right-hand side should equal zero. Hence, the covered interest differential can be written as:

$$(1+c_d) - (1+c_f)\left(\frac{F}{S_0}\right) = \text{covered interest differential}$$

Hedging Techniques

The **forward hedge**. The forward hedge is used to eliminate (most of) the currency risk. Utilizing a forward hedge assumes forward contracts are available and actively traded on the foreign currency in terms of the domestic currency. If so, the manager enters a forward contract to sell the foreign currency at the current forward rate.

The **proxy hedge**. In a proxy hedge the manager enters a forward contract between the *domestic currency and a second foreign currency* that is correlated with the first foreign currency (i.e., the currency in which the bond is denominated). Gains or losses on the forward contract are expected to at least partially offset losses or gains in the domestic return on the bond. Proxy hedges are utilized when forward contracts on the first foreign currency are not actively traded or hedging the first foreign currency is relatively expensive.

The **cross hedge**. Notice that in currency hedging the proxy hedge is what we would usually refer to as a cross hedge in other financial transactions. In other words, the manager can't construct a hedge in the long asset, so he hedges using another, correlated asset. In a currency cross hedge, the manager enters into a contract to deliver the original foreign currency (i.e., the currency of the bond) for a third currency. Again it is hoped that gains or losses on the forward contract will at least partially offset losses or gains in the domestic return on the bond. In other words, the manager takes steps to eliminate the currency risk of the bond by replacing it with the risk of another currency. The currency cross hedge, therefore, is a means of changing the risk exposure rather than eliminating it.

The Hedging Decision

Using only the following data on two foreign bonds with the same risk characteristics (e.g., maturity, credit risk) **determine** which bond should be purchased, if the currency risk of either can be fully hedged with a forward contract.

Country	*Nominal Return*	*Risk-Free Rate*
i	4.75%	3.25%
j	5.25%	3.80%

Answer:

Since their maturities and other risk characteristics are similar and an investment in either can be hedged using a forward contract, we can determine the better bond to purchase by calculating their excess returns:

Bond i: 4.75% – 3.25% = 1.50%

Bond j: 5.25% – 3.80% = 1.45%

Bond i offers the higher excess return, so given the ability to fully hedge the manager should select Bond i.

To Hedge or Not to Hedge

A U.S. manager is considering a foreign bond. The U.S. risk-free rate (i.e., the domestic rate) is 4% and the risk-free rate in the foreign country (i.e., the local rate) is 4.8%. The manager expects the dollar to appreciate only 0.4% over the expected holding period. Based on this information and assuming the ability to hedge with forward contracts, **determine** whether the manager should hedge the position or leave it unhedged.

Answer:

We start by calculating the forward differential expected by the market:

$$f \approx i_d - i_f = 4.0\% - 4.8\% = -0.8\%$$

The current nominal risk-free interest rates imply a forward differential of –0.8%; the market expects the foreign currency to depreciate 0.8% relative to the dollar. The manager on the other hand expects the dollar to appreciate only 0.4%. If the manager's expectations are correct, the *forward dollar is too expensive*, or alternatively, the forward price of the foreign currency is too cheap. The manager is better off not hedging the currency risk, as the foreign currency will not fall in value as much as predicted by the market.

Breakeven Spread Analysis

Breakeven analysis is an active management bond swap tool. It identifies the spread change between two bonds at which the manager *can be sure* the bond selected would outperform.

Step 1: Identify the two bonds and the difference in expected return over a specified time period.
Step 2: Calculate the breakeven spread change such that relative price performance will just offset the projected return difference in Step 1.

Consider bonds i and j yielding 4.75% and 5.25%. Their durations are 4 and 5. The holding period is 6 months for a periodic yield, and the projected return difference is calculated as follows: (5.25 – 4.75)/2 = 25bp. There are three scenarios.

A. Buy j to pick up expected return. The risk is the spread widens. Bond j can underperform in relative price by no more than 25bp. Breakeven spread change (BES) is –25bp = –5(BES). BES is a widening of no more than 5bp. When the risk is spread widening (bought the higher yield bond), use the higher duration to be sure BES will not lead to underperformance.

B. Buy i and give up yield. This is a less common trade. The spread must widen for a relative price gain by bond i to reach breakeven. Bond i must outperform in relative price by at least 25bp. BES is 25bp = –4(BES). BES is widening of at least 6.25bp. (Technically there is a minus sign, which means the yield on i must decline versus j.) When a spread widening is required (bought the lower yield bond), use the lower duration to be sure BES will lead to outperformance.

C. The analyst (question) directs which bond's yield will change. If so, use that bond's duration to calculate BES.

Emerging Market Debt

In actively managing a fixed income portfolio, managers often utilize a **core-plus** approach. In a core-plus approach, the manager holds a *core* of investment grade debt and then invests in bonds perceived to add the potential for generating added return. Emerging market debt (EMD) is frequently utilized to add value in a core-plus strategy.

Advantages of investing in EMD include:

- Increasing quality in emerging market sovereign bonds.

- Increased resiliency; the ability to recover from value-siphoning events.
- Lack of diversification in the major EMD index, the Emerging Markets Bond Index Plus (EMBI+). The index is concentrated in Latin American debt (e.g., Brazil, Mexico). The bond investor can diversify the fixed income portfolio, so an undiversified index offers return-enhancing potential.

Risks associated with EMD include:

- Unlike emerging market governments, emerging market corporations do not have the tools available to help offset negative events.
- EMD returns can be highly volatile with negatively skewed distributions.
- A lack of transparency and regulations gives emerging market sovereign debt higher credit risk than sovereign debt in developed markets.
- Under-developed legal systems that do not protect against actions taken by governments.
- A lack of standardized covenants.
- Political risk (a.k.a. geopolitical risk).

Selecting a Fixed Income Manager

Criteria that should be utilized in determining the *optimal mix* of active managers i*nclude style analysis, selection bets, investment processes*, and *alpha correlations*.

Style analysis. The majority of active returns can be explained by the manager's selected style. The primary concerns associated with researching the managers' styles include not only the styles employed but any additional risk exposures due to style.

Selection bets. Selection bets include credit spread analysis (i.e., which sectors or securities will experience spread changes) and the identification of over- and under-valued securities. By decomposing the manager's excess returns, the sponsor can determine the manager's ability to generate superior returns from selection bets.

Investment processes. This step includes investigating the total investment processes of the managers. What type of research is performed? How is alpha attained? Who makes decisions and how are they made (e.g., committee, individual).

Alpha correlations. If the alphas of the various managers are highly correlated, not only will there be significant volatility in the overall alpha, but the alphas will tend to be all positive or negative at the same time.

The process for determining the best mix of fixed income active managers is much the same as that for selecting the best mix of equity portfolio managers. The one consideration that distinguishes the two is the need for a low-fee strategy. That is, fees are an important consideration in selecting any active manager, but the ratio of fees to alpha is usually higher for fixed income managers.

Equity Portfolio Management

Study Session 12

Topic Weight on Exam	5–15%
SchweserNotes™ Reference	Book 4, Pages 1–50

I would expect an item set or essay question dedicated to Equity Portfolio Management. I hope you notice that this material overlaps with concepts covered in Fixed Income.

Equity Portfolio Management

Cross-Reference to CFA Institute Assigned Reading #23

Equities and Inflation

Equity returns provide a reasonable **inflation hedge** in the long run because they are a residual claim on the company's assets and company earnings tend to rise with inflation. However, in the short run, the correlation is imperfect and the hedge is imperfect because corporate taxes are not inflation indexed (reducing return to investors) and companies vary in their ability to pass through inflation (high levels of competition reduce pricing power).

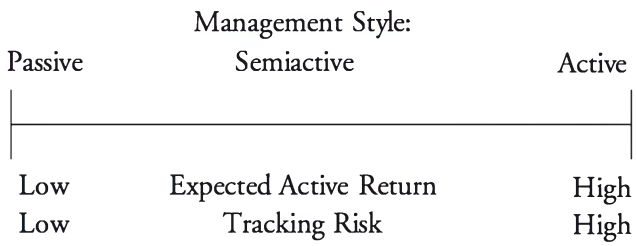
Active, Passive, and Semiactive Strategies

Passive equity managers do not use forecasts to influence their investment strategies. The most common implementation of passive management is indexing.

Active equity managers buy, sell, and hold securities in an attempt to outperform their benchmark.

Active return is excess return relative to the benchmark. *Tracking risk* is the standard deviation of active return and is a measurement of *active risk*. The more actively (passively) managed the equity portfolio, the greater (less) the potential for active return and tracking risk.

The **information ratio** is the active return divided by the tracking risk, so it shows the manager's active return per unit of tracking risk.



Typically, the information ratio is maximized by semiactive management styles.

Passive strategies are optimal for investors seeking to minimize turnover, transaction costs, and taxes in markets that have high information efficiency or to access markets they are unfamiliar with.

Equity Index Weighting Schemes

A **price-weighted index** is an arithmetic average of the prices of the securities included in the index.

A **market capitalization-weighted index** (or "value-weighted") is calculated by summing the total market value of all the stocks in the index.

A subtype of a value-weighted index is the **free float-adjusted market capitalization index**.

In an **equal-weighted index**, all stock *returns* are given the same weight.

Biases in the Weighting Schemes

Price-weighted index. Higher-priced stocks have a greater impact on the index's value than lower-priced stocks. The price of a stock changes through time as a firm splits its stock, repurchases stock, or issues stock dividends. Assumes the investor purchases one share of each stock represented in the index, which is rarely followed by any investor.

Value-weighted index and free float-adjusted market capitalization index. Firms with greater market capitalization have a greater impact on the index. Biased towards large firms that may be mature and/or overvalued. May be less diversified, if they are over represented by large-cap firms. Institutional investors may not be able to mimic a value-weighted index if they are subject to maximum holdings and the index holds concentrated positions.

Equal-weighted index. Biased towards small-cap companies because they have the same weight as large-cap firms. May contain more small firms than large firms. Required rebalancing of this index creates higher transactions costs for index investors. Emphasis on small-cap stocks means that index investors may not be able to find liquidity in many of the index issues.

Index reconstitution refers to the process of adding and deleting securities from an index. Indices that are reconstituted by a committee will have lower turnover, and hence, lower transactions costs and taxes for the index investor. These indices may drift from their intended purpose, though, if they are reconstituted too infrequently. In contrast, an index regularly reconstituted by a mechanical rule will have more turnover and less drifting. Another difference in index methodologies concerns minimum liquidity requirements. The presence of small-cap stocks may create liquidity problems but also offers the index investor a potential liquidity risk premium.

Passive Investing

Index Mutual Funds and Exchange-Traded Funds

There are five main differences between **index mutual funds** and **exchange-traded funds** (ETFs):

1. In the United States, a mutual fund's value is typically only provided once a day, at the end of the day, when trades are executed. An ETF trades throughout the day.

2. ETFs do not have to maintain records for shareholders, whereas mutual funds do, and related expenses can be significant. There are trading expenses associated with ETFs, because they trade through brokers like ordinary shares.

3. Index mutual funds usually pay lower license fees to Standard & Poor's and other index providers than ETFs do.

4. ETFs are generally more tax efficient than index mutual funds.

5. Although ETFs carry brokerage commissions, the costs of holding an ETF long-term is typically lower than that for an index mutual fund.

Separate or Pooled Accounts

In a pooled account, the indexed portfolios of several investors are combined under one manager. Pooling is advantageous to smaller funds, which cannot afford a dedicated manager, but it is difficult to differentiate the performances of the separate, pooled funds, and the pool manager may have to hold excess cash to provide liquidity for all the pooled funds.

Equity Futures vs. ETFs

Compared to ETFs, equity futures have two *disadvantages*. First, equity futures contracts have a finite life and must be periodically rolled over. Second, using basket trades and futures contracts in combination for risk management may be problematic, because a basket may not be shorted if one of the components violates the uptick rule.

Approaches to Creating an Indexed Portfolio

Full Replication. All the stocks in the index are purchased according to the weighting scheme used in the index. The *advantage* of replication is that there is low tracking risk and the portfolio only needs to be rebalanced when the index stocks change or pay dividends. The return on a replicated fund should be the index returns minus the administrative fees, cash drag, and transactions costs of tracking the index. A replicating fund will underperform the index to a greater extent when the underlying stocks are illiquid, and the index does not bear the trading costs that the replicating fund does.

Stratified Sampling. The portfolio manager separates the stocks in an index using a structure of two or more dimensions and places the stocks accordingly into cells of the resulting matrix. Within each cell, the manager picks a few representative stocks. The primary *advantage* of stratified sampling is that the manager does not have to purchase all the stocks in an index.

Optimization. A factor model matches the factor exposures of the fund to those of the index. The advantage of an optimization is that the factor model accounts for the covariances between risk factors. In a stratified sampling procedure, it is implicitly assumed that the factors (e.g., industry, size, price-earnings ratios) are uncorrelated.

There are three main *disadvantages*. First, the risk sensitivities measured in the factor model are based on historical data. Second, optimization may provide a misleading model. Third, the optimization must be updated to reflect changes in

risk sensitivities. Regardless of its limitations, an optimization approach leads to lower tracking risk than a stratified sampling approach.

Equity Styles

Value investors focus on the *numerator* in the P/E or P/B ratio, looking for stocks with depressed prices. There are three main *substyles* of value investing: high dividend yield, low price multiple, and contrarian.

Growth investors focus on the *denominator* in the P/E ratio, searching for firms and industries where high expected earnings growth has not already been incorporated into stock prices. There are two main *substyles* of growth investing: consistent earnings growth and momentum.

Market-oriented investing is neither value nor growth. Market-oriented investors sometimes focus on stock prices and other times focus on earnings. The *substyles* of market-oriented investing are market-oriented with a value tilt, market-oriented with a growth tilt, growth at a reasonable price (GARP), and style rotation.

Market Capitalization Based Investing

Small-cap investors believe smaller firms are more likely to be underpriced than well-covered, larger cap stocks. *Micro-cap* investors focus on the smallest of the small-cap stocks. *Mid-cap* investors believe that stocks of this size may have less coverage than large-cap stocks but are less risky than small-cap stocks. *Large-cap* investors believe that they can add value using their analysis of these less-risky companies. All categories can be further classified as value, growth, or market-oriented.

Identifying Style

In **returns-based style analysis**, the returns on a manager's fund are regressed against the returns for various security indices. The regression coefficients, known as Sharpe style weights, represent the portfolio's exposure to asset classes. The coefficient of determination (R^2) shows the amount (%) of the investor's return explained by the regression's style indices. One minus R^2 indicates the amount unexplained by style and due to the manager's security selection.

A single regression in a returns-based style analysis provides the average fund exposures during the time period under analysis. A series of regressions can be used to check the style consistency of a manager over time.

Holdings-Based Style Analysis

Value or growth: A manager who invests in low P/E, low P/B, and high dividend yield stocks would be characterized as a value manager. A manager with high P/E, high P/B, and low dividend yield stocks would be characterized as a growth manager. A manager with average ratios would be characterized as market-oriented.

Expected earnings per share growth rate: If the manager has a heavy concentration in firms with high expected earnings growth, the manager would be characterized as a growth manager.

Earnings volatility: If the manager holds firms with high earnings volatility, the manager would be characterized as a value manager, because value managers are willing to take positions in cyclical firms.

Industry representation: Value (i.e., price-focused) managers tend to have greater representation in the utility and financial industries, because these industries typically have higher dividend yields and lower valuations. Growth (i.e., earnings-focused) managers tend to have higher weights in the technology and healthcare industries, because these industries often have higher growth. Individual firms within industries do not always fit the industry mold, and the value/growth classification of an industry will vary as the business cycle varies.

Equity Style Indices

Viewing style as a category means that there will be no *overlap* when a style index is constructed (i.e., stocks are assigned to only one style). Viewing style as a quantity (i.e., splitting a stock between styles) means that there will be overlap. Another distinguishing characteristic is **buffering**. Buffering means a stock is not immediately moved to a different style when its style changes slightly. This means there will be less turnover in the style indices and lower transactions costs from rebalancing for managers tracking the index.

The Equity Style Box and Style Drift

Another method of characterizing a portfolio's style is to use a **style box**. This method is used by Morningstar to characterize mutual funds and stocks. In this approach, a matrix is formed with value/growth characteristics across the top and market cap along the side. Morningstar uses holdings-based style analysis to classify securities.

Categorizing portfolios by size is fairly standard in that market cap is the usual metric for evaluating size. However, different providers use different categorizations

of value and growth attributes. For this reason, the categorization of portfolios can differ a great deal depending on the provider. Usually, price-multiples are used to define value stocks, whereas earnings or sales growth rates are used to define growth stocks.

Socially responsible investing (SRI), also known as ethical investing, is the use of ethical, social, or religious concerns to screen investment decisions. The screens can be negative, where the investor refuses to invest in a company they believe is unethical; or positive, where the investor seeks out firms with ethical practices. However, the SRI criteria may skew the portfolio style in a way that is not otherwise desirable.

Long-Short and Long-Only Investment Strategies

A **long-short strategy** can earn **two alphas**, where long-only strategy can only earn the long alpha through security selection. In addition, a long only investor can significantly overweight a position but under-weighting is limited. For example, if a stock is 1% of the benchmark, the long only portfolio is limited to a 0% weight for a 1% underweighting, while the long-short portfolio can have a negative weight.

A long-short portfolio can be made **market neutral** by balancing the long and short positions with each other. The short positions provide the funds for the long purchases and the investor's capital can be invested to earn the risk-free rate. The portfolio is market neutral with zero beta earning two alphas and the risk-free rate.

Other alternatives are possible:

The investor's capital can be invested in ETFs or in an equivalent amount of futures contracts to earn any desired market's return. The alphas can be earned from any market where the manager has the skill to identify misvaluations and the market return can be from that or any other market the investor's capital is invested in. The alphas are said to be **portable** or **transportable** and are skill based. The market return is passive and available for low cost. Such portfolios are typically evaluated versus cash equivalents and hedge funds.

This is similar to **alpha and beta separation**. Portfolio funds are invested in an index portfolio matching the investor's benchmark for beta. then a long-short (beta neutral) manager is used to generate alpha.

Short extension or **partial long-short** is considered a variation of long only, allowing limited short positions. For example, in a 130/30 short extension strategy, the manager invests 130% of the portfolio in long and 30% in short positions. Net, the portfolio is 100% long and is likely to be evaluated versus long only portfolios

but limited short selling is allowed to exploit overvalued securities. However, it is not possible to separate the source of the alphas from the source of market return.

In **core-satellite**, the core (majority) of the portfolio is held in index or semi-active funds replicating the investor's benchmark. This minimizes active risk (and return) at low cost and anchors total return to the investor's benchmark. Satellite managers have discretion to vary from the investor's benchmark, adding active return (and tracking risk) with the smaller portion of the portfolio. **Completeness portfolios** are similar but start with value added managers for alpha and then add a completeness portfolio, so the total portfolio better tracks the investor's benchmark.

Four reasons for pricing inefficiencies on the short side:

- Long-only investors ignore overvalued securities.
- Sell-side analysts mostly make buy recommendations.
- Sell-side analysts avoid antagonizing a company's management by making a sell recommendation.
- Window dressing leads managers to sell underperformers, further depressing their price.

Selling Disciplines

Substitution is replacing an existing security with another with brighter prospects. This approach is referred to as an *opportunity cost sell discipline*. After careful research, a manager may also conclude that a firm's business will worsen in the future. This is referred to as a *deteriorating fundamentals sell discipline*.

In a *valuation-level sell discipline,* a value investor may sell a stock if its P/E or P/B ratio rises to the ratio's historical mean. In a *down-from-cost sell discipline*, the manager may sell a stock if its price declines more than say 20% from the purchase price. In an *up-from-cost sell discipline*, the manager may sell a stock once it has increased, either a percentage or a dollar amount from the purchase price. In a *target price sell discipline*, the manager determines the stock's fundamental value at the time of purchase and later sells the stock when it reaches this level.

Enhanced Indexing

Using a **stock-based enhanced indexing strategy**, the manager underweights or overweights index stocks based on beliefs about the stocks' prospects. Risk is controlled by monitoring factor risk and industry exposures. In a **derivatives-based enhanced indexing strategy**, the manager obtains an equity exposure through derivatives.

There are two *limitations* to enhanced indexing: successful managers will be copied and their alpha will disappear, and models obtained from historical data may not be applicable to the future.

Fundamental Law of Active Management

The **fundamental law of active management** states that an investor's information ratio (IR) is a function of his depth of knowledge about individual securities (the information coefficient—IC) and the number of investment decisions (the investor's breadth—IB).[1] Investor breadth measures the number of *independent* decisions an investor makes.

More formally:

$$IR = IC\sqrt{IB}$$

Components of Total Active Return

Total portfolio return may reflect both investor and manager investment decisions. The investor may determine the portfolio's long-term strategic benchmark (the investor's benchmark) but choose to make a TAA allocation decision by assigning a manager a different benchmark (the manager's normal benchmark). In such cases:

- Total active return (value added or alpha) = manager's return – investor's benchmark return.
- Manager's "true" active return = manager's return – manager's normal benchmark.
- Manager's "misfit" active return = manager's normal benchmark – investor's benchmark.
- Total active risk (tracking error) is the standard deviation of total active return.
- True active risk is the standard deviation of true active return.
- Misfit active risk is the standard deviation of misfit active return.

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

The manager's value added in the portfolio is best determined by the manager's true information ratio:

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

1. Richard C. Grinold and Ronald N. Kahn. *Active Portfolio Management.* (McGraw Hill, 1995).

Selecting Equity Managers

Qualitative and quantitative screens are typically used to evaluate and identify a group of suitable managers. The qualitative considerations focus on strength of the manager's investment approach, research, and personnel. The quantitative considerations focus on past performance and investment style. While poor performance generally excludes managers from consideration, good past performance does not guarantee future performance.

A **manager questionnaire** is used to screen potential managers. The typical sections include:

1. Organization and staff.

2. Investment philosophy and process.

3. Resources (other than people).

4. Performance (benchmarks, alpha, risk sources, holdings).

5. Fee schedules: Ad valorem (percentage of assets) and performance fees.

Alternative Investments for Portfolio Management

Study Session 13

Topic Weight on Exam	5–15%
SchweserNotes™ Reference	Book 4, Pages 51–93

The basic ideas and concepts are not hard and have been introduced at earlier levels of the exam. The most likely exam scenario is one item set, although the benefits of alternative investments in diversifying risk appears and is pertinent in multiple topic areas. There is an excessive amount of detail so focus on the main conceptual points and conclusions of the material. It is extraordinarily rare for a question to depend on memorizing a specific number from an empirical study.

Alternative Investments Portfolio Management[1]

Cross-Reference to CFA Institute Assigned Reading #24

Common Features of Alternative Investments

1. Low liquidity.
2. Diversification benefits.
3. High due diligence costs.
4. Difficult to value.
5. Limited access to information.

Due diligence checkpoints for investing in alternative investments include:

1. Assess the market opportunity offered.
2. Assess the investment process.
3. Assess the organization of the manager.
4. Assess the people.
5. Assess the terms and structure of the investment.
6. Assess the service providers (i.e., lawyers, brokers, ancillary staff).
7. Review documents, such as the prospectus and other memoranda.

1. The terminology used throughout this section is industry convention as presented in *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Ch. 8, "*Alternative Investments Portfolio Management*," Jot K. Yau et al. In addition, facts, figures, and returns presented are from *Managing Investment Portfolios: A Dynamic Process*, 3rd edition, Ch. 8, "*Alternative Investments Portfolio Management*," Jot K. Yau et al.

Issues for Private Wealth Clients

1. **Tax issues** can be unique to the individual.
2. Determining the **suitability** of investments varies across individuals.
3. **Communication** with the client is important because the client may not be knowledgeable enough to effectively communicate his/her needs.
4. **Decision risk** is the risk of irrationally changing a strategy.
5. Wealthy individuals frequently hold **concentrated portfolios**.

Alternative Investment Groups

Real Estate

Indirect real estate investments include:

- Companies that develop and manage real estate.
- REITS.
- CREFs.
- Infrastructure funds, which provide private investment in public projects.

Direct investments in real estate generally have low liquidity, large size, high transactions costs, and asymmetric information in transactions (low transparency).

Real estate provides diversification to a stock/bond portfolio, but real estate as an asset class and each individual real estate asset can have a large idiosyncratic risk component.

Private Equity

Private equity subgroups include *start-up companies, middle-market private companies,* and *private investment in public entities*. The distinguishing feature of the subgroups is the stage of development of the company receiving the invested dollars. Investments in start-up and middle-market private companies have more risk and lower returns than investments in established companies via buyout funds. They also suffer from the risks associated with asymmetric information. All the categories have low liquidity.

A *direct* investment in private equity is when the investor purchases a claim directly from the firm.

Indirect investment is usually done through private equity funds, which include venture capital (VC) and buyout funds.

Commodities

Direct investment is either the purchase of the physical commodity or the derivatives on those assets. *Indirect* investment in commodities is usually done through investment in companies whose principal business is associated with a commodity.

Investments in both commodity futures and publicly traded commodity companies are fairly liquid. Investments in commodities have *low correlation with stocks and bonds*, and most have a *positive correlation with inflation.*

Managed Futures

Managed futures funds share many characteristics with hedge funds. The primary legal structure of most managed futures in the United States is the limited partnership. Managed futures funds also utilize much the same compensation scheme for managers. Like hedge funds, they are usually classified as absolute return strategies.

The primary feature that distinguishes managed futures from hedge funds is managed futures funds tend to trade only in derivatives markets. Also, managed futures funds generally take positions based on indices, while hedge funds tend to focus more on individual asset price anomalies.

Buyout Funds

Buyout funds are the largest segment of the private equity market and can be divided into *middle market buyout funds* and *mega-cap buyout funds*. The primary difference between the two is the size of the target.

Middle-market buyout funds concentrate on divisions spun off from larger, publicly-traded corporations and private companies that, due to their relatively small size, cannot efficiently obtain capital. **Mega-cap buyout funds** concentrate on taking publicly-traded firms private.

Buyout funds usually capture value for their investors by selling the acquisitions through private placements or IPOs or through *dividend recapitalization*. In a dividend recapitalization, the buyout fund issues debt through an acquired firm and pays a special dividend to itself and other equity investors. *Recapitalization* in this case refers to reducing the firm's equity and increasing its leverage, sometimes to critical levels. Notice, however, that the buyout fund retains control.

Infrastructure Funds

Infrastructure funds specialize in purchasing public infrastructure assets (e.g., airports, toll roads) from cities, states, and municipalities. Since infrastructure assets typically provide a public service, they tend to produce relatively stable, long-term real returns.

They tend to be regulated by local governments, which only adds to the predictability of cash flows. Their low correlation with equity markets means infrastructure assets provide diversification, and their long-term natures provide a good match for institutions with long-term liabilities (e.g., pension funds). Their relatively low risk, however, means that infrastructure returns are low.

Distressed Securities

Analysts often consider distressed securities to be part of the hedge fund class of alternative investments. It may also be part of the private equity class. One way to construct subgroups in distressed securities is by structure, which determines the level of liquidity. The hedge-fund structure for distressed security investment is more liquid. The private equity fund structure describes funds that are less liquid, because they have a fixed term and are closed ended.

Alternative Investment Benchmarks

Figure 1 presents a summary of alternative investment benchmarks, their construction, and their associated biases.

Figure 1: Alternative Investment Benchmarks

	Benchmarks	*Construction*	*Biases*
Real estate	NCREIF; NAREIT.	NCREIF is value-weighted; NAREIT is cap-weighted.	Measured volatility is downward biased. The values are obtained periodically (annually).
Private equity	Provided by Cambridge Associates and Thomson Venture Economics.	Constructed for buyout and venture capital. Value depends upon events. Often construct custom benchmarks.	Repricing occurs infrequently which results in dated values.
Commodities	Dow Jones-AIG Commodity Index; S&P Commodity Index.	Assume a futures-based strategy. Most types considered investable.	Indices vary widely with respect to purpose, composition, and method of weighting.
Managed futures	MLMI; CTA Indices.	MLMI replicates the return to a trend-following strategy. CTA Indices use dollar-weighted or equal-weighted returns.	Requires special weighting scheme.
Distressed securities	Characteristics similar to long-only hedge fund benchmarks.	Weighting either equally-weighted or based upon assets under management. Selection criteria can vary.	Self-reporting; backfill or inclusion bias; popularity bias; survivorship bias.

Hedge Fund Benchmarks

Hedge fund benchmarks vary a great deal in composition and even frequency of reporting. Also, there is no consensus as to what defines hedge fund strategies, and this leads to many differences in the indices as style classifications vary from company to company.

The following list is of providers of *monthly indices* with a few of their general characteristics:

- *CISDM of the University of Massachusetts*: several indices that cover both hedge funds and managed futures (equally-weighted).
- *Credit Suisse/Tremont*: provides various benchmarks for different strategies and uses a weighting scheme based upon assets under management.
- *EACM Advisors*: provides the EACM100® Index, an equally-weighted index of 100 funds that span many categories.
- *Hedge Fund Intelligence, Ltd.*: provides an equally-weighted index of over 50 funds.
- *HedgeFund.net*: provides an equally-weighted index that covers more than 30 strategies.

Biases often exist in these indices because of the *self-reporting* of fund returns. This can apply to returns as they are earned or when filling in gaps in the historical data. *Backfill* or *inclusion bias* is the potential bias when a hedge fund joins an index and the manager adds historical data to complete the series. Also, the methods for selecting and weighting funds included in the index can cause a wide range of return differences among indices in the same class.

- **Popularity bias** can result if one of the funds in a value-weighted index increases in value and then attracts a great deal of capital.
- **Survivorship bias.** Indices may drop funds with poor track records or that fail, causing an upward bias in reported values.

Return Enhancement and Diversification

Real estate. High risk-adjusted performance is possible because of the low liquidity, large sizes, high transactions costs, and low information transparency that usually means the seller knows more than the buyer. Real estate provides great *diversification* potential.

Private equity is less of a diversifier and more a long-term return enhancer.

Commodities offer *diversification* to a portfolio of stocks and bonds. The returns on commodities are generally lower than stocks and bonds.

Hedge funds generated higher returns than stocks and bonds over the period 1990–2004 and generally provide moderate to good *diversification* benefits.

Managed futures provide returns similar to that of hedge funds and can provide *diversification*.

Distressed securities have generally beaten stocks and bonds but have a large negative skew and are uncorrelated with the overall stock market.

Direct Real Estate Equity Investing

Advantages:

- Many expenses are tax deductible.
- Ability to use more leverage than most other investments.
- More control than stock investing.
- Ability to diversify geographically.
- Lower volatility of returns than stocks.

Disadvantages:

- Lack of divisibility.
- High information commission, operating and maintenance, and management costs.
- Special geographical risks.

Venture Capital Investing

Issuers of venture capital include *formative-stage companies* and *expansion-stage companies*. **Buyers** of venture capital include: *angel investors, venture capitalists,* and *large companies,* who are also called *strategic partners*.

The **stages** through which private companies pass are: early stage, later stage, and exit stage.

In contrast to venture capital funds, **buyout funds** usually have:

- A higher level of leverage.
- Earlier and steadier cash flows.
- Less error in the measurement of returns.
- Less frequent losses.
- Less upside potential.

Convertible preferred stock is a good vehicle for direct venture capital investment, because preferred stockholders must be paid a specified amount, before common stockholders receive distributions.

Private Equity Investing

Private equity funds usually take the form of **limited partnerships** or **limited liability companies** (LLC).

The sponsor (i.e., general partner) typically gets a *management fee* and *incentive fee*. The **management fee** is usually 1.5% to 2.5% and is based upon the *committed funds*. The **incentive fee** is also called the carried interest. It is the share of the

profits that are paid to the manager after the fund has returned the outside investors' capital. A *claw-back* provision may be in place that requires the manager to give back money, if the expected profits are not realized.

Any strategy for private equity investment must address:

- Low liquidity.
- Diversification through a number of positions.
- Plans for meeting capital calls.

The Term Structure of Futures Prices

Direct commodity investment entails either purchasing the actual commodities or gaining exposure via derivatives. **Indirect commodity investment** is the purchase of indirect claims, like shares in a corporation that deals in the commodity.

Direct investment gives more exposure, but cash investment in commodities can incur carrying costs. Indirect investment may be more convenient, but it may provide very little exposure to the commodity, especially if the company is hedging the risk itself.

The components of the return to a commodity futures contract are the *spot return*, the *collateral return*, and the *roll return*.

total return = spot return + collateral return + roll return

The *spot return* (a.k.a. *price return*) is the return on the futures caused by the change in the underlying commodity's price.

The *collateral return* (a.k.a. *collateral yield*) is approximately the risk-free rate.

Roll return (or *roll yield*) is the change in the futures price minus the change in the spot price over a period of time. It can be positive or negative. If a contract is held to expiration, the total roll yield for the life of the contract will be the initial spot price minus initial forward price and is known in advance. This total roll yield will be positive when buying contracts for a market in backwardation (initial forward price is below the spot price) and negative for a market initially in contango (initial forward price is above the spot price).

The returns of storable (energy and metals) commodities generally have had a **positive correlation with inflation**, which produces a unique portfolio diversification benefit.

Hedge Fund Classifications

Hedge funds have been classified in various ways by different sources. Since hedge funds are a "style-based" asset class, strategies can determine the subgroups. Within the strategies, there can be even more precise subgroups, such as long/short and long-only strategies. The following is a list of nine of the more familiar hedge fund strategies.

1. *Convertible arbitrage* commonly involves buying undervalued convertible bonds, preferred stock, or warrants, while shorting the underlying stock to create a hedge.
2. *Distressed securities* investments can be made in both debt and equity. Since the securities are already distressed, shorting can be difficult or impossible.
3. *Emerging markets* generally only permit long positions, and often there are no derivatives to hedge the investments.
4. *Equity market neutral* (pairs trading) combines long and short positions in undervalued and overvalued securities, respectively, to eliminate systematic risk while capitalizing on mispricing.
5. *Fixed-income arbitrage* involves taking long and short positions in fixed-income instruments based upon expected changes in the yield curve and/or credit spreads.
6. *Fund of funds* describes a hedge fund that invests in many hedge funds. They tend to be more correlated with equities than with individual hedge fund strategies.
7. *Global macro strategies* take positions in major financial and non-financial markets through various means (e.g., derivatives and currencies). They tend to focus on an entire group or area of investment instead of individual securities or classes of securities.
8. *Hedged equity strategies* (a.k.a. *equity long-short*) represent the largest hedge fund classification in terms of assets under management. They take long and short positions in under- and overvalued securities, respectively, similar to equity market neutral strategies. The difference is that hedged equity strategies do not focus on balancing the positions to eliminate systematic risk and can range from net long to net short.
9. *Merger arbitrage* (a.k.a. *deal arbitrage*) focuses on returns from mergers, spin-offs, takeovers, etc.

Another classification scheme divides hedge funds strategies into five general segments: *relative value, event driven, hedged equity, global asset allocators*, and *short selling*.

1. *Relative value* strategies attempt to exploit price discrepancies.
2. *Event-driven* strategies invest with a short-term focus on an event, like a merger (merger arbitrage) or the turnaround of a distressed company (distressed securities).

3. *Hedged equity* entails taking long and short equity positions with varying overall net long or short positions and can include leverage.
4. *Global asset allocators* take long and short positions in a variety of both financial and non-financial assets.
5. *Short selling* takes short-only positions.

Styles that are mainly long-only tend to offer less potential for diversification than long/short styles, and liquidity can vary from fund to fund or even within subgroups. A hedge fund within any of the classes can have a lock-up period, for example.

Hedge Fund Structure

The most common **compensation structure** of a hedge fund consists of an assets-under-management fee, or *AUM fee*, and an *incentive fee*. **High water marks** are typically employed to avoid incentive fee double-dipping.

A **lock-up period** is a common provision in hedge funds that limits withdrawals by requiring a minimum investment period (e.g., one to three years), and designating exit windows. The rationale is to prevent sudden withdrawals that could force the manager to have to unwind positions.

Hedge Fund Incentive Fees

Incentive fees are paid to encourage the manager to earn even higher profits. There is some controversy concerning incentive fees, because the manager should have goals other than simply earning a gross return. For example, the manager may be providing limited downside risk and diversification. An incentive fee based upon returns does not reward this service.

Managers with good track records often demand higher incentive fees. The concern for investors is whether the manager with a good historical record can continue to perform well enough to truly earn the higher fees.

Fund of Funds

A **fund of funds** (FOF) is a hedge fund that consists of several, usually 10 to 30, hedge funds. The point is to achieve diversification, but the extra layer of management means an extra layer of fees. Often, a FOF offers more liquidity for the investor, but the cost is cash drag caused by the manager keeping extra cash to meet potential withdrawals by other investors.

A FOF may serve as a *better* indicator of aggregate performance of hedge funds (i.e., a better benchmark), because they suffer from less survivorship bias. If a fund of funds includes a fund that dissolves, it includes the effect of that failure in the return of the fund of funds, while an index may simply drop the failed fund.

A FOF can, however, suffer from **style drift** and FOF returns have been more highly correlated with equity markets than those of individual hedge funds. This can produce problems in that the investor may not know what she is getting. Over time, individual hedge fund managers may tilt their respective portfolios in different directions. Also, it is not uncommon for two FOF who claim to be of the same style to have returns with a very low correlation.

Hedge Fund Performance Evaluation

Some claim that hedge funds **absolute-return vehicles**, which means that no direct benchmark exists. To create comparable portfolios, analysts (1) create single and multi-factor models and (2) use an optimization technique to create a tracking portfolio.

Conventions to consider in hedge fund performance evaluation are the impact of performance fees and lock-up periods, the age of funds, and the size of funds. Empirical studies have found that:

- Funds with longer lock-up periods tend to produce higher returns than those with shorter lock-up periods.
- Younger funds tend to outperform older funds.
- Large funds underperform small funds.

Returns. By convention, hedge funds report *monthly* returns, which are then compounded to arrive at annual returns. Note that returns are often biased by entry into and exit from the fund, which are allowed on a quarterly or less-frequent basis, and by the frequency of the manager's trading (i.e., cash flows). To smooth out variability in hedge fund returns, investors often compute a *rolling return*, such as a 12-month moving average.

Leverage. The convention for dealing with **leverage** is to treat an asset as if it were fully paid for (i.e., effectively "look through" the leverage as if it weren't there). When derivatives are included, the same principle of *de-leveraging* is applied.

Risk. Hedge fund returns are usually skewed with significant leptokurtosis (fat tails), so standard deviation fails to measure the true risk of the distribution.

Downside deviation is a popular hedge-fund risk measure, as it measures only the dispersion of returns below some specified threshold return. The threshold return

is usually either zero or the risk-free rate of return. If the threshold is a recent average return, then we call the downside deviation the **semivariance**. The point of these measures is to focus on the negative returns and not penalize a fund for high positive returns, which increase measured standard deviation.

The Sharpe Ratio

Annual hedge fund Sharpe ratios are calculated using *annualized* measures:

$$\text{Sharpe}_{\text{HF}} = \frac{\text{annualized return} - \text{annualized risk-free rate}}{\text{annualized standard deviation}}$$

In addition to concerns associated with the way returns are calculated, the Sharpe ratio has the following *limitations* with respect to hedge fund evaluation:

- *Time dependency*. The Sharpe ratio is higher for longer holding periods (e.g., monthly versus weekly returns) by a scale of the square root of time, because monthly or quarterly returns and standard deviations are annualized. For example, quarterly returns are multiplied by 4, but the quarterly standard deviation is multiplied by $\sqrt{4}$.
- *Assumes normality*.
- *Assumes liquidity*.
- *Assumes uncorrelated returns*: Returns correlated across time will artificially lower the standard deviation. For example, if returns are trending for a period of time, the measured standard deviation will be lower than what may occur in the future. Serially correlated returns also result when the asset is illiquid and current prices are not available (e.g., private equity investments).
- *Stand-alone measure*: Does not automatically consider diversification effects.

Managed Futures in a Portfolio

Managed futures programs are typically run by **Commodity Pool Operators** (CPOs). CPOs can themselves be **Commodity Trading Advisors** (CTAs) or will hire CTAs to actually manage all or part of the pool. In the United States, both must be registered with the U.S. Commodity Futures Trading Commission and the National Futures Association.

CTAs are typically classified by style, the markets in which they specialize, or by strategy. Because they often seek performance in major markets, managed futures are sometimes thought of as a subset of global macro hedge funds that specialize in trading derivatives.

CTA strategies can be described as systematic or discretionary. CTAs that specialize in **systematic trading strategies** typically apply sets of rules to trade according to

short, intermediate, and/or long-term trends. They may also trade counter to trends in a contrarian (against the trend) strategy. A **discretionary trading strategy** is based on the discretion of the CTA in the same way that any active manager seeks value.

Managed futures can also be classified according to the markets in which they trade. They apply systematic or discretionary trading strategies in financial markets, currency markets, or diversified markets.

In *financial markets*, they trade in financial (i.e., interest rate) and currency futures, options, and forward contracts. Those that specialize in *currency markets* trade exclusively in currency derivatives. A fund that trades in *diversified markets* trades in all the financial derivatives markets described as well as commodity derivatives.

Role in the Portfolio

The primary benefit to managed futures is the significant diversification potential (i.e., improved Sharpe ratios). Some research has shown that managed futures have exhibited positive correlation to equities and bonds during up markets and negative correlations during falling markets. Private funds seem to add value whereas publicly traded funds have performed poorly both stand-alone and in portfolios.

In selecting a CTA to include in the portfolio, the manager should consider risk. For example, even though CTAs often exhibit negative correlations with equities, correlations among CTAs themselves can range anywhere from significantly to only modestly positive. In addition, the beta that relates the performance of an individual CTA to a fund of CTAs can be a good indicator of future risk-adjusted performance. Just as equity beta relates the volatility (risk) of an individual equity security or portfolio to the overall equity market, the CTA beta measures the risk of the individual CTA relative to a fund of CTAs.

Distressed Securities Investing

Long-only value investing tries to find opportunities where the prospects will improve. *High-yield investing* is buying publicly-traded, below investment grade debt. *Orphan equities investing* is the purchase of the equities of firms emerging from reorganization.

Distressed debt arbitrage is the purchasing of a company's distressed debt while short selling the company's equity. **Private equity** is an "active" approach where the investor acquires positions in the distressed company, and the investment gives some measure of control. All distressed securities can have event risk, liquidity risk, market risk, and J-factor risk.

Risk Management

Study Session 14

Topic Weight on Exam	Approximately 5%
SchweserNotes™ Reference	Book 4, Pages 94–230

This study session includes an important reading that could be relevant for 5% of exam questions. While item set questions are most likely, it can also be integrated with other material in constructed response questions. The reading deals with risk management and different ways to measure risk. VAR, its interpretation, ways to calculate it, and related issues are particularly important. You must know concepts, calculations, and terminology.

Risk Management

Cross-Reference to CFA Institute Assigned Reading #25

The **risk management process** is a *continual* process of:

- Identifying and measuring specific risk exposures.
- Setting specific tolerance levels.
- Reporting risk exposures (deemed appropriate) to stakeholders.
- Monitoring the process and taking any necessary corrective actions.

Risk governance, a part of the overall corporate governance system, is the name given to the overall process of developing and putting a risk management system into use.

- A *decentralized* risk governance system puts risk management in the hands of the individuals (i.e., managers) closest to everyday operations.
- A *centralized* system (also called ERM) provides a better view of how the risk of each unit affects the overall risk borne by the firm.

Some of the specific risks that must be monitored include:

- Market risk (financial risk).
- Liquidity risk (financial risk).
- Settlement risk (non-financial risk).
- Credit risk (financial risk).
- Operations risk (non-financial risk).
- Model risk (non-financial risk).
- Sovereign risk (financial and non-financial risk components).

- Regulatory risk (non-financial).
- Political risk, tax risk, accounting risk, and legal risk (all non-financial).

Evaluating a Risk Management System

The analyst should determine whether:

- Senior management allocates capital on a risk-adjusted basis.
- The ERM system properly identifies all relevant risk factors.
- The ERM system utilizes an appropriate model.
- Risks are properly managed.
- There is a committee in place to oversee the entire system.
- The ERM system has built-in checks and balances.

Evaluating Financial (Market) Risk

Market risk in this context refers to the response in the value of an asset to changes in interest rates, exchange rates, equity prices, and/or commodity prices.

The measure you are no doubt most familiar with is **standard deviation**. When measured relative to a benchmark, the volatility (standard deviation) of the asset's excess returns is called **active risk**, **tracking risk**, **tracking error volatility**, or **tracking error**.

The manager's excess return over the benchmark, called **active return**, is typically compared to the historical volatility of excess returns, measured by **active risk**. The ratio of the active return to the active risk is known as the **information ratio** (IR):

$$IR_P = \frac{\text{active return}}{\text{active risk}} = \frac{R_P - R_B}{\sigma_{(R_P - R_B)}}$$

It is very important to recognize that the market risk of an asset has two dimensions: (1) the sensitivity of the asset to movements in a given market factor, and (2) changes in the asset's sensitivity to the factor.

Evaluating Non-Financial Risk

Because most non-financial risk (e.g., tax, legal and regulatory, sovereign) are difficult if not impossible to measure, managers will often not even attempt to assign an associated VAR value. Although regulators and managers have made advances in measuring the losses associated with these risk factors, the lack of relevant historical data leads managers to buy *insurance*, which protects against these losses.

Value at Risk

VAR is used as an estimate of the minimum expected loss (alternatively, the maximum loss):

- Over a set time period.
- At a desired level of *significance*.

When estimating VAR for a portfolio, the correlations of the returns on the individual assets must be considered because the overall VAR is not just the simple sum of individual VARs. Methods for estimating VAR include:

- The **analytical method** (a.k.a. the **variance-covariance** or **delta normal method**).
- The **historical method**.
- The **Monte Carlo method**.

For the exam, if you are given the standard deviation of annual returns and need to calculate a daily VAR, the daily standard deviation can be estimated as the annual standard deviation divided by the square root of the number of (trading) days in a year, and so forth:

$$\sigma_{daily} \cong \frac{\sigma_{annual}}{\sqrt{250}};\ \sigma_{monthly} \cong \frac{\sigma_{annual}}{\sqrt{12}};\ \sigma_{daily} \cong \frac{\sigma_{monthly}}{\sqrt{22}}$$

Analytical VAR

The expected 1-day return for a $100,000,000 portfolio is 0.00085 and the historical standard deviation of daily returns is 0.0011. **Calculate** daily value at risk (VAR) at 5% significance:

$$\begin{aligned} VAR &= \left[\hat{R}_p - (z)(\sigma)\right]V_p \\ &= \left[0.00085 - 1.65(0.0011)\right]\($100,000,000\) \\ &= -0.000965\($100,000,000\) \\ &= -\$96,500 \end{aligned}$$

Advantages and Limitations of VAR

One primary *benefit of VAR* is that it is interpreted the same, regardless of the assets in question. A primary *disadvantage* is that VAR does not give the magnitude of potential extreme losses (i.e., losses in the lower tail of the distribution).

Incremental VAR (IVAR) is the effect of an individual asset on the overall risk of the portfolio. **Cash flow at risk** (CFAR) measures the risk of the company's cash flows. **Earnings at risk** (EAR) is analogous to CFAR only from an accounting earnings standpoint. **Tail value at risk** (TVAR) is VAR plus the expected value in the lower tail of the distribution, which could be estimated by averaging the possible losses in the tail.

We do not directly consider **liquidity** in measuring VAR, so VAR can give an inaccurate estimate of the true potential for loss.

Stress testing measures the impacts of unusual events that might not be reflected in the typical VAR calculation. **Scenario analysis** is used to measure the effect on the portfolio of simultaneous movements in several factors or to measure the effects of unusually large movements in individual factors.

Stressing Models

In **factor push analysis**, the analyst deliberately pushes a factor or factors to the extreme and measures the impact on the portfolio. **Maximum loss optimization** involves identifying risk factors that have the greatest potential for impacting the value of the portfolio. **Worst-case scenario** is exactly that; the analyst simultaneously pushes all risk factors to their worst cases.

Evaluating Credit Risk

The monetary exposure to credit risk is a function of the probability of a default event and the amount of money lost if the default event occurs.

Current credit risk (also called **jump-to-default risk**) is associated with payments that are currently due, while potential credit risk is associated with payments due in the future. In measuring potential credit risk, creditors must consider cross-default-provisions.

Credit VAR

Credit VAR is also called **credit at risk** or **default VAR**. Unlike traditional VAR, credit managers focus on the *upper tail* of possible returns. An increase in the value of these assets (e.g., a positive return from falling interest rates), for example, accrues to the debtor in the form of the option to refinance.

Forward Contracts

The value (credit risk) of a forward contract to the long:

$$= \frac{\text{spot}}{(1+f)^t} - \frac{\text{forward}}{(1+d)^t}$$

Swaps

credit risk = PV(received) – PV(paid)

The credit risk of the typical *interest rate swap* is highest somewhere around the middle of its life. As some time passes and interest rates change, one or both of the parties begins to experience credit risk. As the swap nears its maturity and the number of remaining settlement payments decreases, the credit risk decreases.

In a *currency swap*, both parties can be simultaneously exposed to credit risk. Also, due to the exchange of principals at inception and the return of principals on the maturity date, the credit risk of a currency swap is highest between the middle and maturity of the agreement.

Options

The credit risk to an option is only borne by the long position. The credit risk to a *European option* can only be potential until the date it matures.

The credit risk of an *American option* will be at least as great as a similar European option. Also, the potential credit risk of an American option becomes current if the long decides to exercise early.

Managing Market Risk

Risk budgeting is the process of determining which risks are acceptable and how total enterprise risk is allocated across business units or portfolio managers. Through an ERM system, upper management allocates different amounts of capital across portfolio managers, each with an associated VAR.

An ERM system affords the ability to continuously monitor the risk budget so that any deviations are immediately reported to upper management. Another benefit of a risk budgeting system is the ability to compare manager performance in relationship to the amount of capital and risk allocated (i.e., measure risk-adjusted performance with **return on VAR**).

- **Position limits** place a nominal dollar cap on positions.
- **Liquidity limits** are related to position limits. Risk managers set dollar position limits according to frequency of trading.
- A **performance stopout** sets an absolute dollar limit for losses over a certain period.

Managing Credit Risk

- **Limit exposure** to any individual debtor.
- **Marking to market.**
- **Collateral** for transactions that generate credit risk.
- **Payment netting** is frequently employed to determine which side faces the credit risk.
- Create **special purpose vehicles** (SPV) and **enhanced derivatives products companies** (EDPC).
- Transfer risk to somebody else:
  - Total return swaps.
  - Credit spread options.
  - Credit spread forwards.
  - Credit default swaps.

Measuring Risk-Adjusted Performance

- **Sharpe ratio.**
- **Information ratio** (IR).
- **Risk-adjusted return on invested capital** (RAROC).
- **Return over maximum drawdown:**

$$\text{RoMAD} = \frac{\bar{R}_p}{\text{maximum drawdown}}$$

- **Sortino ratio:**

$$\text{Sortino} = \frac{\bar{R}_p - \text{MAR}}{\text{downside deviation}}$$

Setting Capital Requirements

Nominal position limits (also called **notional** or **monetary position limits**) are specified in terms of the amount of money allocated across portfolio managers based upon upper management's desire for return and exposure to risk.

Problems associated with nominal position limits stem from the ability of the individual portfolio manager to exceed the limit by combining assets (usually derivatives) to replicate the payoffs of other assets, and from management's inability to capture the effects of correlation among the nominal positions.

VAR-based position limits are sometimes used in lieu of nominal position limits. The benefit is a clear VAR picture. The drawback is the failure to consider the correlation of the different positions (i.e., different VARs).

A **maximum loss limit** is the maximum allowable loss. The sum of the individual maximum loss limit is the theoretical maximum the firm will have to endure. The benefit to setting maximum loss limits is the ability to allocate capital so the maximum loss never exceeds the firm's capital. The drawback is the possibility of all units simultaneously exceeding their limits.

Internal and regulatory capital requirements are set by regulation (e.g., banks). The ERM system must recognize the potential for incentive conflicts between management, which allocates the risk and the portfolio managers.

Risk Management Applications of Derivatives

Study Session 15

Topic Weight on Exam	5–15%
SchweserNotes™ Reference	Book 4, Pages 132–230

Derivatives are likely to be involved in 10% or more of exam questions. Item set questions are the most likely but constructed response questions have been included on past exams. Concepts, calculations, and terminology are all important.

Risk Management Applications of Forward and Futures Strategies

Cross-Reference to CFA Institute Assigned Reading #26

Adjusting the Portfolio Beta or Duration

Buying equity or bond contracts increases exposure to those markets and a portfolio's beta or duration. Selling equity or bond contracts decreases exposure to those markets and a portfolio's beta or duration.

The number of contracts to put or sell depends on the desired change in exposure (desired target beta or duration vs. existing beta or duration) divided by contract beta or duration as well as the ratio of the value to modify divided by the full value of each contract. If the delta *r* of the portfolio and contract are not assumed to be 1.0, yield beta must be included in the bond contract formula. The formulas to calculate number of contracts are:

$$\text{number of contracts} = \left(\frac{\beta_T - \beta_P}{\beta_f}\right)\left(\frac{V_P}{P_f(\text{multiplier})}\right)$$

$$\text{number of contracts} = \left(\frac{MD_T - MD_P}{MD_F}\right)\left(\frac{V_P}{P_f(\text{multiplier})}\right)(\text{yield beta})$$

Ex Post Evaluation

Risk and return modification results are rarely perfect due to basis risk. Basis risk exists whenever the relationship between the item modified is not identical to the hedging contract, and they move in unexpected ways relative to each other. Typical causes of basis risk include:

- The portfolio to adjust is not identical to the index on which the contract is based, also called cross hedge risk.
- The portfolio and contract perform differently than their projected betas and duration.
- The hedge results are examined at a point other than contract expiration. At contract expiration, the relationship of f_T and S_T are known, and they will converge. This is a known as a change in relationship and not basis risk.
- The number of contracts was rounded.
- The initial futures and spot prices were not fairly priced based on the arbitrage relationships covered at Level II.

Ex post beta can be calculated as:

$$\frac{\%\Delta \text{ in value of the portfolio}}{\%\Delta \text{ in value of the index}}$$

Synthetic Positions

Synthetic positions are an extension of the previous hedging formulas; however, additional steps are used to make the initial and ending cash flows match the cash flows that would have occurred if actual (rather than contract) positions had been used.

For synthetic equity, purchase equity futures and hold sufficient cash assets earning the risk-free rate to "pay for" the long contract position at expiration.

For synthetic cash, sell equity futures and hold sufficient underlying securities that can "be delivered" to close the short futures position.

The formulas shown in the previous section for basic hedging can be used, but V_P must be a future value. If the amount is given as a present value, increase it by the periodic risk-free rate. Often the assumption is made that the desired change in beta or duration is the same as the contract beta or duration. This produces a ratio of 1.0, and the formulas can be rewritten.

For synthetic equity:

$$\text{number of contracts}_{\text{UNrounded}} = \frac{(T_{\text{held}})(1+R_F)^t}{(P_f)(\text{multiplier})}$$

For synthetic cash:

$$\text{number of equity contracts} = -\frac{V_P(1+R_F)^T}{P_f}$$

Adjusting the Portfolio Allocation

Figure 1: Steps for Synthetically Altering Debt and Equity Allocations

To reallocate from *equity to bonds*:

1. Remove all *systematic risk* ($\beta = 0$) by shorting the appropriate amount of stock index futures.
2. Add the desired amount of *duration* using bond futures.

To reallocate from *bonds to equity*:

1. Remove all *duration* (MD = 0) by shorting the appropriate amount of bond futures.
2. Add the desired amount of *beta* using stock index futures.

Adjusting the Equity Allocation

To transfer \$V from class A to class B, use futures to first transfer \$V in class A to cash and then transfer \$V in cash to class B using index futures.

Pre-investing is the practice of taking long positions in futures contracts to create an exposure that converts a yet-to-be-received cash position into a synthetic equity and/or bond position.

Exchange Rate Risk

Three types of foreign exchange rate risk.

1. *Economic exposure* is the loss of sales that a domestic exporter might experience if the domestic currency appreciates relative to a foreign currency.

2. *Translation exposure* refers to the decline in the value of assets that are denominated in foreign currencies when those foreign currencies depreciate.

3. *Transaction exposure* is the risk that exchange rate fluctuations will make contracted future cash flows from foreign trade partners decrease in domestic currency value or make planned purchases of foreign goods more expensive.

Derivatives are used most often to hedge *transactions exposure*. Being *long the currency* (in this context) means you have contracted to *receive* the foreign currency. Being *short the currency* means you have contracted to *pay* the foreign currency, and the concern is that the currency will appreciate.

Risk Management Applications of Option Strategies

Cross-Reference to CFA Institute Assigned Reading #27

Analyzing Combined Option Positions

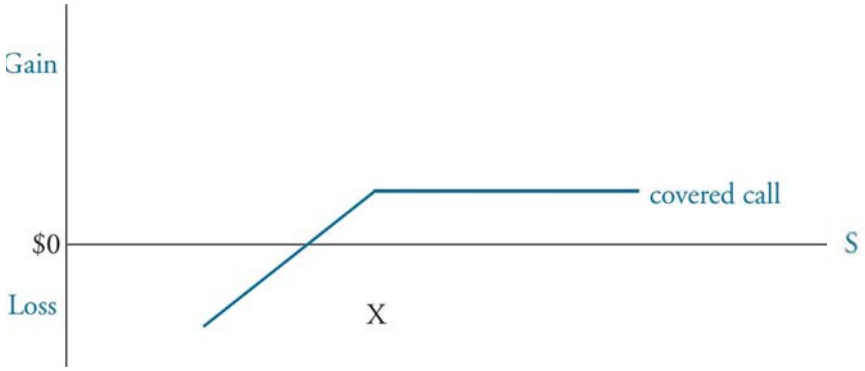
Know the inherent payoff patterns of the combinations and use them to solve problems. The extensive, individual specialized formulas are not recommended. Instead:

- **Calculate profit at any ending price for the underlying as sum of initial investment versus ending value of the positions held.**
- **Max gain: examine the payoff pattern and, from that underlying's price, sum the initial investment versus ending value of the positions held.**
- **Max loss: examine the payoff pattern and, from that underlying's price, sum the initial investment versus ending value of the positions held.**
- **Breakeven(s): examine the payoff pattern and, from either max gain or loss, determine how much the underlying must increase or decrease.**

Covered Call

- Own the underlying security at S_0 and sell a call option.
- Limits upside but retains most downside.
- Generates option premium income.
- Best if the underlying security is relatively stable in price.

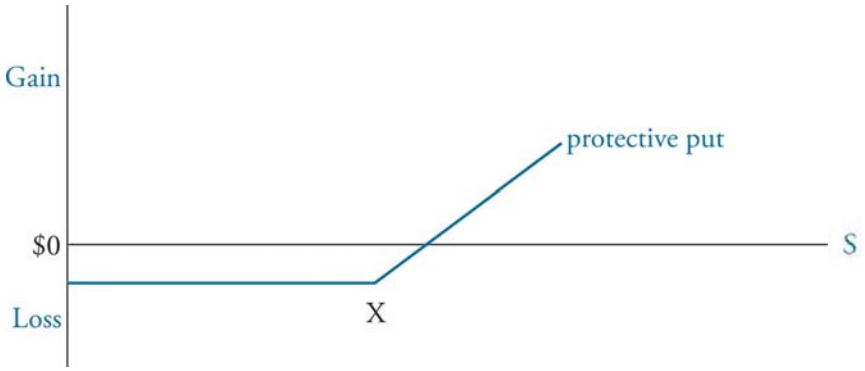
Figure 2: Payoff Pattern for a Covered Call



Protective Put (Portfolio Insurance)

- Own the underlying security at S_0 and buy a put option.
- Limits downside risk and retains upside.
- Requires paying a premium and best if the underlying is volatile.

Figure 3: Protect Put



Bull Spread

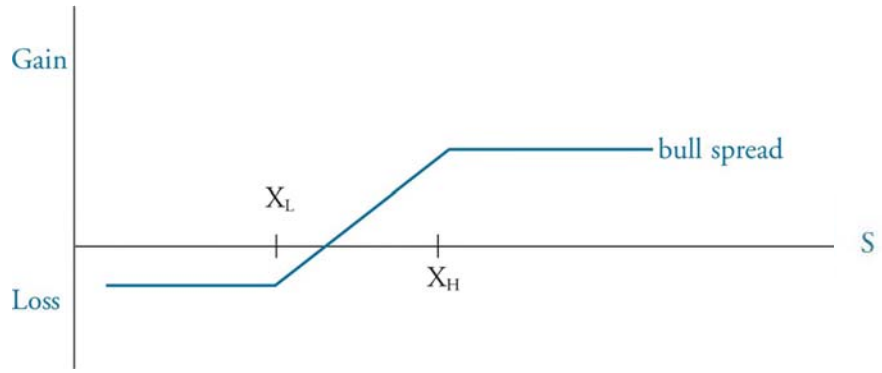
Gains if the underlying increases but with limited upside potential and downside risk.

Can be constructed as:

Buy a call X_L and sell a call X_H, or

Sell a put X_H and buy a put X_L

Figure 4: Bull Spread



Bear Spread

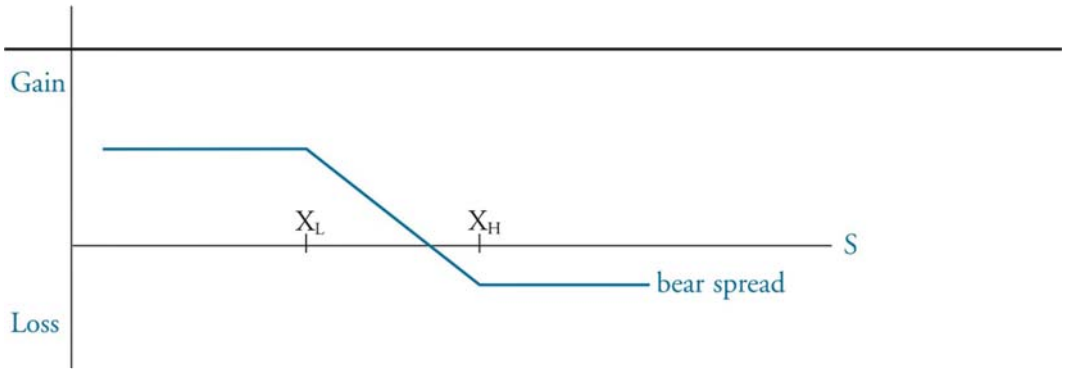
Gains if the underlying decreases but with limited upside potential and downside risk.

Can be constructed as:

Buy a put X_H and sell a put X_L, or

Sell a call X_L and buy a call X_H

Figure 5: Bear Spread



Butterfly Spread

A butterfly spread requires four options (two long and two short) with three strike prices. It gains if the underlying is stable while having limited upside and downside.

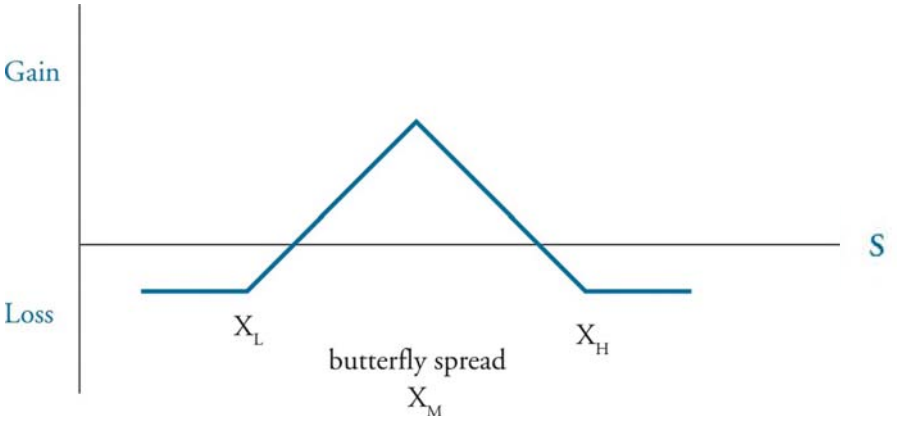
It can be constructed as:

Buy a call X_L, sell 2 calls X_M, and buy a call X_H, or

Buy a put X_H, sell 2 puts X_M, and buy a put X_L, or

Sell a put and call X_M, buy a put X_L, and buy a call X_H

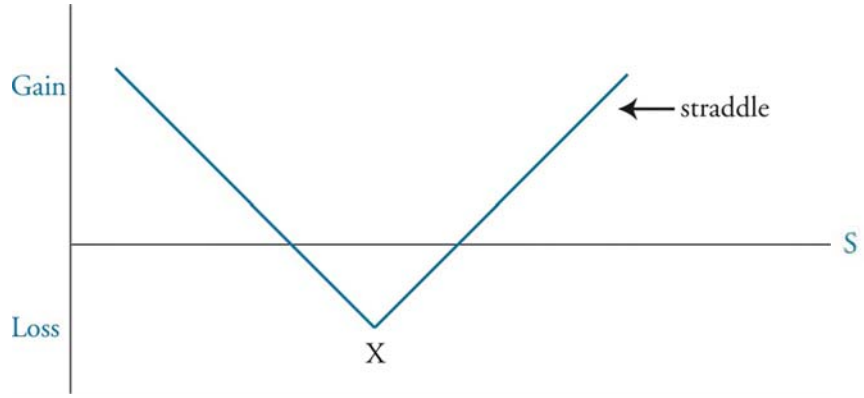
Figure 6: Butterfly Spread



Straddle

Buy a put and call with the same strike price to gain from increasing volatility. Requires paying two premiums. For a reverse straddle, sell both, receive the two premiums, and gain from decreasing volatility.

Figure 7: Straddle

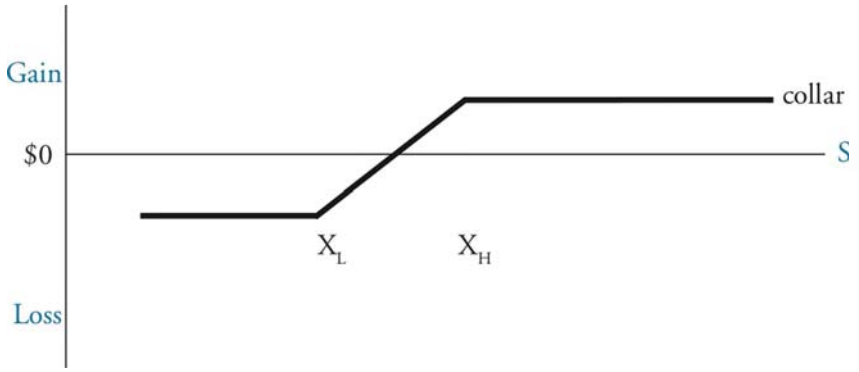


Collar

A collar is the combination of owning the underlying at S_0, buying a put X_L, and sell a call X_H.

The payoff pattern is identical to a bull spread, but the bull spread achieves the pattern using only options. If the premiums of the two are equal, it is called a *zero-cost collar*.

Figure 8: Payoff Graph for a Collar



Box Spread Strategy

The *box spread* is a combination of a bull spread and a bear spread on the same asset using only two strike prices. It can be created by:

Buy a call X_L and sell a call X_H, plus

Buy a put X_H and sell a put X_L

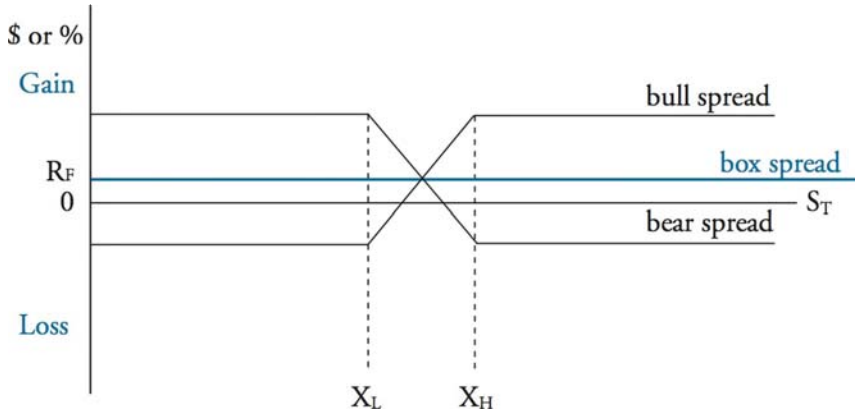
Or

Sell a put X_H and buy a put X_L, plus

Sell a call X_L and buy a call X_H

The initial and terminal cash flow will be known at initiation of the spread. Assuming option prices are fair, the difference in the initial and ending cash flow will reflect the periodic risk-free rate.

Figure 9: Payoff to the Box Spread



Interest Rate Options

Interest rate options are usually based on LIBOR. The call receives the difference in rates if the underlying rate is above the strike rate, and the put receives the difference if the underlying rate is below the strike rate. The interest rate will specify a time period (D), and the payoff on the option is normal D period after option expiration. This matches the "in arrears" convention used in floating rate securities. That rate at start of period determines payout at end of period.

$$\text{call payoff} = (NP)[\max(0, \text{LIBOR} - \text{strike rate})](D / 360)$$

$$\text{put payoff} = (NP)[\max(0, \text{strike rate} - \text{LIBOR})(D / 360)]$$

Buying an interest rate call protects against increasing rates and buying a put from decreasing rates.

Interest Rate Caps, Floors, and Collars

A cap is a series of interest rate calls. Each call is called a caplet. The issuer of a floating rate debt can protect against rising rates by buying a cap.

A floor is a series of interest rate puts. Each floor is called a floorlet. The owner of a floating rate debt can protect against falling rates by buying a floor.

The owner of the floating rate debt could also sell a cap at a higher strike rate (creating a collar) to reduce the initial premium cost from buying the floor, but the short cap will limit the benefits of increasing interest rates. If the premiums are equal, it is a zero-cost collar.

Delta Hedging

Delta hedges are created by taking offsetting positions in the underlying and in an option on the underlying. Instantaneous change in value of one is offset by instantaneous change in the other. The position is fully hedged and should earn the risk-free rate. A dealer who has sold call options is at risk if the underlying increases in value. Owning shares of the underlying stock will hedge the short call position. The number of shares to own are:

$$\#\text{ shares} = \Delta_{\text{option}} \times \#\text{ options}$$

True delta is an instantaneous change in the option for change in the underlying security. It is the $N(d_1)$ term from the Black-Scholes-Merton formula.

For a matched put and call pair, the sum of their absolute deltas is always 1.00.

Delta is approximately the change in the option price for a change in the price of the underlying:

$$\Delta_{\text{option}} = \frac{O_1 - O_0}{S_1 - S_0} = \frac{\Delta O}{\Delta S}$$

Gamma is the change in the value of delta given a change in the value of the underlying stock:

$$\text{gamma} = (\text{change in delta}) / (\text{change in S})$$

Gamma is high for at-the-money options approaching expiration. The higher the gamma, the more unstable the delta and the riskier the delta hedge.

Risk Management Applications of Swap Strategies

Cross-Reference to CFA Institute Assigned Reading #28

Swaps are another way to modify risk and return patterns. Being able to draw and use a swap diagram is the basic tool behind solving virtually all CFA swap questions. Swap diagrams are shown and used in our SchweserNotes™ and class slides. This section summarizes the conclusions.

Converting Debt Coupon Structure

To convert a floating rate debt liability to fixed, enter a receive floating and pay fixed swap.

To convert a fixed rate debt liability to floating, enter a receive fixed and pay floating swap.

Adjusting Duration and Swaps

Fixed rate assets and liabilities may have high absolute duration, while floating rate assets and liabilities have low absolute duration. Floating rate duration is generally approximated as ½ the reset period of the instrument. For zero coupon bonds, duration is term to maturity. For non-zero fixed coupon bonds, duration increases with maturity (all else is the same) but is less than maturity. One CFA swaps author likes to assume the fixed coupon bond's duration is 75% of its maturity; you can use that if nothing else is given.

An interest rate swap's cash flows can be replicated with a fixed and floating rate bond; therefore, the swap's duration is the difference between those bond's durations:

$$D_{\text{pay floating}} = D_{\text{fixed}} - D_{\text{floating}} = +D$$

$$D_{\text{pay fixed}} = D_{\text{floating}} - D_{\text{fixed}} = -D$$

In contrast to the low absolute duration and **market value risk** of floating rate instruments, their future cash flows are uncertain; they have high **cash flow risk.**

Generally, higher absolute duration indicates higher market value risk but lower cash flow risk.

Using Swaps to Change Duration

Each interest rate swap will have a duration. Based on that swap's duration, a notional amount of the swap can be calculated that will achieve a desired change in portfolio duration.

$$NP = (V_p)\left(\frac{MD_T - MD_p}{MD_{swap}}\right)$$

Currency Swaps

The standard currency swap requires exchange of notional principals (NPs) at initiation and termination of the swap. It is an ideal vehicle to synthetically convert debt in one currency to debt in another currency. For example, an ASD firm needs to borrow EUR 10M for five years, semiannual pay, but can obtain lower relative rates in ASD. The exchange rate is 1.50AS/EUR. The firm should borrow ASD 15M and enter a pay EUR receive ASD swap.

To initiate the swap, the firm delivers ASD 15M and receives EUR 10M notionals. Semiannually the firm makes EUR coupon and receives ASD coupon payments on the swap. The ASD payment receipts may be higher, lower, or the same as the ASD debt coupon payments. At swap termination, the ASD NP received back covers the principal payoff of the initial borrowing of ASD 15M.

A special currency swap with no exchange of NPs can be used to convert a constant stream of payments in one currency to another currency. While NPs are not exchanged, they are still necessary to determine the periodic payments. For example, suppose the ASD firm is net receiving ASD 100,000 each six months as a result of the previous swap:

- Enter a pay ASD receive EUR currency swap that does not require NP exchanges.
- Divide the ASD 100,000 by the swap's ASD interest rate to determine the associated ASD NP.
- Calculate the associated EUR NP using the spot currency exchange rate.
- Multiply this EUR NP by the swap's EUR interest rate to determine the periodic EUR receipt.

Equity Swaps

Diversifying concentrated risk: swap the return on a single security for a diversified index return.

Example:

A client owns GBP 50M of a single stock and swaps its periodic return for the return of the S&P 500 Index.

Result:

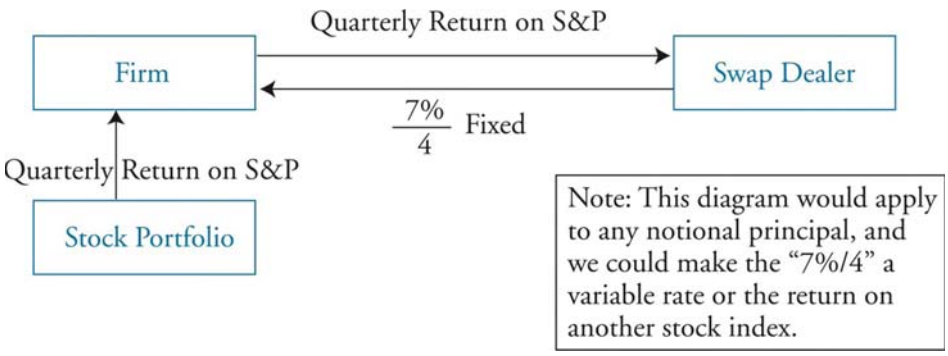
Concentrated security risk is reduced and international diversification is achieved.

Changing asset allocation: swap the return on one index for another index.

Example:

A client has $100M allocated 50/50 between LC U.S. stocks and bonds. The manager swaps the return on $10M S&P 500 Index plus $10M of a bond index for the return on $20M SC stocks.

Figure 10: Quarterly Cash Flows to an Equity Swap: Example



Interest Rate Swaptions

A swaption is an option to enter a prenegotiated swap. A payer swaption allows the swaption buyer to pay fixed versus receive floating and gains value if rates rise. A receiver swaption allows the swaption buyer to receive fixed versus pay floating and gains value if rates fall.

Example:

XY Corporation will in one year borrow $50M at a floating rate for five years. Fearing that rates may rise over the next year, it buys a one-year $50M European style payer swaption on a five-year 4% fixed rate swap for $500,000. In one year if the five-year swap rate is more than 4%, it will be advantageous to exercise the option.

One year later, swap rates increase to 6%. XY borrows the $50M at LIBOR and exercises the option to pay 4% and receive LIBOR.

XY is net paying 4% but fears rates may increase or decrease substantially during the next six months. XY buys a 6-month, American-style receiver swaption on a 4.5 year, 3.7% swap for $250,000.

Over the next six months, if rates fall and swap rates are below 3.7%, exercise the swaption to receive 3.7% and pay LIBOR. If rates rise and swap fixed rates exceed 3.7%, allow the swaption to expire.

Figure 11: Swaption and Future Liability

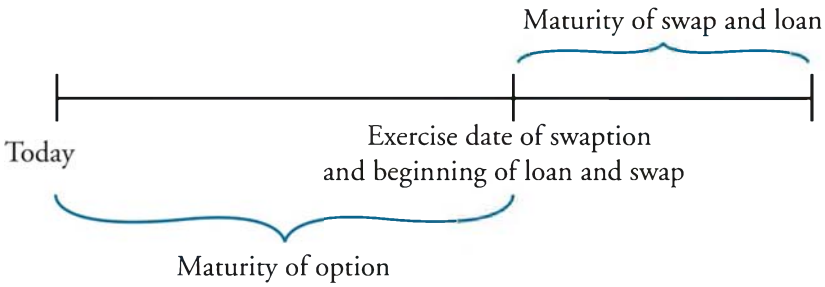
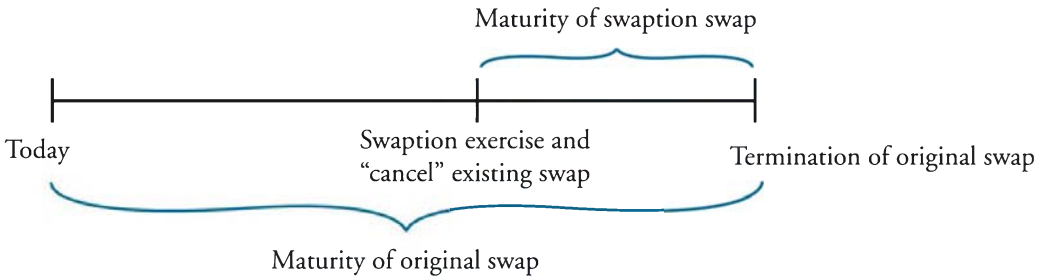


Figure 12: Swaption Cancels Swap



Trading, Monitoring, and Rebalancing

Study Session 16

Topic Weight on Exam	5%
SchweserNotes™ Reference	Book 5, Pages 1–54

One item set for 5% of the exam is the most likely scenario for this section. Know the calculations, concepts, and terminology.

Execution of Portfolio Decisions[1]

Cross-Reference to CFA Institute Assigned Reading #29

A **market order** is an order to immediately execute the trade at the best possible price. If the order cannot be completely filled in one trade which offers the best price, it is filled by other trades at the next best possible prices. The emphasis is *speed*. The disadvantage is **price uncertainty**.

A **limit order** is an order to trade at the limit price or better. If not filled on or before the specified date, limit orders expire. The emphasis is price. The disadvantage is **execution uncertainty**.

The Effective Spread

From a trader's perspective, the best bid price is referred to as the **inside bid** or **market bid**. The best ask price is referred to as the **inside ask** or **market ask**. The best bid price and the best ask price in the market constitute the **inside** or **market quote**. Subtracting the best bid price from the best ask price results in the **inside bid-ask spread** or **market bid-ask spread**. The average of the inside bid and ask is the **midquote**.

The **effective spread** compares the transacted price against the midquote of the market bid and ask prices. This difference is then doubled. More formally:

effective spread for a buy order = 2 × (execution price – midquote)
effective spread for a sell order = 2 × (midquote – execution price)

1. The terminology utilized in this section follows industry convention as presented in Reading 29 of the 2017 Level III CFA Curriculum.

Market Structures

Securities markets provide **liquidity, transparency,** and **assurity of completion.**

There are three types of securities markets:

1. Quote-driven markets: investors trade with dealers.

2. Order-driven markets: investors trade with each other without the use of intermediaries.

3. Brokered markets: investors use brokers to locate the counterparty to a trade.

A fourth market, a hybrid market, is a combination of the other three markets. Additionally, new trading venues have evolved, and the electronic processing of trades has become more common.

Quote-Driven Markets

In **quote-driven markets**, traders transact with dealers (a.k.a. *market makers*) who post buy and sell prices, so quote-driven markets are sometimes called **dealer markets**.

In an **order-driven market**, traders transact with other traders.

In an **auction market**, traders post their orders to compete against other orders for execution. An auction market can be periodic (a.k.a. batch) or continuous.

Automated auctions are also known as electronic limit-order markets.

In **brokered markets**, brokers act as traders' agents to find counterparties to their trades, and **hybrid markets** combine features of quote-driven, order-driven, and broker markets.

Market Quality

A **liquid** market has small bid-ask spreads, market depth, and resilience. Market *depth* allows larger orders to trade without largely affecting security prices. A market is *resilient* if asset prices stay close to their intrinsic values, and any deviations from intrinsic value are minimized quickly.

In a **transparent market**, investors can obtain both pre-trade information (regarding quotes and spreads) and post-trade information (regarding completed trades). If a

market does not have transparency, investors lose faith in the market and decrease their trading activities.

When markets have **assurity of completion**, investors can be confident that the counterparty will uphold their side of the trade agreement. To facilitate this, brokers and clearing bodies may provide guarantees to both sides of the trade.

Execution Costs

The **explicit costs** in a trade include commissions, taxes, stamp duties, and fees. **Implicit costs** include the bid-ask spread, market or price impact costs, opportunity costs, and delay costs (a.k.a. slippage costs).

Volume weighted average price (VWAP) compares the executed trade to the weighted average trade prices during a day of trading for that security.

Implementation shortfall (IS) is a conceptual approach that measures transaction costs as the difference in performance of a hypothetical portfolio in which the trade is fully executed with no cost and the performance of the actual portfolio.

IS can be reported in several ways. Total IS can be calculated as an amount (dollars or other currency). For a per share amount, this total amount is divided by the number of shares in the initial order. For a percentage or basis point (bp) result, the total amount is divided by the market value of the initial order. Total IS can also be subdivided into component costs, which will sum up to the total IS if additional reference prices are assumed.

Total IS is based on an initial trade decision and subsequent execution price. In some cases, a trade may not be completed in a manner defined as timely by the user, or the entire trade may not be completed. For all of the IS components to be computed, revisions to the initial price when the order was originated and/or a cancelation price for the order will be needed. Key terms include:

- *Decision price (DP)*: The market price of the security when the order is initiated. Often orders are initiated when the market is closed, and the previous trading day's closing price is used as the DP.
- *Execution price (EP)*: The price or prices at which the order is executed.
- *Revised benchmark price (BP*)*: This is the market price of the security if the order is not completed in a timely manner as defined by the user. A manager who requires rapid execution might define this as within an hour. If not otherwise stated, it is assumed to be within the trading day.
- *Cancelation price (CP)*: The market price of the security if the order is not fully executed and the remaining portion of the order is canceled.

The CFA material and questions do not use consistent terminology or formulas in this section. You are responsible for understanding and applying the concepts we are defining to any given set of facts and phrasing.

Basic Concepts of Calculation

IS calculations must be computed in amount and also interpreted:

- For a purchase:
  - An increase in price is a cost.
  - A decrease in price is an account benefit (a negative cost).
- For a sale:
  - An increase in price is an account benefit (a negative cost).
  - A decrease in price is a cost.

Total IS can be computed as the difference in the value of the hypothetical portfolio if the trade was fully executed at the DP (with no costs) and the value of the actual portfolio.

Missed trade (also called opportunity or unrealized profit/loss) is the difference in the initial DP and CP applied to the number of shares in the order not filled. It can generally be calculated as:

$$|CP - DP| \times \#\text{ of shares canceled}$$

Explicit costs (sometimes just referred to as commissions or fees) can be computed as:

$$\text{cost per share} \times \#\text{ of shares executed}$$

Delay (also called slippage) is the difference in the initial DP and revised benchmark price (BP*) if the order is not filled in a timely manner, applied to the number of shares in the order subsequently filled. It can generally be calculated as:

$$|BP^* - DP| \times \#\text{ of shares later executed}$$

Market impact (also called price impact or realized profit/loss) is the difference in EP (or EPs if there are multiple partial executions) and the initial DP (or BP* if there is delay) and the number of shares filled at the EP. It can generally be calculated as:

$$|EP - DP \text{ or } BP^*| \times \#\text{ of shares executed at that EP}$$

Decomposition of Implementation Shortfall (Example)

- On Wednesday, the stock price for Megabites closes at $20 a share.
- On Thursday morning before market open, the portfolio manager decides to buy Megabites and submits a limit order for 1,000 shares at $19.95. The price never falls to $19.95 during the day, so the order expires unfilled. The stock closes at $20.05.
- On Friday, the order is revised to a limit of $20.06. The order is partially filled that day as 800 shares are bought at $20.06. The commission is $18. The stock closes at $20.09 and the order for the remaining 200 shares is cancelled.

Calculate the **gain on the paper portfolio**, which is assumed to include all 1,000 shares purchased at the benchmark price. Its terminal value is based on the cancellation price (i.e., the closing price the day the order is cancelled).

- The investment made by the paper portfolio is 1,000 × $20.00 = $20,000.
- The terminal value of the paper portfolio is 1,000 × $20.09 = $20,090.
- The gain on the paper portfolio is $20,090 – $20,000 = $90.

Calculate the **gain on the real portfolio**. The investment made in the real portfolio considers the commission, the actual number of shares bought, and the actual execution price. Its terminal value is the actual number of shares times the cancellation price.

- The investment made by the real portfolio is (800 × $20.06) + $18 = $16,066.
- The terminal value of the real portfolio is 800 × $20.09 = $16,072.
- The gain on the real portfolio is $16,072 – $16,066 = $6.

The total implementation shortfall as a percent is the gain on the paper portfolio minus the gain on the real portfolio as a percentage of the paper portfolio investment:

$$\text{Implementation shortfall} = \frac{\text{paper portfolio gain} - \text{real portfolio gain}}{\text{paper portfolio investment}}$$

$$= \frac{\$90 - \$6}{\$20{,}000} = 0.0042 = 0.42\%$$

$$\text{Explicit costs} = \frac{\text{commission}}{\text{paper portfolio investment}} = \frac{\$18}{\$20{,}000} = 0.0009 = 0.09\%$$

$$\text{Delay} = \frac{\text{revised benchmark price} - \text{decision close}}{\text{decision price}} \times \frac{\text{shares purchased}}{\text{shares ordered}}$$

$$= \left(\frac{\$20.05 - \$20.00}{\$20.00}\right) \times \left(\frac{800}{1{,}000}\right) = 0.0020 = 0.20\%$$

$$\text{Price impact} = \frac{\text{execution price} - \text{revised benchmark price}}{\text{decision price}} \times \frac{\text{shares purchased}}{\text{shares ordered}}$$

$$= \left(\frac{\$20.06 - \$20.05}{\$20.00}\right) \times \left(\frac{800}{1{,}000}\right) = 0.0004 = 0.04\%$$

$$\text{Missed trade} = \frac{\text{cancellation price} - \text{decision price}}{\text{decision price}} \times \frac{\text{shares not purchased}}{\text{shares ordered}}$$

$$= \left(\frac{\$20.09 - \$20.00}{\$20.00}\right) \times \left(\frac{200}{1{,}000}\right) = 0.0009 = 0.09\%$$

The sum of the components equals the total implementation cost calculated previously:

total implementation cost = 0.42% = 0.09% + 0.04% + 0.20% + 0.09%

Advantages of VWAP:

- Easily understood.
- Simple to compute.
- Can be applied quickly to enhance trading decisions.
- Most appropriate for comparing small trades in nontrending markets.

Disadvantages of VWAP:

- Not informative for trades that dominate trading volume.
- Can be gamed by traders.
- Does not evaluate delayed or unfilled orders.
- Does not account for market movements or trade volume.

Advantages of implementation shortfall:

- Portfolio managers can see the cost of implementing their ideas.
- Demonstrates the tradeoff between quick execution and market impact.
- Decomposes and identifies costs.
- Can be used to minimize trading costs and maximize performance.
- Not subject to gaming.

Disadvantages of implementation shortfall:

- May be unfamiliar to traders.
- Requires considerable data and analysis.

Econometric models can be used to forecast transaction costs, because trading costs are nonlinearly related to:

- Security liquidity: trading volume, market cap, spread, price.
- Size of the trade relative to liquidity.
- Trading style: more aggressive trading results in higher costs.
- Momentum: trades that require liquidity.
- Risk.

Major Trader Types

Figure 1 contains a summary of the major trader types, including their motivations and order preferences:

Figure 1: Summary of Trader Types and Their Motivations and Preference

Trader Types	*Motivation*	*Time or Price Preference*	*Preferred Order Types*
Information-motivated	Time-sensitive information	Time	Market
Value-motivated	Security misvaluations	Price	Limit
Liquidity-motivated	Reallocation & liquidity	Time	Market
Passive	Reallocation & liquidity	Price	Limit

Trading Tactics

A summary of trading tactics is presented in Figure 2.

Figure 2: Summary of Trading Tactics

Trading Tactic	*Strengths*	*Weaknesses*	*Usual Trade Motivation*
Liquidity-at-any-cost	Quick, certain execution	High costs & leakage of information	Information
Costs-are-not-important	Quick, certain execution at market price	Loss of control of trade costs	Variety of motivations
Need-trustworthy-agent	Broker uses skill & time to obtain lower price	Higher commission & potential leakage of trade intention	Not information
Advertise-to-draw-liquidity	Market-determined price	Higher administrative costs and possible front running	Not information
Low-cost-whatever-the-liquidity	Low trading costs	Uncertain timing of trade & possibly trading into weakness	Passive and value

Algorithmic Trading

Algorithmic trading is a form of automated trading that accounts for about one-quarter of all trades. The **motivation for algorithmic trading** is to execute orders with minimal risk and costs.

Algorithmic trading strategies are classified into *logical participation, opportunistic, and specialized strategies*. There are two subtypes of logical participation strategies: simple logical participation strategies and implementation shortfall strategies.

Simple logical participation strategies (SLP) seek to trade with market flow so as to not become overly noticeable to the market and to minimize market impact.

In a VWAP SLP, the order is broken up over the course of a day so as to equal or outperform the day's VWAP.

In a time-weighted average price strategy (TWAP), trading is spread out evenly over the whole day so as to equal a TWAP benchmark.

Implementation shortfall strategies, or arrival price strategies, minimize trading costs as defined by the implementation shortfall measure or total execution costs. Both measures use a weighted average of opportunity costs and market impact costs.

The basis of simple participation strategies is to break up the trade into small pieces so that each trade is a small part of trading volume and market impact costs are minimized. In contrast, an implementation shortfall strategy focuses on trading early to minimize opportunity costs. An implementation shortfall strategy typically executes the order quickly, whereas a simple participation strategy breaks the trade into small pieces and trades throughout the day.

Monitoring and Rebalancing

Cross-Reference to CFA Institute Assigned Reading #30

The manager must regularly monitor the client's circumstances and determine, for example, when to start shifting out of equities and real estate and into bonds and other less risky assets. Remember that changes to any one of the investor's objectives or constraints can potentially affect the others.

Common factors that can lead to changes to the portfolio allocation include the following:

- Change in wealth.
- Changing time horizons.
- Changing liquidity requirements.
- Tax treatment.
- Laws and regulations.
- New asset alternatives.
- Changes in asset class risks.
- Bull versus bear markets.
- The stock market and central bank policy.
- Changes in inflation.
- Changes in asset class expected returns.

Rebalancing

Calendar rebalancing. The primary benefit to calendar rebalancing is that it provides discipline without the requirement for constant monitoring. The *drawback* is that the portfolio could stray considerably between rebalancing dates.

Percentage-of-portfolio rebalancing (PPR) is also referred to as *percent range rebalancing or interval rebalancing*. By not waiting for specified rebalancing dates, PPR provides the benefit of minimizing the degree to which asset classes can violate their allocation corridors. The primary *cost* to PPR is associated with the need to constantly monitor the portfolio.

Optimal Corridor Width

As an asset class (AC) or the other portfolio ACs change in value, the percent allocation will shift. If it moves outside the corridor width, the AC must be rebalanced (which will require rebalancing other ACs as well).

To minimize risk and costs, the corridor should be wider for:

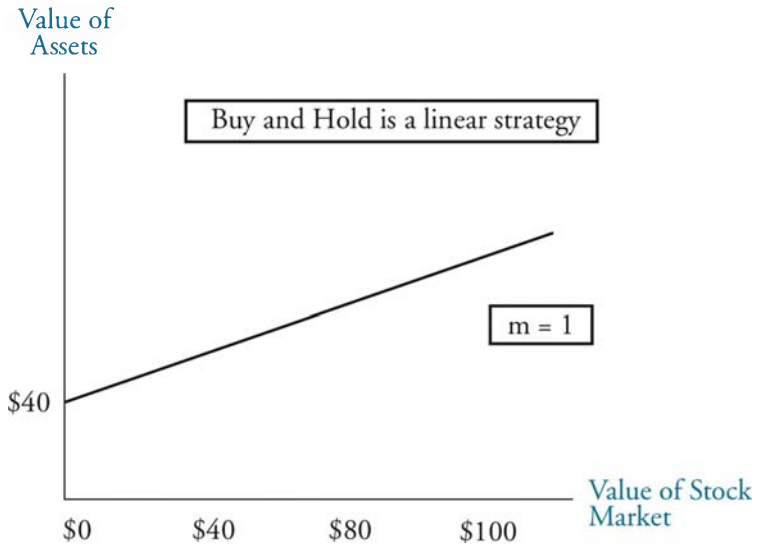
- ACs with higher transaction costs.
- ACs with higher positive correlation to other ACs.
- Clients with higher risk tolerance.

The corridor should be narrower when either the AC or other ACs are more volatile.

Dynamic Rebalancing Strategies

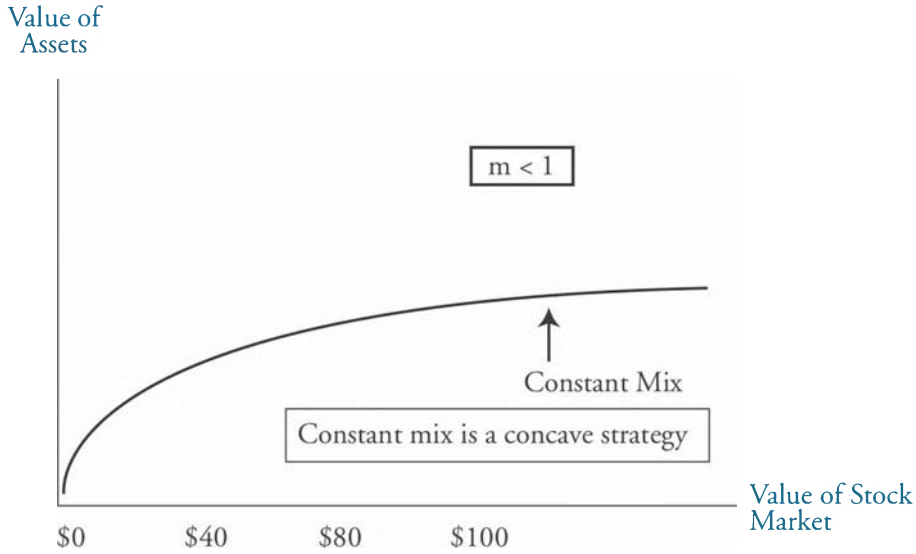
The **buy-and-hold strategy** is linear as is illustrated in Figure 3.

Figure 3: Buy-and-Hold Strategy



The **constant-mix strategy** payoff is illustrated in Figure 4.

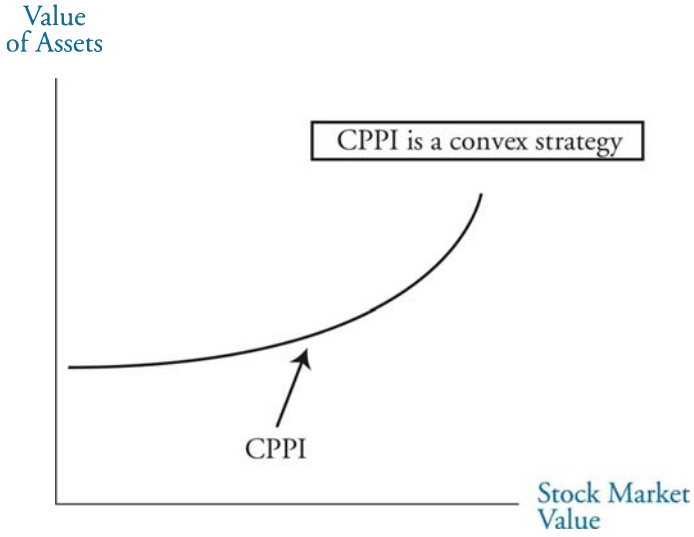
Figure 4: Constant-Mix Strategy



Constant-proportion strategies, also known as constant-proportion portfolio insurance (CPPI) strategies, are convex strategies as shown in Figure 5. The equation used to create the desired dollar amount of stock is the following:

$$\$ \text{ in stock} = m(TA - F); \quad m > 1$$

Figure 5: Constant-Proportion Portfolio Insurance



Rebalancing in Up and Down Markets

When comparing dynamic strategies for asset allocation, keep the following points in mind:

- The buy-and-hold investor travels up and down a single straight line in the payoff diagram. The constant-mix investor rebalances by changing the number of shares of stock held. Therefore, the slope of the payoff line changes. The slope of the line increases at an increasing rate with CPPI.
- Constant-mix buys stocks as they fall and sells stocks as they rise (*concave strategy*). CPPI sells stocks as they fall and buys stocks as they rise (*convex strategy*).
- A constant-mix strategy will outperform buy-and-hold and CPPI strategies in a *flat* but *oscillating* market (e.g., up-down oscillation). CPPI does poorly in a flat, oscillating market. In a flat, oscillating market, CPPI sells on weakness only to have the market rebound. Alternatively, it buys on strength only to see the market falter.
- A constant-mix strategy will *underperform* comparable buy-and-hold and CPPI strategies when there are *no reversals* (e.g., down-down oscillation). CPPI will do at least as well as the floor (i.e., the strategy is protected on the downside). CPPI outperforms the other strategies in a trending market (bull or bear).
- Cases in which the market ends up near its starting point are likely to favor constant-mix strategies, while those in which the market ends up far from its starting point are likely to favor CPPI.

Figure 6 summarizes the **risk and return** consequences of the strategies in up, down, and flat markets:

Figure 6: Impact of Strategies on Risk and Return

	Buy-and-Hold	*Constant-Mix*	*CPPI*
Return	Outperforms a constant-mix strategy in a trending market; outperforms CPPI in a *flat* but *oscillating* market.	Outperforms a comparable buy-and-hold strategy; outperforms a CPPI strategy in a *flat* but *oscillating* market.	Outperforms a comparable buy-and-hold strategy; outperforms a constant-mix strategy in trending markets.
Risk	Passively assumes risk tolerance is directly related to wealth.	Absolute risk tolerance increases/ decreases with wealth. Relative risk tolerance is constant.	Actively assumes risk tolerance is directly related to wealth.

Convex and Concave Strategies

- Any procedure that buys when stocks rise or sells when stocks fall (e.g., CPPI) is a convex strategy. The more investors follow convex strategies, the more volatile the markets will become.
- Any procedure that buys when stocks fall or sells when stocks rise (e.g., constant-mix) is a concave strategy. If more investors follow concave strategies, the markets will become too stable (i.e., excessive buyers in down markets and excessive sellers in up markets).
- Convex and concave strategies are mirror images. If there is more demand for one strategy, it will be more costly. The more popular strategy will subsidize the other.

Performance Evaluation

Study Session 17

Topic Weight on Exam	5%
SchweserNotes™ Reference	Book 5, Pages 55–114

One item set for 5% of the exam is the most likely scenario for this section. Know the calculations, concepts, and terminology.

Evaluating Portfolio Performance

Cross-Reference to CFA Institute Assigned Reading #31

The three components of performance evaluation include performance measurement, performance attribution, and performance appraisal.

Return Calculations With External Cash Flows

If there is an external cash flow at the *beginning* of the evaluation period:

$$r_t = \frac{MV_1 - (MV_0 + CF)}{MV_0 + CF}$$

When the cash flow is at the *end* of the evaluation period:

$$r_t = \frac{(MV_1 - CF) - MV_0}{MV_0}$$

A portfolio return can be broken up into three components: *market, style,* and *active management*.

$$P = M + S + A$$

The manager's *active management decisions* (A) are assumed to generate the difference between the portfolio and benchmark returns (P – B):

$$P = B + A$$

Introducing the market index (M):

$$P = M + (B - M) + A$$

The manager's *investment style* is assumed to generate the difference between the benchmark return and the market index (B – M):

$$P = M + S + A$$

Properties of a Valid Benchmark

1. Specified in advance.
2. Appropriate.
3. Measurable.
4. Unambiguous.
5. Reflective of current investment opinions.
6. Accountable.
7. Investable.

There are seven primary types of benchmarks in use:

1. Absolute.
2. Manager universes.
3. Broad market indices.
4. Style indices.
5. Factor-model-based.
6. Returns-based.
7. Custom security-based.

The construction of a **custom security-based benchmark** entails the following steps:

1. Identify the manager's investment process, asset selection (including cash), and weighting.
2. Use the same assets and weighting for the benchmark.
3. Assess and rebalance the benchmark on a predetermined schedule.

Tests of Benchmark Quality

- Minimal systematic bias in the benchmark relative to the account.
- A manager's active decision making (A) should be *uncorrelated* with the manager's investment style (S), and the difference between portfolio returns and the market should be positively correlated with the manager's style.
- Tracking error is relatively small.
- An account's systematic risk should be similar to the benchmark's.
- The higher the coverage ratio, the more closely the manager is replicating the benchmark.
- Passively managed portfolios should utilize benchmarks with low turnover.
- For actively managed long-only accounts, you would expect the manager to hold primarily **positive active positions**. If not, an inappropriate benchmark has been selected or constructed.

Macro performance attribution is done at the fund sponsor level. The approach can be carried out in percentage terms and/or monetary terms. **Micro performance attribution** is done at the investment manager level.

There are three main inputs into the **macro attribution** approach:

1. Policy allocations.
2. Benchmark portfolio returns.
3. Fund returns, valuations, and external cash flows.

Macro Attribution Analysis

There are six levels of investment policy decision making, by which the fund's performance can be analyzed:

1. Net contributions.
2. Risk-free asset.
3. Asset categories.
4. Benchmarks.
5. Investment managers.
6. Allocation effects.

Starting at **net contributions**, management determines how much of the fund's assets to allocate to each level and will place assets in the next highest level only if that allocation will produce sufficient incremental return.

At the **asset categories** level, the fund is allocated to different asset category benchmarks. This is a pure benchmarking or benchmark replication strategy.

At the **benchmark level**, fund assets are still passively managed, but they are assumed to be invested in style portfolio *manager benchmarks* according to policy weights.

At the **investment managers** level, funds are allocated according to policy as if invested directly in the managers' portfolios.

Micro Performance Attribution (a.k.a. Allocation/Selection Attribution)

$$R_V = \underbrace{\sum_{j=1}^{S}\left(w_{P,j} - w_{B,j}\right)\left(R_{B,j} - R_B\right)}_{\text{pure sector allocation}} + \underbrace{\sum_{j=1}^{S}\left(w_{P,j} - w_{B,j}\right)\left(R_{P,j} - R_{B,j}\right)}_{\text{allocation/selection interaction}} + \underbrace{\sum_{j=1}^{S} w_{B,j}\left(R_{P,j} - R_{B,j}\right)}_{\text{within-sector selection}}$$

R_V = the value-added return

The **pure sector allocation** return measures the impact on performance attributed only to the *sector weighting* decisions by the manager. It assumes that the manager holds the same securities in each sector as in the benchmark but over or under weights the sector.

The **within-sector selection** return assumes the manager weights each sector in the portfolio in the same proportion as in the overall benchmark, and excess returns are due to security selection.

The **allocation/selection** return involves the joint effect of assigning weights to both sectors and individual securities.

Fundamental Factor Model Micro Attribution

It should be possible to construct multifactor models to conduct micro attribution. This involves combining economic sector factors with other fundamental factors (e.g., a company's size, its growth characteristics, its financial strength). Constructing a suitable factor model would involve the following:

- Identify the fundamental factors that will generate systematic returns.
- The exposures of the portfolio and the benchmark to the fundamental factors of the model must be determined at the start of the evaluation period.
- A benchmark needs to be specified. This could be the risk exposures of a style or custom index, or it could be a set of *normal* factor exposures that are typical of the manager's portfolio.
- Determine the performance of each of the factors.

The strengths and limitations of the allocation/selection and fundamental factor model attributions are summarized in Figure 1.

Figure 1: Strengths and Limitations of Allocation/Selection Attribution (Micro Attribution) and Fundamental Factor Model Attribution

	Allocation/Selection Attribution	*Fundamental Factor Model Attribution*
Strengths	Disaggregates performance effects of managers' decisions between sectors and securities. Relatively easy to calculate.	Identifies factors other than just security selection or sector allocation.
Limitations	The need to identify an appropriate benchmark with specified securities and weights at the start of the evaluation period. Security selection decisions will have a knock-on effect on sector weighting decisions. Can cause confusion as it reflects the joint effect of allocating weights to both securities and sectors (i.e., difficult to separate the two factors), so often not worth the time and effort.	Exposures to the factors need to be determined at the start of the evaluation period. Can prove to be quite complex, leading to potential spurious correlations.

Fixed-Income Portfolio Return Attribution

- Interest rate management effect. The ability of the manager to predict changes in relevant interest rates.
- Sector/quality effect. The ability of the manager to select and overweight (underweight) outperforming (underperforming) sectors and qualities.
- Security selection effect. The ability of the manager to select superior securities to represent sectors.
- Trading activity. The residual effect. Assumed to measure the return to active trading (buying and selling) over the period.

Risk-Adjusted Performance Measures

Ex post alpha uses the security market line (SML) as a benchmark to appraise performance.

$$\alpha_p = R_p - [R_F + \beta_p(R_m - R_F)]$$

- A portfolio that generates a *positive alpha* would plot *above* the SML.
- A portfolio that generates a *zero alpha* would plot *on* the SML.
- A portfolio that generates a *negative alpha* would plot *below* the SML.

Similar to alpha, the **Treynor measure** compares an account's excess returns to its systematic risk, using beta.

$$T_P = \frac{\bar{R}_P - \bar{R}_F}{\beta_P}$$

The **Sharpe ratio** calculates excess returns above the risk-free rate, relative to **total** risk measured by standard deviation.

$$S_P = \frac{\bar{R}_P - \bar{R}_F}{\sigma_P}$$

Using the capital market line (CML), **the M^2 measure** compares the account's return to the market return.

$$M_P^2 = \bar{R}_F + \left(\frac{\bar{R}_P - \bar{R}_F}{\sigma_P} \right) \sigma_M$$

Quality Control Charts

To construct a chart, three important assumptions are made about the distribution of the manager's value-added returns:

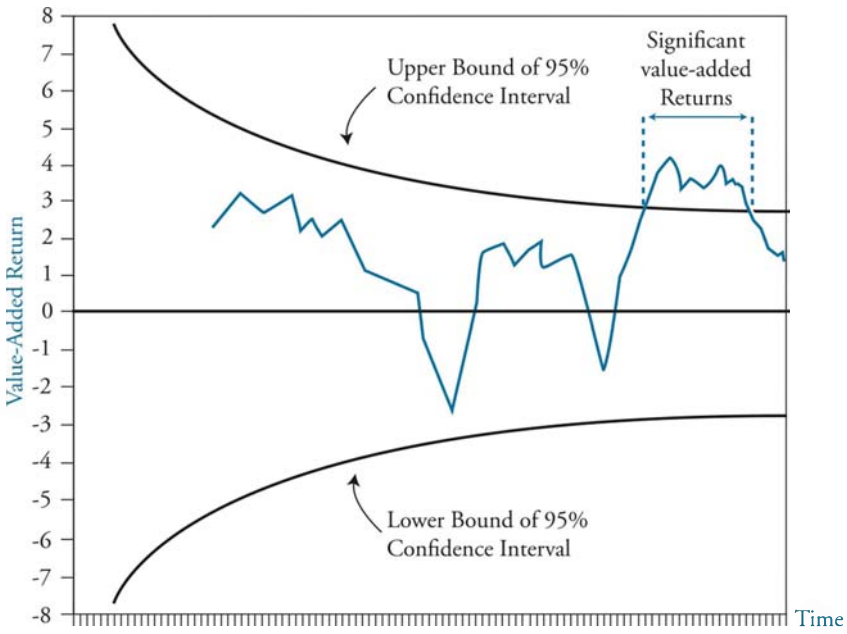
1. The null hypothesis: the expected value-added return is zero.

2. Value-added returns are independent and normally distributed.

3. More or less constant variability of the value-added returns.

Figure 2 shows an example of a quality control chart.

Figure 2: Example Quality Control Chart



Manager Continuation Policies

Guidelines associated with the management review process:

- Replace managers only when justified.
- Develop formal policies and apply them consistently to all managers.
- Use portfolio performance and other information in evaluating managers.
  - Appropriate and consistent investment strategies.
  - Relevant benchmark (style) selections.
  - Personnel turnover.
  - Growth of the account.

Type I Errors and Type II Errors

H_0: The manager adds no value.
H_A: The manager adds positive value.

Type I error – Rejecting the null hypothesis when it is true. (Keeping managers who are not adding value.)

Type II error – Failing to reject the null when it is false. (Firing good managers who are adding value.)

Global Investment Performance Standards

Study Session 18

Topic Weight on Exam	0–5%
SchweserNotes™ Reference	Book 5, Pages 115–190

One item set for 5% of the exam is the most likely scenario for this section, if tested. Typical questions require you know the basic issues of GIPS and recognize compliance or non-compliance in a *current* GIPS report. The assigned reading includes extensive details related to the historical evolution and changes in requirements over time. *We recommend and this review focuses on the current issues for GIPS.* Notice that the reading title is "overview." The CFA reading does not discuss and we will not cover everything you can think of to ask.

GIPS is principle driven and applies to investment firms, not individuals. GIPS is voluntary, not mandatory, though it is strongly encouraged. If adopted, it is up to each firm to determine how to apply GIPS to its situation. GIPS is consistent with the requirements found in the Code and Standards (C&S), but if adopted, GIPS will require policies and procedures beyond the basic C&S.

Overview of the Global Investment Performance Standards

Cross-Reference to CFA Institute Assigned Reading #32

Compliance Issues:

- Compliance must be investment firmwide. However, the firm has wide latitude to define itself. The firm must be a recognizable business entity.
- The fair market value of firm assets must be disclosed and include both discretionary and non-discretionary assets of fee paying and any non-fee paying accounts.
  - Only discretionary assets are included in performance results. The firm must disclose what makes an account non-discretionary (and the determination must be related to issues that prevent implementing the intended investment strategy).
- You cannot claim partial compliance with GIPS. Note that you can say "calculated in accordance with GIPS" but only to present a single client's results to that client.

Input Data Requirements

- All data must be captured and documented based on fair value, using trade date accounting, and including accrued income for fixed-income securities.
- If market value of a security does not exist, the preferred fair value approach sequence is to use:
  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, Div. Yield).
  4. Subjective, unobservable inputs (e.g., discounted cash flow).
- Basic GIPS requires valuing portfolios at least monthly and on the date of all large external cash flows (ECFs); see the following calculation methods. Large is anything big enough to materially distort the computation of account or composite return.

Calculation Methods

- Sub-period returns are geometrically linked to calculate time-weighted return that is reported by year.
  - However, if the manager controls the timing of ECFs, money-weighted (IRR) return calculations must be used.
- The returns must include the impact of manager decisions to hold cash equivalents, even if a third party manages the cash.
- Returns can be reported gross or net of investment management fees. Gross means after direct trading expenses but before any other fees. Net means after direct trading and investment management fees.
  - A bundled fee combines these two and/or any other fees. If it is not possible to separate the direct trading and investment management fee from each other and from any other fees to meet the intent of this requirement, remove the entire bundled fee and fully disclose what was done and what is in the bundled fee.

Composite Construction

- GIPS reporting is done by composite, which is a group of accounts with comparable investment objectives.
  - Composite return can be weighted by beginning value (BV) or beginning value plus weighted ECFs. For example if BV is 100 and 10 is contributed day 5 of a 31 day month, account value for weighting can be 100 or $100 + (10 \times (31 - 5)/31)$.
- "All actual fee-paying discretionary accounts must be included in at least one composite"
  - Model and hypothetical results must be excluded, but can be given as supplemental information.

- Non-fee paying accounts can be included if this is disclosed and done consistently.
- Non-discretionary accounts must be excluded for any month that was partially or fully non-discretionary by either excluding the entire account or the account portion that is non-discretionary.
- With disclosure, accounts below a relevant (to the investment strategy) minimum size can be excluded from the composite.
- 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.
  - That account has its own cash balance.
  - Managed by that composite's manager(s).

Required Disclosures

The following must appear in the report:

1. **The appropriate GIPS compliance statement, either:**

   For firms that are verified:

   [Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has been independently verified for the periods [insert dates]. 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.

   For composites of a verified firm that have also had a performance examination:

   [Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has been independently verified for the periods [insert dates]. 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 [insert name of composite] composite has been examined for the periods [insert dates]. The verification and performance examination reports are available upon request.

For firms that have not been verified:

[Insert name of firm] claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. [Insert name of firm] has not been independently verified.

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 six 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).**
   - **If standard deviation is not relevant, explain and present a dispersion measure that is relevant.**

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.**

The following disclosures are required but only if relevant. Simple omission of these items cannot be taken as evidence of non-compliance:

- If presenting gross of fees, any fees deducted in addition to direct trading expenses.
- 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.

- 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 that the client can understand the nature of the risks).
- All significant events that would help prospective clients interpret the presentation.
- Periods prior to 2000 that include non-compliant data that are included in the presentation.
- Date, description of, and reason for redefining the firm.
- Date, description of, and reason for redefining a composite.
- Any changes to the name of the composite.
- Minimum account asset level for inclusion in the composite and any changes to that level.
- 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).
- Any known material differences in exchange rates *and valuation sources* among portfolios in the composite or between the composite and the benchmark.
- If the presentation conforms to local laws or regulations that conflict with GIPS and the manner of the conflict.
- Any periods prior to 2010 of carve-out accounting done by internal computations rather than by setting up separately managed subaccounts.
- If the composite contains portfolios with bundled fees, the types of fees included in the bundled fees.
- Any use of sub-advisors selected by the firm and the periods of usage.
- Any periods prior to 2010 using other than month-end valuation.
- Starting January 1, 2011, report any material use of subjective, unobservable portfolio valuation inputs.
- If composite valuation hierarchy differs materially from the recommended fair valuation hierarchy.
- If the firm has a significant ECF policy for the composite, how the firm defines *significant.*
- If the firm determines no appropriate benchmark exists, explain why.
- If the benchmark changed: date of, description of, and reasons why the benchmark changed.
- If a custom benchmark or a combination of benchmarks is used: the benchmark components, weights, and rebalancing process.
- Whether performance of a past firm or affiliation is linked and included.

Presentation and Reporting

- GIPS reporting is by annual return periods and composite. Returns of a relevant benchmark for the same periods must be included. The initial GIPS report for a composite must include at least five years unless that composite's strategy has existed for less than five years. Thereafter, add at least one year to the composite presentation record until at least a rolling 10-year history is included.
- For each year, disclose:
  - The number of accounts in the composite (if there are six or more).
  - The amount of assets in the composites and in the firm (or percentage of firm assets made up by this composite).
- Reporting is for the firm and the historical results cannot be changed (except to correct a reporting mistake). However, if one firm acquires another firm, that is now the acquirer's record and will be included in the historical record of the acquirer if:
  - Substantially all the decision makers continue to be employed.
  - The decision process remains independent and comparable.
  - The past record can be documented.

Real Estate (RE) and Private Equity (PE)

These securities are often illiquid, lack regular market pricing, and/or are offered through closed-end finite life funds where the manager controls the timing of admissions and withdrawals (ECFs). In those cases, there are special GIPS provisions that apply. The CFA text stresses this is a highly complex area and only the basic concepts are being introduced. Liquid marketable securities such as REITs, MBS, and evergreen funds (which allow admissions and withdrawals) remain under the regular provisions of GIPS.

Basic GIPS requires monthly valuation and measurement.

- RE valuation is quarterly and can be done internally by the firm.
  - At least every 12 months, the valuation must be done by a qualified external source. The external valuation can be as infrequent as every 36 months if the client agrees. In that case, the GIPS report must also disclose the percentage of composite assets valued externally each year.
- PE must be valued annually with return reported both gross and net of fees.

For closed-end funds, return must be computed and presented since inception of the fund using IRR (SI-IRR) and continued until the fund is liquidated. The ECFs used to calculate SI-IRR for RE must be at least quarterly and for PE they must be daily.

Closed-end fund composites (both RE and PE) must group accounts by comparable investment style *and by vintage year* (year of fund inception). Return

reporting must break down source of return between income (which is typically actual cash flow) and price change (which is generally based on estimated value prior to liquidation of the fund).

Wrap Fees/Separately Managed Accounts (WFSMA)

WFSMA rules are additional considerations that apply where:

- The client's account is managed by a *sub-advisor.*
- The *sponsor* manager effectively serves as an intermediary and handles all other portfolio management duties such as client communication, determining suitable strategy, and reporting to the client.
- The client pays the sponsor one fee and the sponsor pays the sub-advisor.
- Both the sponsor and sub-advisor comply with GIPS.

Be aware that the basic provisions of GIPS still apply to WFSMAs. The sponsor is responsible for determining the sub-advisor is qualified and for the sub-advisor's subsequent actions. Bundled fees are common in WFSMAs, so careful attention to bundled fee rules are required. WFSMA rules provide additional details and specify that:

- The sub-advisor can rely on the sponsor to calculate account performance and then use those calculations for the sub-advisor's composite reporting.
- Composites presented to prospective WFSMA clients should be for actual WFSMAs (not other types of accounts). (Any periods of non-compliance with this requirement must be disclosed.)
- The sub-advisor's composites are style specific, not sponsor specific. If the sub-advisor manages accounts for more than one sponsor, the WFSMA result of all the sponsors must be included in the sub-advisor's composite.
    - Additional sponsor-specific composites can be maintained but used only for presentations to and internal use by that sponsor. In this case, the entire bundled fee does not have to be deducted as long as the report is clearly labeled as such. The intent is that such a report is only for internal use by the sponsor and not for subsequent marketing to clients. (Basic GIPS provisions still require that GIPS reports to clients reflect the bundled fee.)

GIPS Advertising Guidelines

GIPS also allows firms to produce "slimmed down" material for advertising and marketing to prospective clients. The firm must be GIPS compliant, and this is supplementary, not required, material. If done, the advertising 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.

GIPS Verification

While not required, firms are encouraged to have their GIPS process reviewed by a qualified independent third party.

- The verifier will issue an opinion regarding whether the firm complies on a firm-wide 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 a 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.

After-Tax Reporting

This is supplemental and optional reporting. Firms that represent that they manage in a tax aware manner may want to produce after-tax return data to support this claim. This is not simply an aggregation of individual after-tax client results, but a representation of how the firm's management would have transferred to after-tax results. Starting with the pre-tax composite and benchmark returns in the GIPS report, the firm must clearly and fully disclose the assumed tax rates, rules, and assumptions used to convert these to after-tax return. There are two broad approaches to this process:

- Pre-liquidation would consider only realized taxes that would be due each period.
- 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 regarding tax rates, deferral, and any other relevant factors are pertinent and applicable to their specific tax situation.

Essential Exam Strategies

Introduction

By this time, you have studied the entire Level III curriculum and have a solid grasp of the exam content.

Level III is unique in three regards:

- The morning is constructed response questions and the afternoon is item set.
- The focus of the material is on portfolio management.
- Much of the material is softer and conceptual based; know the arguments for and against an idea.

Constructed response will include both shorter and longer essay questions. Some questions will direct you to answer in a template and others to use lined paper that is provided. These constructed response questions require you read the case facts, think of the relevant principles that were taught, and draw the expected conclusion. You will be scored on whether you answer the specific commands of the question. Clear, relevant bullet points that answer the question based on the facts are superior to long, rambling dissertations. Partial credit is normal so follow the processes that have been taught and show your work.

Ignoring the assigned minutes is ignoring the question instructions. In general, you should spend about half the allotted minutes reading the question and thinking about your answer. The other half of the time is for writing the answer. The assigned minutes are part of the question instructions.

The afternoon portion of your exam will be 10 selected response, item set. These will include a vignette with six 3-point selected response (multiple choice) questions, just like those at Level II. Never leave one of these unanswered. Always try to eliminate any incorrect choices and mark the best of the remaining answers.

The main difference between Level II and Level III is that most Level III questions require more thoughtful response and judgment. The Level III exam asks you to take your knowledge and apply it to given situations. Many candidates expect to "coast" through Level III after succeeding at Level II. While the Level III curriculum is generally less technically challenging than Level II from a content perspective, do not become complacent in your exam preparation!

The remainder of this discussion includes some proven approaches to exam study, how to spend the final 7 to 10 days of preparation, techniques to relax, and strategies to approach different styles of questions.

Getting Started

Over the past few months, you have studied a lot of material. The 6-volume CFA Institute Level III curriculum is extensive. The bad news is that remembering every detail in such a vast amount of material is impossible. The good news is that you don't have to remember every detail.

As you prepare for the CFA exam, try to focus on the exam itself. Don't add to your stress level by worrying about whether you'll pass or what might happen if you don't. There is ample stress from remembering the material—you certainly do not need to add to that stress level. Many of the tips I have included are proven stress reducers on exam day. Your grasp of the content combined with these tips should have you very well prepared for the exam.

The Big Picture

At Levels I and II, the topics were primarily stand-alone; you didn't have to understand one topic to answer questions on another topic. You could pass those exams by memorizing equations, relationships, and accounting entries. In other words, the material was tested much as it was presented in the curriculum.

At Level III, you must focus on the big picture. I hope you know by now that the same topics repeat throughout the curriculum. The biggest topic is the IPS. Other large recurring topics are use of derivatives to modify a portfolio, currency, ALM versus asset only management, manager or strategy selection, and ways to assess risk. Even smaller topics like Monte Carlo Simulation and VAR pop up multiple times.

It is more important to remember and understand the main points than try to reconcile minor discrepancies in what one author said versus another. Seeing the big picture is learning to think like a portfolio manager. It is much better to understand the main points made repeatedly and spread your study across all the material rather than try to ace a few sections. It may sound strange, but I believe the exam process is fair. It rewards candidates who focus on the main points that were emphasized and penalizes candidates who focus on memorizing minutia.

Calculations

Calculations and formulas are unavoidable. But candidates who are successful regularly say that most formulas are just logic and following why you do it makes things easier. Rather than focusing on memorizing formulas, focus on practice questions and you will become proficient. Then, when you find the rare formula that is used more than once and just does not seem logical, go ahead and memorize it. It should go without saying that in multiple choice all that matters is making the right selection. But when a calculation is asked in constructed response, showing the work is part of earning full credit.

Know Your Strengths

Everyone has his or her own style of learning. Some people can sit down and study for hours at a time. Some people do better learning small pieces of the curriculum each day. Be aware of your study habits, and do not place unrealistic burdens on yourself. Do not skip a topic because you think you already know it. You are graded based on the CFA answer, which is not always the same as how you may apply it in a particular job. But in the end, most learning comes down to repetition and time. Take the time to learn the material that is presented. Work practice questions to verify you understand what the material means and how it is used.

CFA Exam Policies and Procedures

Prior to exam day, be sure to visit the CFA Institute Web site and thoroughly read the information listed under CFA Exams. I have reproduced some of that material in the following, but you can go to *www.cfainstitute.org* and click on *CFA Program* and then *About the Exam* for the complete list and text. As Level III candidates, you are expected to follow all instructions and policies related to the Program and the Exam, including the CFA Code and Standards.

Exam Day Experience[1]

Timing of the Exams

Instructions begin prior to the start of the exam. Testing personnel will keep the official time and will tell you when to start and stop work on each separately timed session. You will be informed of the time remaining at specific intervals.

1. http://www.cfainstitute.org/programs/cfaprogram/exams/Pages/cfa_exam_day_experience.aspx

You must not open the exam or begin work before instructed to do so by the testing personnel. At the end of the exam, you must immediately put pens and pencils down when instructed to do so.

A verbal announcement will be made to all candidates when 30 minutes remain in each timed session. A final reminder will be announced when 15 minutes remain.

A standard exam day follows this format (exact times may vary):

8:00 a.m. Candidates arrive for morning session and begin the check-in process.

8:30 a.m. Doors close and announcements start.

Once doors close, candidates will not be allowed to enter the testing room until the timed portion of the exams has started.

9:00 a.m. Morning session begins. Passports and calculators will be checked again.

11:30 a.m. Candidates are not permitted to leave the exam.

12:00 p.m. Morning session ends.

Lunch break

1:00 p.m. Candidates arrive for afternoon session and begin the check-in process.

1:30 p.m. Doors close and announcements start.

Once doors close, candidates will not be allowed to enter the testing room until the timed portion of the exams has started.

2:00 p.m. Afternoon session begins. Passports and calculators will be checked again.

4:30 p.m. Candidates are not permitted to leave the exam.

5:00 p.m. Afternoon session ends.

At the conclusion of each session, candidates must remain seated until all exam materials are collected and reconciled. This may require candidates to remain seated for an additional 10–20 minutes.

In testing rooms where there are no clocks, the timekeeper will mark time remaining on a chalkboard or flipchart in the following increments:

- Less than 2.5 hours remain.
- Less than 2 hours remain.

- Less than 1.5 hours remain.
- Less than 60 minutes remain.
- Less than 45 minutes remain.
- Less than 30 minutes remain (verbal announcement).
- Less than 15 minutes remain (verbal announcement).

About the Level III Item Sets[2]

The morning session of the exam is constructed response questions and the afternoon is 10, six-question vignettes. Each of the six questions in each vignette is multiple choice. Each vignette is typically based on 1–2½ pages of information. In other words, the afternoon session is structured like the Level II exam was structured.

The six items in each item set can only be answered based on the information in the vignette. You will need to read the vignette before answering the items, and you will need to refer back to the vignette for information. The six items can generally be answered independently of each other, but they do require information in the vignette.

The Level II exam had a total of 120 items (20 vignettes with six items each) compared to 240 multiple-choice items on the Level I exam. The exam formats (including the essays at Level III) adapt to the changing topic focus and learning focus at each level. The topic focus on Level I is on investment tools, the topic focus on Level II is on asset valuation, and the topic focus on Level III is on portfolio management. The learning focus also changes, from knowledge and comprehension (Level I), to application and analysis (Level II), to synthesis and evaluation (Level III).

The Level II and III exams are graded for 360 points, corresponding to the number of minutes on the exam. The 120 Level II items are equally weighted, 3 points each, with no penalty for guessing. At Level III, the morning essay exam is 180 points, and the afternoon item set exam is 180 points.

Just like for Level I multiple choice questions, remember:

- *Think before you answer*. A hasty answer probably gets you an invitation to take the test again next year.
- *You may mark up your exam book*. Circle or underline important information in the vignette and write down your equations or logic. However, only your final answers recorded on the answer sheets are graded.

2. http://www.cfainstitute.org/programs/cfaprogram/exams/Pages/index.aspx

- *Mark your answers on the answer sheet as you complete each question.* Some candidates mark their answers in the exam book and wait until the end of the exam to complete the answer sheet. *This is not an advisable strategy.*
- If you do not know the answer to a question:
  - You might be able to eliminate one or more choices based on what you know about the topic. There is no penalty for guessing.
  - Use reasoning and logic. The concepts that you know on one topic often apply to another topic.
- *Expect to encounter questions that you will not be able to answer correctly.* There is a great deal of material to master, and exam questions are challenging. Standard setters and the Board of Governors (at all three levels) take account of exam difficulty in setting Minimum Passing Scores.

About the Level III Essay Questions[3]

The Level III constructed response exam segment is given in the morning session and has a maximum score of 180 points. The essay exam typically has 10–15 questions, and each question generally has multiple parts. The point value for each question is provided in the exam.

On the essay section of the Level III exam, you'll see two types of questions:

- One requires that you write your answers on the lined page(s) following the question. For these questions, label each part of your answer clearly (A, B, C, or i, ii, iii, and so forth) and the same way the question was labeled.
- The other type asks you to provide your answers in a template following the question. Instructions in bold print immediately preceding the question direct you to the page number of each template.

You must follow the instructions given with each question. A single question may have parts that direct you to use a template and other parts that direct you to use the lined paper. You must use the paper provided.

Essay Exam Book Features[4]

Your exam book will contain three features to help ensure you answer all parts of each question in the appropriate place:

- Page one of the exam book lists all of the questions on the exam and the topic and minutes assigned for each question.
- The heading on the page where each question begins states the number of parts in that question and the total number of minutes/points. For example: "Question 2 has two parts (A, B) for a total of 18 minutes."

3. Ibid.
4. Ibid.

- Preceding each subpart that requires a template answer, you will find a statement with the page number of the template. For example: "Answer Question 2-B in the Template provided on page 12."

Make sure you familiarize yourself with the essay exam question formats so that you don't overlook any part of a question. Use the templates to enter your answers; otherwise, they will not be graded.

The following are some general tips for Level III candidates on the essay exam:

- The published guideline answers on past essay exams are more complete and better written than actual exam answers that receive full credit.
- The published guideline answers may not reflect all alternative approaches to the question that received full or partial credit.
- Answers are graded only on content. They are not graded for language and style.
- Use short phrases and bullet points to save time, but be sure your meaning is clear.
- Handwriting is rarely so poor that the answer cannot be graded.
- Points are awarded for direct answers to a question.
- No points are awarded for general knowledge that is not responsive to the question.
- Do not spend too little or too much time on any single question. Look at the minutes assigned to the question. Formulate a direct response to the command words, and use the amount of time allotted.
- You should expect to encounter questions that you will not be able to answer correctly. There is a great deal of material to master, and exam questions are challenging. Standard setters and the Board of Governors (at all three levels) take account of exam difficulty in setting Minimum Passing Scores.

The following are common reasons that graders give for poor candidate performance on the essay portion of the Level III exam:

- Not responsive to command word list (list, define, etc.).
- Answered a question they wish they had been asked instead of the question that was asked.
- No work shown on a calculation question, and the answer is incorrect.
- Hedged on questions that asked for a recommendation and justification (e.g., recommended A, but justified B).
- Neglected to answer part of the question (especially if a several-part question). Note that you can still answer part E, even if you do not know the answer to part D.
- Content area experts spent too much time on their area of expertise, leaving too little time for weak areas.
- Providing more items or responses than requested. If a question asks for three factors, only the first three that you list will be graded.

CFA Program Testing Policies[5]

To protect the integrity of the CFA Program and ensure the exam process is fair for all candidates, we enforce the following policies and procedures. *Failure to comply may result in suspension or termination from the CFA Program.*

It is your responsibility to read and understand all testing policies set forth by the CFA Program. Testing personnel will report to CFA Institute any violations of testing rules or policies that occur during the exam.

Admission Ticket Policy[6]

Before viewing your ticket, you will be prompted to read and agree to abide by the conditions, requirements, policies, and procedures for the CFA exam. It is your responsibility to print one copy of your admission ticket on clean, unused paper and bring it with you to the test center on exam day. You will not be admitted into the testing room without an admission ticket.

You must not write on the front or back of your admission ticket at any time before, during, or after the exam. Your ticket must display the correct exam date and test center according to our records. Your ticket will only allow you admittance to the test center listed.

The information on your admission ticket must match the information as it appears on your valid international travel passport. Submit an Identification Information Change Request if necessary. If the information does not match, you will not be permitted to sit for the exam and will forfeit your registration fee. Review the existing identification policy for more information.

Identification Policy[7]

Effective January 1, 2011, the CFA Program identification policy changed.

In order to *enroll in the CFA Program and to register to sit for the CFA exam*, you must have a valid international travel passport. The number on your passport and the country of issuance must be entered during online exam registration. On exam day, the name, date of birth, passport number, expiration date, and country of issuance on your passport must match the information you provided to CFA Institute.

5. http://www.cfainstitute.org/programs/cfaprogram/exams/Pages/policies.aspx
6. Ibid.
7. Ibid.

ID requirements are strictly enforced. *It is your responsibility to read and understand the instructions and requirements.* If you do not present appropriate ID, you will not be admitted to the test center, and you will forfeit your registration fee. Failure by proctors to detect an invalid passport does not imply the passport is valid or that your scores will ultimately be reported.

In order for your passport to be considered valid it must:

- Be an international travel document. Internal passports used as a national ID are not sufficient.
- Be current (not expired).
- Contain your name, date of birth, passport number, expiration date, and country of issuance exactly as you provided to CFA Institute.
- Include a recognizable photograph.
- Be an original document. Photocopies will not be accepted.

This policy sets forth one global standard, in the form of a single document that is both internationally obtainable and recognizable, that allows us to confirm the identity of our candidates and to ensure that all candidates receive identical treatment during the exam day admissions process.

Acceptable Name Variation

Name on Passport	*Name on Admission Ticket*	*Acceptable?*
Doe Maria Jane	Maria Jane Doe	Yes
Maria Jane Doe	Jane Maria Doe	Yes

Calculator Policy[8]

Only two calculator models are authorized for use during CFA Program exams:

- Texas Instruments BA II Plus (including BA II Plus Professional).
- Hewlett Packard 12C (including the HP 12C Platinum, 12C 25th anniversary edition, and 12C 30th anniversary edition).

Both authorized models are widely available through retail stores or online. Buy an approved calculator early so you can practice using it as you study.

Bring the approved calculator with you on exam day; calculators will not be available at the test center.

Please note that CFA Institute does not profit from the sales of these calculators. CFA Institute does not endorse, warrant, or guarantee the calculators or any other products or services provided by these distributors.

8. Ibid.

CFA Institute strictly enforces all policies with regard to calculator usage during the exams, and candidates are required to abide by the policies of CFA Institute.

Your calculator will be inspected prior to the start of the exam. Your calculator must remain on your desk in full view, and proctors will continue to inspect calculators throughout the administration of the exam. Possession or use of an unauthorized calculator at the test center will result in the voiding of your exam results and may lead to the suspension or termination of your candidacy in the CFA Program. Failure by the proctors to detect an unauthorized calculator prior to the start of the exam, or your use of an unauthorized calculator at any time during the exam, does not imply that the calculator is an approved model or that your scores will ultimately be reported.

Calculator covers, keystroke cards, and loose batteries are permitted in the testing room; instruction manuals are not. You may keep a small screwdriver with you if necessary to replace batteries in the BA II Plus. The best strategy is to install fresh batteries in your calculator the week before the exam.

Candidate Pledge Policy[9]

At the testing center, you will be required to sign a pledge affirming that you have not given or received assistance during the exam.

Sample Candidate Pledge (may vary on exam day)

As a candidate in the CFA Program, I am obligated to follow Standard VII(A) of the CFA Institute Standards of Professional Conduct, which states that members and candidates must not engage in any conduct that compromises the reputation or integrity of CFA Institute or the CFA designation or the integrity, validity, or security of the CFA exam.

- Prior to this exam, I have not given or received information regarding the content of this exam. During this exam, I will not give or receive any information regarding the content of this exam.
- After this exam, I will not disclose any portion of this exam, and I will not remove any exam materials from the testing room in original or copied form. I understand that all exam materials, including my answers, are the property of CFA Institute and will not be returned to me in any form.
- I will follow all rules of the CFA Program as stated on the CFA Institute Web site and the back cover of the exam book. My violation of any rules of the CFA Program will result in CFA Institute voiding my exam results and may lead to suspension or termination of my candidacy in the CFA Program.

9. Ibid.

Exam Materials Policy[10]

You must attend both sessions or you will not receive exam results. If you do not sit for the morning session, you will not be permitted to sit for the afternoon session.

Completed exams become the property of CFA Institute and will not be returned in either original or copied form. You must not remove any materials from the testing room. Legal action will be taken against any candidate who removes an exam book (either in part or in whole) from the testing room and/or reproduces it.

You must not open the exam or begin work before instructed to do so by the testing personnel. At the end of the exam, you must immediately put pens and pencils down when instructed to do so.

You must remain seated until all exam materials are collected and reconciled. Because of enhanced exam security, this process may require you to remain seated for additional time after the 12:00 p.m. and 5:00 p.m. end times.

Personal Belongings Policy[11]

You are strongly encouraged to leave your personal belongings at home or in your car. As a courtesy, your test center will have an area away from the testing room designated for personal belongings. If you must bring personal belongings to the test center, please ensure they are clearly identifiable as many items look the same, particularly mobile phones.

If proctors or security personnel find items that are not permitted in the testing room, you will be required to place them in the personal belongings area. You will not have access to these items during the exam, only during the lunch break and at the conclusion of the exam.

Please note that it is not the responsibility of the proctors or security personnel to ensure the safety of the materials in the personal belongings area. Neither CFA Institute nor the test center, testing personnel, or vendors will assume responsibility or liability for stolen, lost, or damaged personal property left in this area.

You must follow these guidelines at your test center. With your cooperation, candidates will be checked in promptly and seated on time.

10. Ibid.
11. Ibid.

The following items must be kept on your desk:

- Exam admission ticket.
- Valid government-issued photo identification.
- Approved calculator.
- Writing instruments (pencils for Levels I and II, pens and pencils for Level III).

The following items may be kept on your desk, if needed:

- Pencil sharpeners (no knives).
- Erasers, with no paper holder or cover.
- Loose calculator batteries (no packaging) and screwdriver for battery replacement.
- Calculator cases and keystroke cards.
- Eyeglasses, but not the eyeglasses case.
- Earplugs.
- Wristwatches (analog and digital); however, audible alarms and/or timers must be turned off.

The following items are permitted in the testing room but must remain in your pockets or under your chair when not in use:

- Wallet (money purse).
- Medicine, tissues, and other necessary medical or personal items.
- Gum, hard candy, cough drops.
- Eyeglasses case.

The following items are not permitted in the testing room:

- Food or drinks.
- Baggage of any kind, including transparent bags, backpacks, handbags, tote bags, briefcases, luggage, carrying cases, passport covers, or pencil cases.
- Study materials, including notes, papers, textbooks, or study guides.
- Scratch paper, present/future value tables, or calculator manuals.
- Highlighters, correction fluid, correction tape, or rulers.
- Knives of any type, including box cutter and X-ACTO® knives for use as pencil sharpeners.
- Mobile phones, MP3 players, cameras, pagers, headsets, computers, electronic organizers, personal data assistants, or any other remote communication or photographic devices.
- Any type of desk clock or timer.

Recording Exam Answers Policy[12]

Level I (multiple choice), Level II (item set), and the PM session of Level III (item set)

It is your responsibility to complete the answer sheet correctly to ensure all information is accurately recorded during grading and your results are correctly reported back to you.

Failure to follow proper instructions may affect how the scanning machine reads and records your information. Your score is determined solely by the marks read by the scanning equipment. Marks made by a writing instrument other than a No. 2 or an HB pencil, or marks that do not fill an oval completely, may not be read by the scanning equipment. Random marks and poor erasures may be read as your intended answer. Only the answers appropriately marked on your answer sheet will be graded.

Completing Your Essay Book: Level III AM Session Only

It is your responsibility to complete the essay book correctly to ensure all information is accurately recorded during grading and your results are correctly reported back to you. When completing your essay book:

- Use blue or black ink. In recent years, this requirement has been relaxed so check the CFA website for the most current requirement. Blue or black still makes sense because it is easier to read.
- Write your CANDIDATE NUMBER and SEAT NUMBER on the front cover of your exam book.
- Sign the candidate pledge inside the front cover. Do not remove the candidate pledge card.
- Essay answers must be written in English.
- Each essay question consists of one or more parts (A, B, C, etc.). Some parts will direct you to write your answer in a template. Instructions in bold print immediately preceding the question will direct you to the page number of each template. All other questions should be answered on the lined page(s) following the question. For these questions, label each part of your answer clearly (A, B, C, or i, ii, iii, etc.).
- If you use all of the designated lined pages, extra lined pages are provided at the back of the book. To use these pages, place a check mark in the box at the bottom of the last page designated for that answer and label the extra pages with the appropriate question number.
- Answers on question pages will not be graded. You may make marks and notes on the question pages.

12. Ibid.

Scratch Paper Policy[13]

You are permitted to do scratch work in the exam book on question pages, blank pages, or (for Level III AM session only) the extra pages in the back of the essay book. You are not permitted to remove any pages from the book, including blank pages. Do not use your admission ticket as scratch paper. It is a CFA Institute testing policy violation to write on the front or back of your ticket at any time.

Final Prep

You should have a definite strategy for the last week before the exam. If possible, it is best to take at least some of the week off from work. You should save at least one practice exam for this last week. To simulate the real thing, you should avoid looking through it until you are ready to sit down and take it for the first time. Take the exam early in the week, and time yourself. Use your results to determine where to focus your study efforts over the last few days. You should devote most of your time to areas where you performed poorly, but spend enough time on your stronger topics to keep them fresh in your mind—this is a definite confidence booster!

At some point in the week before the exam, it is a good idea to visit the actual exam center. Figure out how long it will take to get there on exam day and where you can park. Even if you are returning to the same site where you took the Level II exam, it is a good idea to be sure nothing has changed due to construction or a move to a different floor or room. It might even be helpful to locate a lunch destination in the area. The fewer surprises and distractions on exam day, the better. If the building has multiple entrances, try to find out where you will enter for the exam.

As a Level III candidate, you know by now to expect problems on exam day. They may not be major problems, but be prepared for things like cold/hot rooms, noise, lines to the restrooms, lines to enter the exam room, et cetera. There are likely to be distractions that you cannot control, but if you are emotionally prepared for them, they are less likely to affect your exam performance.

The evening before the exam, try to avoid studying. Try to relax and make a concerted effort to get a good night's sleep. Tired candidates make silly mistakes on the CFA exam. If you are not rested, you will more than likely miss easy points. This seems like an obvious and trite point, but it is difficult to overemphasize the importance of going into the exam well rested.

A final note: During the lunch break eat a healthy, light lunch and get some exercise. I found that a brisk 15-minute walk reinvigorated me for the afternoon. A

13. Ibid.

heavy lunch (or no lunch) coupled with lying down under a tree can lead to a lack of energy. Even though in recent years it has proven to be more straight-forward than the morning portion of the exam, the afternoon portion is still going to be a challenge. You will need a clear head to perform up to your capabilities.

Exam Day

Answering a Level III Selected Response Item Set Question (Multiple Choice)

Here are some tips to keep in mind as you work through selected response item set questions:

- You will have 18 minutes for each 6-question selected response item set, but answering the questions themselves should not take that long. You should read the vignette after first quickly reading the questions. The vignettes can be quite long, and knowing what the questions ask will help you focus on the relevant information.
- In some cases you will be given information that seems unrealistic. That's okay. Unless you are specifically asked to critique the information (e.g., a statement by a client), accept it as given and use it to answer the questions.
- Focus on the individual words in the question and watch for double negatives, like "All of the following are disadvantages except:" It is very important not to misread words by reading too quickly (e.g., reading "most likely" instead of "least likely"). There will be distracters aimed at this type of mistake.
- Be careful to answer the question as written. Sometimes a distracter looks good because it is consistent with information in the case, but it is actually irrelevant to the question you're answering.
- Try to restate the question in your own words (i.e., what you think the question is really asking). This can help you filter out extraneous information and focus quickly on appropriate answer choices.
- On calculation questions, don't mark an answer too quickly just because it agrees with your answer. Pause for a moment and think about whether the magnitude or sign of the answer seems logical. For example, in hedging a bond portfolio with futures, did you forget to use the total futures price? Did you forget to divide the dollar duration of the CTD by its conversion factor? Did you mark a positive answer when you are long the bonds and should short (negative sign) the futures? I can guarantee there will be distracters that incorporate these and other common mistakes.
- Make sure that you are marking your answer in the right place on the answer sheet. If you skip questions or do the questions out of order, be careful to check yourself.

- It is okay to change an answer, but only do so if you have a sound reason. When you come back to a question, you will most likely be tired and not thinking as clearly. You may even be biased by a later question that made you think differently.
- As for the format of the selected response item set questions, you should expect the unexpected. That sounds cliché, I admit, but it's quite appropriate for the CFA exam. Regardless of the format of the selected response questions, they can be attacked in the same manner as always.
- Finally, do not lose confidence. No one has ever received a perfect score on a CFA exam. Remember, the passing score is probably 65% to 70%. That means you can miss 30% to 35% and still pass. So even if you know you have struggled on a few questions (maybe even five or six in a row), do not lose confidence. The worst thing you can do is start second-guessing yourself—you will take longer to answer every question, and you might even start changing correct answers.

What to Do With a Difficult Item Set Question

No matter how hard you study, you will run into questions that give you trouble. You might not understand the question, you may think none of the answers makes sense, or you just might not know that concept. Here are some tips to follow if you find yourself facing a difficult question:

- If the question does not make sense or if none of the answers looks even remotely correct, reread the question to see if you missed something, like a double negative.
- Look at the other questions in the item set and see if they shed any light on the question. There might be a logical progression in the questions that will become apparent.
- Never leave an answer blank. A blank answer has a maximum point value of zero. A randomly marked answer has an expected value of $0.33 \times 3 = 1$ point, and if you eliminate at least one bad answer that value increases. You are not penalized for wrong answers!
- Also, take some comfort from the fact that the CFA exams are graded on somewhat of a curve. If the question gave you trouble, it is quite possible that other candidates had trouble with it as well.
- As I said earlier, do not lose confidence. There are 59 other item set questions.

Answering a Level III Essay Question

Here are some tips to keep in mind as you work through constructed response essay questions. You should consider these tips in tandem with the next section on how essay questions are graded—there is an obvious connection between how your exam will be graded and how you should approach your answers.

Answer the question that is asked, not the question you wanted. Sometimes candidates see a concept they know and build their answer around that concept, disregarding other important aspects of the question. You do not get points for demonstrating knowledge beyond the scope of the question! In fact, you might even irritate the grader, which is not a good idea.

Allocate points to various parts of the question. If a question asks you to list and describe three characteristics, and it is worth six points, then assume you will get one point each for naming the characteristic and one point each for a description. It should be obvious, but do not write a half page for a two-minute question. You are wasting your time and the grader's time.

If the question asks you to choose, select, recommend, et cetera, be sure that you do so. Many times candidates write a good answer, defending their choice, without ever explicitly stating the choice. The choice itself is usually worth a point or two, and if you do not explicitly state it, you will not get those points. On a template question, remember to circle a choice if you are asked to do so.

Show your calculations. Sometimes the question specifically asks you to do this, but you should always show your calculations on essay questions. If the grader sees that you set it up right but miscalculated, you will get partial credit. Also, if you had some pieces of a formula in the wrong place and some in the right place, you will get partial credit. If you only write down your final answer, you will get points only if that is the exact answer and the question did not specifically say to show your calculations.

Don't be afraid to repeat yourself in your answer. Candidates sometimes feel that their answer can't be right because they are just restating something they have already said in another part of the question, or possibly rewriting part of the question itself. Do not second-guess yourself just because you feel like your answer is redundant.

Do not worry about spelling or grammar. Try to write legibly, but do not take too much time to do so. Graders are used to seeing the handwriting of candidates under stress, and yours is probably no worse than most. If you cross out part of your answer and replace it with text somewhere else on the page, be sure to draw an arrow so the grader can follow what you did.

Never leave an essay answer blank. Clearly stating the relevant principles to apply or setting up a calculation you are unable to complete will earn partial credit. For example, on a 12-point question, an answer with anything resembling a relevant response could probably get three or four points. Give yourself a chance at these points.

Always follow the instructions for each question: address the specific commands in the question, adjust the length of your answer to the number of minutes assigned to the question, and write you answer where directed.

What to Do With a Difficult Essay Question

By taking a big-picture approach in preparing for the Level III exam, you should be able to write something relevant on just about any concept. If you hit a brick wall trying to answer an essay question, keep these tips in mind.

If the question itself is confusing, try and rephrase it in your own words. This may help you come up with a plausible answer. If you think you do not know the answer, think about the question in basic terms. For example, assume you are asked to describe an option straddle, and you skipped that material because you did not think it would appear on the exam. Do not be afraid to use common sense. An option straddle obviously combines multiple options on a single underlying asset. The name "straddle" suggests that you are buying or selling options with strike prices "straddling" the current price. In other words, work from what you do know and earn some partial credit.

This same logic applies to a template question, an essay question that asks you to make a choice or reach a conclusion. Make the choice, even if you have little or no supporting argument. You might get some points. A blank answer never gets any points.

Just like the item sets, you should not feel compelled to answer the essay questions in order. You will have about ten multi-part essay questions and you should feel free to skip around answering those that you can answer quickly and correctly. Important! Note that I said *quickly*. If you feel like you know a question really well, do not be lured into writing too much. Once you have answered the question asked, anything else you write is a waste of time and might even cost you points if you somehow contradict yourself. Once you have answered all the questions you feel you know well, then go back and try to earn as many points as possible on the ones you're unsure of.

How an Essay Answer is Graded

There is a thorough system of checks and balances in the grading process that assures that essay answers are graded as consistently and as fairly as possible. Exams that are near the passing mark are audited to be sure nothing was missed. This audit is not just performed on a sample of exams, it is performed on all exams that are near passing, and it is performed by the more experienced graders. In short, the

grading process is structured to give all candidates a fair and reliable assessment of their exams.

Here are some facts about the grading process that might help you formulate essay answers.

Each question is graded by a team of graders who grade only that question. Because these graders will review hundreds of exams, they will quickly learn to look for certain features in answers, such as key words or phrases. Remember, because graders see only one question, they will not be aware of things you said on other parts of the exam. Do not be afraid to repeat a point you have already made in an earlier answer—it will be new information to the grader of this question.

A grading key is established for each question, identifying the key components of the correct answer and allocating the points to be awarded to each component. These keys usually break the answer down into 1- or 2-point pieces that can be evaluated quickly and objectively.

Graders see a version of the "guideline answer," although it is often revised and refined during the grading process. The grading key is usually derived from this guideline answer. Rest assured, however, that graders do not see any candidate answers that are very similar to the guideline. The guideline answer is written by the authors of the question, who have all of the assigned materials in front of them and hours to work on it. Graders do not expect to see anything resembling the guideline answer, and you should not expect your answer to be as comprehensive. Do not hesitate to use very short, incomplete sentences, phrases, or even bullet points. Just be sure what you write conveys all you wanted to say. Graders are not allowed to "interpret" your answer.

Time Management

Candidates who fail the CFA exam typically cite time management as their biggest downfall. Do not let poor time management determine your exam results. The following will help you manage your time wisely:

- After you gain proficiency with the material, take several exams under timed conditions. This will give you some indication of whether you will have problems with time on exam day. However, do not let positive results on practice exams lull you into overconfidence. The stress of exam day plus possible distractions like noise, unpleasant and/or changing room temperature, or other candidates' noises can make a big difference in how fast you work. A good way to solidify proficiency and enhance speed is to retake previous practice exams after a delay of at least several days.

- I always say, "Get your points, and give CFA Institute theirs." *Your points* are for the questions you're confident you can correctly answer. Do not feel that you are required to answer the exam questions in order. When you open the exam, quickly look at the first few questions to determine where to start, and start by answering a question you're most comfortable with. By writing your answer as quickly yet thoroughly as possible, you might just "bank" some minutes. For example, assume the question is worth 15 points, meaning it is allocated 15 minutes. If you can answer it thoroughly in ten minutes, you bank five minutes to use on more difficult questions later. Once you have answered that question, move to the "next easiest" question, and so forth. If instead you open the exam and answer the questions in order, you could quickly come to one of CFA Institute's questions (with CFA Institute's points). These are questions with which you are uncomfortable and you will tend to spend too much time on your answer. I refer to these as CFA Institute's points…let CFA Institute have them so they don't keep you from getting your points! These questions can easily consume more than the allotted time, and you could end up with insufficient time to answer one of your questions later. Answer CFA Institute's questions only after you have answered all of your questions.
- Remain calm. Even if you fall behind, panic will only make things worse. You won't think clearly and you'll miss easy questions. If you need a short break, put down your pencil and take a few deep breaths. This will take about 30 seconds, and may very well help you think clearly enough to answer several additional questions correctly. In fact don't be afraid to take a mind-clearing water break. Just don't overdo it.

Time Management for Constructed Response Essay Questions (Morning Session)

Monitor your progress. Keep an eye on the time as you work through the exam. There will typically be 10–12 multiple-part questions worth anywhere from 10–30 points each. The total points equal the minutes available (180). You may deviate some as you work through easy and more difficult questions, but be careful not to ever let yourself fall too far behind. Also, bear in mind that you do not have 15 minutes to answer a 15-point question—you will need some of that time to read the question and think about your answer.

Pay attention to the points allowed for each question, and do not get carried away with a topic you know very well. If you spend ten minutes on a 4-point answer you are not helping yourself. In fact, you may be penalizing yourself by reducing the time you have available for other, more difficult questions.

Time Management for Selected Response Item Set Questions (Afternoon Session)

Again, monitor your progress. There will be 60 3-point questions in 10 item sets, each of which is allocated 18 minutes. As with essays, you may deviate some as you work through the easy and more difficult questions, but be careful to not let yourself fall behind.

Catch your breath at lunch. As previously mentioned, it is a good idea to have a lunch destination planned beforehand. You may or may not want to join other candidates for lunch. If you do talk to other candidates, do not let their comments influence you. They may be saying the exam is easier or more difficult than they expected, but they may or may not be correct about how well they are doing. If you want to review a little at lunch, that is fine, but if you need to relax for a few minutes, that relaxation may do you just as much good as an additional 30-minute cram session. Do what you are comfortable with. I found taking a brisk 15-minute walk did wonders for clearing the cobwebs out of my brain.

Types of Item Set Questions to Expect

It is very difficult to generalize about item set questions, but there are certainly some formats you should be prepared for. Most item set questions require some thought and will definitely be more difficult if you are not well rested, or if you are really stressed out. I list and discuss several general types of questions in the following.

Long Questions

Look out for these. They are major time-burners. There are two possible ways you may see long questions: (1) the vignette might be long or (2) the questions themselves might be long. Be prepared for extraneous information and irrelevant facts in every item set. The exam authors want to be sure you can identify the relevant information to demonstrate your grasp of the material.

Two-Column Questions

You might see some questions like this on the exam. There are a few things to keep in mind with this type of question:

- One question actually tests two concepts.
- These questions can combine qualitative and quantitative components.
- By determining that half of the answer is incorrect, you can usually eliminate one or more choices.

- These questions can be of two general types:

  1. A list of statements with choices like:
     A. Statement i is correct; statement ii is correct.
     B. Statement i is incorrect; statement ii is correct.
     C. Statement i is correct; statement ii is incorrect.

  2. An answer with a single sentence that doesn't appear to be two separate concepts, like:
     A. A non-collateralized loan, such as a repo.
     B. A collateralized loan, such as a repo.

Even though the correct answer might be to use a repo, Answer A is incorrect because repos are collateralized. Read the answers carefully. Don't mark the incorrect answer because you are in a hurry!

Answer Choices That are Direct Opposites

You will see some questions where there are pairs of answer choices—either one pair with two other different answers, or two pairs. By pairs we mean answers that are identical except for one word, for example, substituting "increase" for "decrease." There may be critical information in these paired answers. One of them is likely to be correct, and the difference between the two answers may be the key to answering the question correctly. If you see paired answers, check to see if the difference between them is critical to the question at hand.

"Distracter" Answers That are True or Sound True but are Not Correct

These are answer choices that sound good. They may sound good for any of several reasons:

- They might be true, but not appropriate answers (or at least not the best answer).
- They might be consistent with irrelevant information provided in the case.
- They might include "buzzwords" or common concepts.

Be very careful with these types of distracters. You always want to try and select the best answer that would apply in the specific case. Distracters may make sense. They may also make you think you could defend them as an answer choice. You might think, "Well, they want me to answer 'A,' but I think 'B' is okay, and I can argue the point with anyone." Think again. You will never get the chance to argue the point. Take the safe bet and choose the CFA Institute answer.

Answer Choices That Can Be Eliminated

It is important to read every answer choice before making your selection. This strategy will help you avoid missing a better answer. Similarly, when you are struggling with a question, eliminate the worst answers to narrow your choices and improve your odds of earning some points.

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