Manual Key of Investments

(Principles & Concepts)

International Student Version

By

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PART ONE: BACKGROUND

Chapter 1: Understanding Investments

CHAPTER OVERVIEW

Chapter 1 is designed to be a standard introductory chapter. As such, its purpose is to introduce students to the subject of Investments, explain what Investments is concerned with from a summary viewpoint, and outline what the remainder of the text will cover. It defines important terms such as **investments, security analysis, portfolio management, expected and realized rate of return, risk-free rate of return, risk, and risk tolerance**.

IT IS IMPORTANT TO NOTE THAT Chapter 1 discusses some important issues, such as the expected return--risk tradeoff that governs the investment process, the uncertainty that dominates investment decisions, the globalization of investments, and the impact of institutional investors. As such, the chapter sets the tone for the entire text and explains to the reader what Investments is all about. It establishes a basic framework for the course without going into too much detail at the outset.

Chapter 1 also contains some material that will be of direct interest to students, including the importance of studying investments (using illustrations of the wealth that can be accumulated by compounding over long periods of time) and investments as a profession. The CFA designation is discussed, and the Appendix for Chapter 1 contains a more detailed description of the CFA program.

Equally important, Chapter 1 does *not* cover calculations and statistical concepts, data on asset returns, and so forth, either in the chapter or an appendix. The author feels strongly that Chapter 1 is not the place to do this when most students have little knowledge of what the subject is all about. They are not ready for this type of important material, and since it will not be used immediately they will lose sight of why it was introduced. The author believes that it is much more effective to introduce the students *thoroughly* to what the subject involves.

It is highly desirable for instructors to add their own viewpoints at the outset of the course; perhaps using recent stories from the popular press to emphasize what investments is concerned with, why students should be interested in the subject, and so forth. One interesting and important topic that can be discussed in class is investment fraud. Scams continue day after day, and many people lose their life savings. By learning a few basic investing principles, students will be able to avoid these "scams," thereby possibly saving themselves or their family and friends from misfortune.

Chapter 1 also discusses ethics in investing, setting the stage for examples of ethical issues in other chapters.

CHAPTER OBJECTIVES

To introduce students to the subject matter of Investments from an overall viewpoint, including terminology.

To explain the basic nature of the investing decision as a tradeoff between expected **return** and **risk**.

To explain that the decision process consists of **security analysis** and **portfolio management** and that external factors affect this decision process. These factors include *uncertainty*, the necessity to think of investments in a *global context*, the environment involving *institutional investors*, and the impact of the internet on investing.

To organize the remainder of the text.

MAJOR CHAPTER HEADINGS [Contents]

An Overall Perspective On Investing

Just Say NO!

Establishing A Framework For Investing

Some Definitions
[investment; investments; financial and real assets; marketable securities; portfolio]

A Perspective on Investing in Financial Assets
[investing is only one part of overall financial decisions]

Why Do We Invest?
[to increase monetary wealth]

The Importance of Studying Investments

The Personal Aspects
[most people make some type of investment decisions; examples of wealth accumulation as a result of compounding; people will be largely responsible for making investing decisions affecting their retirement; how an understanding of the subject will help students when reading the popular press]

Investments as a Profession
[various jobs, salary ranges; financial planners; CFA designation]

Understanding the Investment Decision Process

The Basis of Investment Decisions—Return and Risk
[expected return; realized return; risk; risk-averse investor; risk tolerance; the Expected-Return--Risk Tradeoff; diagram of tradeoff; ex post vs. ex ante; risk-free rate of return, RF]

Structuring the Decision Process
[a two-step process: security analysis and portfolio management]

Important Considerations in the Investment Decision Process for Today's Investors

The Great Unknown
[uncertainty dominates decisions--the future is unknown!]

The Global Investments Arena
[the importance of foreign markets; the Euro; emerging markets]

The Importance of the Internet
[using the internet to invest]

Individual Investors vs. Institutional Investors
[individual investors compete with institutional investors, but individuals are the beneficiaries of institutional investor activity; Regulation FD; spin-offs]

Ethics in Investing

Organizing the Text

[Background; Realized and Expected Returns and Risk; Bonds; Stocks; Security Analysis, including both fundamental and technical analysis; Derivative Securities; Portfolio Theory and Capital Market Theory; the Portfolio Management Process and Measuring Portfolio Performance]

POINTS TO NOTE ABOUT CHAPTER 1

Exhibits, Figures and Tables

Exhibit 1-1 discusses some professional designations used by people in the money management business. It offers a good opportunity to discuss with students the opportunities in the field, such as financial planner.

Figure 1-1 is an important figure because it is the basis of investing decisions--indeed, it is the basis of all finance decisions. It shows the expected return--risk tradeoff available to investors. This diagram should be emphasized because it can be used to generate much useful discussion, including:

- The upward-sloping tradeoff that dominates Investments.
- The role of RF, the risk-free rate of return.
- The importance of risk in all discussions of investing.
- The different types of financial assets available.
- The distinction between realized and expected return.

NOTE: THIS DIAGRAM IS RELEVANT ON THE FIRST DAY OF CLASS, AND THE LAST. IT IS A GOOD WAY TO START THE COURSE, AND TO END IT.

NOTE: Example 1-1 shows wealth accumulations possible from an IRA-type investment. It typically generates considerable student interest to see the ending wealth that can be produced by compounding over time. This type of example can be related to 401 (k) plans, which are quickly becoming of primary importance to many people.

Boxed Inserts

Box 1-1 is a good example of why Investments is a difficult subject. It highlights some statements by the investing community which turned out not to be accurate. This Box Insert is taken from a regular feature of *Smart Money*, and offers a good opportunity to start informing students about the popular press magazines and newspapers available to investors.

ANSWERS TO END-OF-CHAPTER QUESTIONS

1-1. **Investments** are the study of the investment process. An **investment** is defined as the commitment of funds to one or more assets to be held over some future time period.

1-2. Traditionally, the investment decision process has been divided into security analysis and portfolio management.

- **Security analysis** involves the analysis and valuation of individual securities; that is, estimating value, a difficult job at best.

- **Portfolio management** utilizes the results of security analysis to construct portfolios. As explained in Part II, this is important because a portfolio taken as a whole is not equal to the sum of its parts.

1-3. The study of investments is important to many individuals because almost everyone has wealth of some kind and will be faced with investment decisions sometime in their lives. One important area where many individuals can make important investing decisions is that of retirement plans, particularly 401 (k) plans. In addition, individuals often have some say in their retirement programs, such as allocation decisions to cash equivalents, bonds, and stocks.

The dramatic stock market gains of 1995-1999 and the sharp losses in 2000-2002 illustrate well the importance of studying investments. Investors who were persuaded in the past to go heavily, or all, in stocks reaped tremendous gains in their retirement assets as well as in their taxable accounts in 1995-1999 and then often suffered sharp losses in 2000-2002.

1-4. A **financial asset** is a piece of paper evidencing some type of financial claim on an issuer, whether private (corporations) or public (governments).

A **real asset**, on the other hand, is a tangible asset such as gold coins, diamonds, or land.

1-5. Investments, in the final analysis, is simply a risk-return tradeoff. In order to have a chance to earn a return above that of a risk-free asset, investors must take risk. The larger the return expected, the greater the risk that must be taken.

The risk-return tradeoff faced by investors making investment decisions has the following characteristics:

- ☞ The risk-return tradeoff is upward sloping because investment decisions involve expected returns (vertical axis) versus risk (horizontal axis).

- ☞ The *vertical intercept of this tradeoff* is RF, the risk-free rate of return available to all investors.

1-6. An investor would expect to earn the risk-free rate of return (RF) when he or she invests in a risk-free asset and is, therefore, at the zero risk point on the horizontal axis in Figure 1-1.

1-7. **Disagree**. Risk-averse investors will assume risk if they expect to be adequately compensated for it.

1-8. The *basic nature of the investment decision* for all investors is the upward-sloping tradeoff between expected return and risk that must be dealt with each time an investment decision is made.

1-9. **Expected return** is the anticipated return for some future time period, whereas **realized return** is the actual return that occurred over some past period.

1-10. In general, the term **risk** as used in investments refers to adverse circumstances affecting the investor's position. Risk can be defined in several different ways. **Risk** is defined here as the chance that the actual return on an investment will differ from its expected return.

Beginning students will probably think of default risk and purchasing power risk very quickly. Some may be aware of *interest rate risk* and *market risk* without fully understanding these concepts (which will be explained in later chapters). Other risks include *political risk* and *liquidity risk*. Students may also remember *financial risk* and business risk from their managerial finance course.

1-11. As explained in Chapter 21, return and risk form the basis for investors establishing their objectives. Some investors think of risk as a constraint on their activities. If so, risk is the most important constraint. Investors face other constraints, including:

- time
- taxes
- transaction costs
- income requirements
- legal and regulatory constraints
- diversification requirements

1-12. All *rational* investors are risk averse because it is not rational when investing to assume risk unless one expects to be compensated for doing so.

All investors do not have the same degree of risk aversion. They are risk averse to varying degrees, requiring different risk premiums in order to invest.

1-13. Investors should determine how much risk they are willing to take before investing—this is their risk tolerance. Based on their risk tolerance, investors can then decide how to invest. Investors may seek to maximize their expected return consistent with the amount of risk they are willing to take.

1-14. The external factors affecting the decision process are:

(1) uncertainty—the great unknown
(2) the global investments arena
(3) the importance of the internet
(4) individual investors vs. institutional investors

The most important factor is uncertainty, the ever-present issue with which all investors must deal. Uncertainty dominates investments, and always will.

1-15. **Institutional investors** include bank trust departments, pension funds, mutual funds (investment companies), insurance companies, and so forth. Basically, these financial institutions own and manage portfolios of securities on behalf of various clienteles.

They affect the investing environment (and therefore individual investors) through their actions in the marketplace, buying and selling securities in large dollar amounts. However, although they appear to have several advantages over individuals (research departments, expertise, etc.); reasonably informed individuals should be able to perform as well as institutions, on average, over time. This relates to the issue of market efficiency.

1-16. Required rates of return differ as the risk of an investment varies. Treasury bonds, generally accepted as being free from default risk, are less risky than corporates, and therefore have a lower required rate of return.

1-17. Investors should be concerned with international investing for several important reasons. First, international investing offers diversification opportunities, and diversification is extremely important to all investors as it provides risk reduction. Second, the returns may be better in foreign markets than in the U. S. markets. Third, many U. S. companies are increasingly affected by conditions abroad--for example, Coca Cola derives most of its revenue and profits from foreign operations. U. S. companies clearly are significantly affected by foreign competitors.

The exchange rate (currency risk) is an important part of all decisions to invest internationally. As discussed in Chapter 6 and other chapters, currency risk affects investment returns, both positively and negatively.

SOME RECOMMENDATIONS WHEN DISCUSSING CHAPTER 1:

1. The expected return-risk tradeoff is fundamental to any understanding of Investments. While it seems to be a straightforward concept, I find that students have problems with it. These problems revolve around understanding the realized tradeoff (what did happen) vs. the anticipated tradeoff (what is expected to happen). I discuss the following relationships to show the various tradeoffs.

   (a) The **expected tradeoff** (illustrated in the text) which is always upward sloping because rational investors must expect to receive a larger return if they are to assume more risk. This is the basis of decision-making when investing.

   (b) The **shorter-term realized tradeoff**, which can be downward sloping. 2000-2002 offers the perfect example. The market declined sharply, and therefore T-bills returned more than stocks.

   (c) The **long-term (for example, 50 or more years) realized tradeoff**, as illustrated by the Ibbotson data and the data in Chapter 6. This tradeoff must slope upward if what is taught in Investments is to make sense. And, of course, it does. Stocks have returned more than bonds, which have returned more than T-bills, over very long periods of time.

   Thus, diagrams for (a) and (c) look similar. The difference is the label on the vertical axis: expected return for (a), and realized return for (c).

2. The decline in the economy and in the stock market in 2000-2002 is a good illustration of risk, and of using the recent past to predict the future. During the late 1990s and into part of 2000, we heard a lot about day traders, and how we were now in a new environment where the old standards of valuation such as profitability were much less important. Since then, of course, many of the high-flyers have crashed and/or gone out of business. Today there is a renewed appreciation for the traditional methods of stock valuation.

Chapter 2: Investment Alternatives

CHAPTER OVERVIEW

The purpose of Chapter 2 is to provide an overview of the major types of financial assets available to investors and discussed in later chapters. It also develops the important alternatives of direct and indirect investing, thereby providing the foundation for Chapter 3.

Obviously, **these assets cannot be discussed in detail in this chapter**; however, instructors can provide additional details as they see fit. What is important here is for students to be exposed to the major types of financial assets early in the course in order for them to understand the basics of alternative investment opportunities. For example, if an instructor were to refer to an example or concept involving a call option or a convertible security, the student may have no idea what is being discussed.

Chapter 2 first discusses the non-marketable alternatives available to investors, such as savings accounts, because many students have encountered these already. Also, they offer a good contrast to the marketable securities, which are the focus of the text.

Money market securities are discussed briefly, primarily because these assets typically are owned by individual investors in the form of money market mutual funds.

Chapter 2 concentrates on the major capital market assets, bonds and stocks, while providing a very brief coverage of derivative securities.

The idea of **indirect investing**--the ownership of investment company shares--is introduced in Chapter 2 in Exhibit 2-1. This is because of the important alternative that such ownership provides all investors. They can turn their funds over to a mutual fund or ETF and not have to make investment decisions. It is desirable for students to think about this alternative early in their study. Many investors will opt for a combination of direct and indirect investing, and this alternative needs to be explained early in the course. Chapter 3 is devoted to indirect investing and provides a detailed discussion of investment companies.

CHAPTER OBJECTIVES

To provide an overview of the major financial assets available to investors and discussed in subsequent chapters.

To explain in some detail the financial assets of importance to most investors, bonds, and stocks.

To explain investors' alternatives, which consist of direct investing, indirect investing, or, as is often done, a combination of the two.

MAJOR CHAPTER HEADINGS [Contents]

Organizing Financial Assets

Direct Investing
[invest directly and indirectly in money market, capital market and other securities]

An International Perspective
[why this is important in today's investing environment]

Nonmarketable Financial Assets

[savings accounts; certificates of deposit (CDs); money market deposit accounts (MMDAs); U. S. government savings bonds--key features summarized in table form]

Money Market Securities

The Treasury Bill
[discussion of important money market securities in table form; emphasis on Treasury bills as the risk-free (RF) rate]

Money Market Rates

Fixed-Income Securities

Bonds
[definition; characteristics--par value, maturity, zero coupon bond, call feature, legal nature of bonds]

Types of Bonds
[Treasuries; Federal Agencies; Municipals; Corporates; debentures, convertible bonds, bond ratings]

Asset-backed Securities
[definition, examples; securitization trends; why investors buy asset-backed securities]

Rates on Fixed-Income Securities

Equity Securities

Preferred Stock
[definition; characteristics; new forms]

Common Stock

[definition; characteristics--book value, market value, dividends, dividend yield, payout ratio, stock dividends and stock splits, the P/E ratio; investing internationally in equities]

Investing Internationally in Equities

Derivative Securities

[Corporate-created securities: warrants; options; futures contracts]

Options

[definition; very brief basics of puts and calls]

Futures Contracts

[definition; purposes]

A Final Note

POINTS TO NOTE ABOUT CHAPTER 2

Exhibits, Figures and Tables

Exhibit 2-1 is useful for organizing financial assets into one diagram. It illustrates both direct and indirect investing.

Exhibit 2-2 outlines the major non-marketable financial assets in order that this topic can be covered quickly and efficiently.

Exhibit 2-3 discusses the major money market securities in table format, relieving the student and instructor from even more tedious details in the body of the chapter. This table contains the relevant facts about these assets. THE IMPORTANT POINT TO STRESS IS THAT MOST INDIVIDUAL INVESTORS WILL OWN THESE ASSETS INDIRECTLY THROUGH MONEY MARKET MUTUAL FUNDS.

Exhibit 2-4 contains a basic summary of S&P debt rating definitions.

ANSWERS TO END-OF-CHAPTER QUESTIONS

2-1. **Indirect investing** involves the purchase and sale of investment company shares. Since investment companies hold portfolios of securities, an investor owning investment company shares indirectly owns a pro-rata share of a portfolio of securities.

2-2. Treasury bills are auctioned weekly in a bid process. Bills are sold at less than face value (a discount) and redeemed at maturity for the face value, with this spread constituting an investor's return. The greater the discount (the smaller the price paid for the bills), the larger the return.

2-3. *Negotiable certificates of deposit (CDs)* are marketable deposit liabilities of the issuing bank that pay a stated interest rate and are redeemable from the issuer at maturity by the holder. The minimum deposit is $100,000. Because they are negotiable, they can be sold in the open market before maturity.

Non-marketable certificates of deposit are sold by banks and other institutions. Penalties may exist for early withdrawal of funds remains in effect. Most importantly, these CDs are nonnegotiable. The owner (purchaser) must deal directly with the issuing institution.

2-4. Bonds are issued by the federal government, federal government agencies, municipalities, and corporations. The last two are the most risky. If one has to be chosen as the most risky, it presumably would be corporates since general obligation municipals (as opposed to revenue bonds) are backed by the taxing power of the issuer.

2-5. *Fannie Maes* are issued by the Federal National Mortgage Association, a government-sponsored agency which is actually a privately owned corporation traded on the NYSE.

Ginnie Maes are issued by the Government National Mortgage Association, a wholly-owned government agency issuing fully-backed securities. Ginnie Mae is known for its pass-through certificates, where both principal and interest are passed through monthly to the certificate holders.

2-6. The two basic types of municipals are *general obligation bonds*, which are backed by the "full faith and credit" of the issuer, and *revenue bonds*, which are repaid from the revenues generated by the project they were sold to finance.

2-7. As a result of mortgage refinancings, investors in both Ginnie Maes and CMOs face the risk that the mortgages may be repaid earlier than expected by borrowers refinancing their obligations.

2-8. The advantages of Treasury bonds include:
(1) the practical elimination of default risk
(2) the minimization of call risk
(3) a very liquid and viable market

The possible disadvantages of Treasury bonds are the lower rates of return and the exposure to inflation risk (unless the new inflation-adjusted bonds are used).

2-9. A savings bond represents the non-marketable part of the U. S. government debt. It cannot be sold in the open market. Treasury bonds represent the marketable portion of federal debt, and can be sold at virtually any time.

2-10. *Preferred stock* is referred to as a hybrid security because it has some features similar to fixed-income securities (it pays a fixed return and has a meaningful par value) and some features similar to equity securities (it never matures and it pays dividends).

2-11. Common stockholders are the residual claimants of a corporation because they are entitled to all earnings after payment of any debt interest and any preferred dividends. In case of liquidation, they are entitled to any assets remaining after bondholder and preferred stockholder claims have been satisfied.

2-12. There is no requirement for a company to pay a dividend on the common stock. Any payment is decided by the company's board of directors, who can change the dividend (or abolish it) at any time.

2-13. A **derivative security** is a security that derives its value from other more basic underlying assets, such as securities, commodities, or currencies. Derivative securities are also referred to as contingent claims.

Equity derivative securities derive all, or part, of their value from the underlying common stock; that is, part, or all, of their value is due to their claim on the common stock.

Corporate-created equity-derivative securities include rights, warrants and convertibles, all of which are issued by corporations while *investor-created equity-derivative securities* involve options (puts and calls), which are written and bought by investors (both individuals and institutions).

Futures contracts are also derivative securities.

2-14. **Securitization** refers to the transformation of illiquid risky individual loans into more liquid, less risky securities.

2-15. The best example of asset-backed securities is the mortgage-backed securities issued by the federal agencies to support the mortgage market, such as Ginnie Maes. Other recent examples include car loans, aircraft leases, credit-card receivables, railcar leases, small-business loans, and so forth.

2-16. For practical purposes, Treasury bills, like other Treasury securities, are considered to be default-free securities. Although very safe, both bank CDs and commercial paper carry some risk of default, however small. Therefore, T-bills should have a lower return.

2-17. The *call feature* is a disadvantage to investors who must give up a higher-yielding bond and replace it (to continue having a position) with a lower-yielding bond. Issuers will call in bonds when interest rates have dropped substantially (e.g., two or three percentage points) from a period of very high rates.

Of course, the bonds may be protected from call for a certain period and cannot be called although the issuer would like to do so. Generally, once unprotected, issuers will call bonds when it is economically attractive to do so, which is when the discounted benefits outweigh the discounted costs of calling the bonds.

2-18. Investors are more likely to hold zero coupon bonds in a non-taxable account because holders must pay taxes each year on zero coupons as if they actually received the interest. By holding zeros in a non-taxable account, the tax can be deferred.

2-19. Direct Access Notes (DANs) are sold by high credit-quality firms at $1,000, thereby eliminating discounts and premiums and accrued interest. Coupon rates are fixed, and maturities vary widely. Maturities and rates on a new issue are posted for one week, allowing investors to shop around.

2-20. An **ADR** represents indirect ownership of a specified number of shares of a foreign company. These shares are held on deposit in a bank in the issuer's home country, and the ADRs are issued by U. S. banks called depositories. In effect, then, ADRs are tradable receipts.

2-21. **Stock dividends and splits** do not, other things being equal, represent additional value. Of course, if a stock dividend is accompanied by a higher cash dividend, the stockholder gains, but this is a change in the dividend policy. Some people believe that these transactions increase the ownership of a stock by bringing it into a more favorable price range, but even if true it is doubtful this would add real value.

2-22. A stockholder is the residual claimant in a corporation, entitled to the earnings remaining after the bondholders and preferred stockholders are paid (of course, all earnings are not usually paid out to stockholders). Also, in case of liquidation, the stockholders are entitled to the residual assets after the bondholders and preferred stockholders (as well as other) claims are settled.

In the case of IBM, the bondholder has considerable assurance of receiving the interest payments, even with IBM's current problems, because of IBM's overall financial strength; however, the bondholder will never receive more than the stated interest and principal payments. While stockholders assume the risk that returns will be negative in some years, they expect some large returns in other years. They also expect, on average, to earn more than the bondholders.

2-23. The $3.20 dividend is the annual dividend. The stock goes ex-dividend on August 11. An investor must buy the stock on or before August 10 to receive the dividend.

With 150 shares, 150 ($.80) = $120 will be received (the quarterly dividend is 1/4 of $3.20, or $.80).

2-24. (b)—ratings reflect the relative likelihood of default.

2-25. (a)

2-26. (d)—stockholders receive what is left over after the fixed claimants have been paid.

ANSWERS TO END-OF-CHAPTER PROBLEMS

2-1. Taxable equivalent yield = $\frac{\text{tax-exempt municipal yield}}{\text{1.0 - marginal tax rate}}$

The taxable equivalent yield for a tax-exempt yield of 5.5%, for an investor in a 15% tax bracket, is

Taxable equivalent yield = .055 / [1-.15]

= 6%

2-2. According to the problem, the corporate bond yields 8.4 (1-.28) = 6 percent after tax.

The municipal bond has a taxable equivalent yield of .06 / [1 - .28] = 8 percent

2-3. First, calculate the **effective state rate** as:

Marginal state rate x (1 – marginal federal rate)

.07 x (1 - .28) = 5.04%

Next, calculate the **combined effective fed/st tax rate** as:

Combined rate = effective state rate + federal rate

= .0504 + .28 = .3304

Finally, solve the **combined TEY** equation using this new combined rate:

Combined TEY = .06 / (1 - .3304) = .0896 or 8.96%

Chapter 3: Indirect Investing

CHAPTER OVERVIEW

Chapter 3, covering indirect investing, is a logical sequence to Chapter 2, which focused on direct purchases and sales of assets by investors. Furthermore, investment companies warrant a separate chapter. The importance of investment companies, primarily mutual funds, to investors is obvious based on the amount of assets they hold. For most investors, investment companies in some form are an integral part of their investing activities. This material deserves emphasis as a separate chapter where the relevant issues can be read and studied as a unified package.

It is also important that investment companies be studied early on in an investments course because of the many references to mutual fund investing that are likely to occur. Students should be exposed to this material early, and make use of it during the course. It may often be the case that term papers or term projects will involve mutual funds and/or other investment companies.

Chapter 3 begins by showing how households have increasingly turned to indirect investing through pension funds and mutual funds. Some discussion of financial intermediation may be appropriate at this point. The dramatic growth in mutual fund assets is illustrated with a graph.

The process of investing indirectly through investment companies is explained and illustrated with a graph. The increasing movement toward "fund supermarkets" at brokerage houses, thereby combining direct investing with indirect investing, is mentioned.

The basic concept of an investment company is discussed in terms of how it is organized, regulated, and operated. This is followed by a discussion of the four types of investment companies: unit investment trusts, closed-end funds, open-end funds, and ETFs. Included here is a discussion and illustration of net asset value.

Mutual funds receive primary emphasis in Chapter 3 because that is the type of investment company most frequently owned. Money market funds are discussed first, followed by equity and bond & income funds. The types of mutual funds are considered, using the objectives defined by the Investment Company Institute.

The details of indirect investing are considered next. What is involved when buying a mutual fund or closed-end fund in terms of how to do it, the expenses involved, and so forth?

Investment company performance is analyzed in Chapter 3, although a detailed discussion of return and risk measures do not occur until Chapter 6. Performance is explained using actual data for funds. The consistency of mutual fund performance is explored.

Exchange-traded funds continue to grow in importance. Some detail is provided on the differences between ETFs and mutual funds, as well as closed-end funds.

Investing internationally through investment companies is analyzed because many investors are interested in international diversification.

CHAPTER OBJECTIVES

To emphasize the important alternative for all investors of indirect investing, and how it fits in most investors' overall plans when investing.

To explain the various types of investment companies, including how they operate, objectives, expenses, and so forth.

To discuss important issues such as fund performance and how to use funds to invest internationally.

To discuss important new developments in this area, primarily exchange-traded funds.

MAJOR CHAPTER HEADINGS [Contents]

[Introduction explains increasing importance of indirect investing to households--the rising ownership of pension fund assets and mutual fund shares; how much mutual fund assets have increased in recent years]

Investing Indirectly

[diagram showing direct and indirect investing; rise of indirect purchase of investment companies in brokerage accounts]

What Is An Investment Company?

[how organized, regulated, and operated]

Types of Investment Companies

Unit Investment Trusts
[definition; characteristics]

Exchange Traded Funds (ETFs)
[definition; examples; tax efficiency; trends]

Closed-End Investment Companies
[characteristics; how to read data]

Open-End Investment Companies (Mutual Funds)
[importance; definition; fund families]

Types of Mutual Funds

Money Market Funds
[description; characteristics; example]

Equity Funds, Bond Funds, and Hybrid Funds
[objectives; value funds vs growth funds; index funds; growth]

The Mechanics of Investing Indirectly

Closed-End Funds
[NAV; discounts and premiums]

Mutual Funds
[distribution; share price; fees vs expenses; load funds; share classes—A, B, and C shares; no-load funds]

Exchange-Traded Funds
[definition; redemptions; expenses]

Investment Company Performance

Measures of Fund Performance
[average annual total return; how to calculate; examples; tax efficiency]

Morningstar Ratings
[what they mean; how used]

Benchmarks
[different funds use different benchmarks]

How Important Are Expenses in Affecting Performance?
[expenses are increasing and investors should be aware]

Some Conclusions About Fund Performance
[the controversy continues; survivorship bias; chasing the hot funds]

Investing Internationally Through Investment Companies

Fund Categories for International Investing
[international funds; global funds; single-country funds]

The Future of Indirect Investing

Fund Supermarkets
[fund supermarkets offered by brokerage houses]

Separately Managed Accounts
[advantages]

Hedge Funds

POINTS TO NOTE ABOUT CHAPTER 3

Exhibits, Figures and Tables

Exhibit 3-1 shows the major investment objectives of mutual funds. This allows us to organize mutual funds by objective.

Figure 3-1 illustrates the difference between direct investing and indirect investing. The important point here is that indirect investing accomplishes the same things as direct investing.

Figure 3-2 shows the types of funds by considering them on a return-risk spectrum.

Figure 3-3 shows the assets of stock and bond & income funds for 2004. Equity funds constitute about 54 percent of the total assets recently, while money market funds accounted for 25%.

Figure 3-4 shows a "style map" for Fidelity's Equity-Income fund. This map shows at a glance the types of securities a fund invests in—for this fund, large cap, value stocks.

Figure 3-5 shows assets of mutual funds for selected years. The dramatic growth in assets is obvious.

Figure 3-6 shows the minimum investment requirements for mutual funds. These are, all in all, quite low and illustrate that most investors can invest by using mutual funds.

Table 3-1 shows the assets of each of the four types of investment company Mutual funds clearly dominate.

Table 3-2 shows an example of the typical data available for closed-end funds. Illustrated are net asset value and market price, and the discounts and premiums that result.

Box Inserts

Box 3-1 discusses how fund investors are unduly influenced by recent events. They chose funds with recent strong performance.

ANSWERS TO END-OF-CHAPTER QUESTIONS

3-1. Indirect investing involves the purchase and sale of investment company shares. Since investment companies hold portfolios of securities, an investor owning investment company shares indirectly owns a pro-rata share of a portfolio of securities.

3-2. An investment company is a financial corporation organized for the purpose of investing in securities, based on specific objectives.

- *Open-end investment companies (mutual funds)* continually sell and redeem their shares, based on investor demands. Shareowners deal directly with the company.

- *Closed-end investment companies* have a fixed capitalization, and their shares trade on exchanges or over-the-counter.

3-3. A closed-end fund selling at a discount is technically worth more dead than alive in the sense that if investors could take over the fund, they could liquidate the portfolio and enjoy a gain. Think of a closed-end selling at a 20 percent discount. If assets could be bought for $0.80 on the dollar and liquidated at face value, in principle a nice gain could be realized. Of course, attempts to take over a fund would likely drive the price up and reduce some, or all, of the potential gain.

3-4. A regulated investment company can elect to pay no federal taxes by "flowing through" distributions of dividends, interest, and realized capital gains to shareholders who pay their own marginal tax rates on these distributions.

3-5. A **money market fund** is an investment company formed to invest in a portfolio of short-term, highly liquid, low risk money market instruments. Interest is earned daily, and shares can be sold at anytime. There are no sales commissions or redemption fees.

Most money market mutual funds hold a substantial part of their assets in the form of Treasury bills because of their safety and liquidity. In effect, these funds are doing for investors what they could do for themselves if they had enough funds to purchase Treasury bills and earn the going risk-free rate of return directly.

Money market funds have appealed to investors seeking to earn the often-attractive rates being paid on money market instruments but who could not afford the large minimum initial investments required. Liquidity is excellent, and safety has been no problem although an investor's funds are uninsured. Fund expenses are very low. In addition, most money market funds offer check writing privileges (often with some minimum amount constraint).

The creation of the money market deposit accounts at financial institutions has lessened the appeal of money market funds. MMDAs are insured, and locally available.

3-6. Benefits of money market funds include:

(a) current money market rates can be earned
(b) securities with high minimum denominations, which most investors could not purchase, are held by these funds on behalf of shareholders
(c) diversification
(d) check-writing privileges--investors continue to earn interest until the check actually clears
(e) shares are quickly redeemable by wire
(f) no sales charge or redemption charge
(g) interest is earned and credited daily

A possible disadvantage is that these funds are not insured.

The **money market deposit accounts (MMDAs)** offered by banks and other financial institutions are a close substitute for a money market fund.

3-7. The board of directors of an investment company must specify the objective that the company will pursue in its investment policy. The company will try to follow a consistent investment policy, given its objective.

(a) **common stock funds**: aggressive growth, growth, growth and income, international, and precious metals

(b) **balanced funds**: hold both bonds and stocks

(c) **bond and income funds**: income funds, bond funds, municipal bond funds and option/income funds

(d) **specialized funds**: index funds, dual-purpose funds, and unit investment trusts.

3-8. A **unit investment trust** is an unmanaged portfolio handled by an independent trustee, while investment companies are actively managed. The sponsor maintains a secondary market for the trust for those wishing to sell, while investment company shares are traded, or redeemed, more actively. The assets in the portfolio of a trust are seldom changed, a situation completely different from an investment company which pursues a more active management strategy.

3-9. The **net asset value (NAV)** for any investment company share is computed daily by calculating the total market value of the securities in the portfolio, subtracting any trade payables, and dividing by the number of investment company fund shares currently outstanding.

3-10. The term open-end refers to the capitalization of the investment company. It is constantly changing for an open-end company as investors buy shares from, and sells shares back to, the investment company. Therefore, the number of outstanding shares of an open-end company is constantly changing.

3-11. Investors might prefer a closed-end fund because it could be bought on an exchange, through a broker, like any other stock. Thus, it would be added to the portfolio like any other security, and when it came time to sell all that would be required would be a call to the broker. Also, an investor might feel there is an advantage to buying a closed-end fund at a discount, because a narrowing of the discount would lead to a gain for the investor. Finally, a particular closed-end fund might appeal to an investor better than the open-end funds that are available because of the closed-end fund's particular focus, managers, expenses, past record, and so forth.

3-12. So-called *international funds* tend to concentrate primarily on international stocks. In one recent year Fidelity Overseas Fund was roughly one-third invested in Europe and one-third in the Pacific Basin, whereas Kemper International had roughly one-sixth of its assets in each of three areas, the United Kingdom, Germany, and Japan.

On the other hand, *global funds* tend to keep a minimum of 25 percent of their assets in the United States. For example, in one recent year Templeton World Fund had over 60 percent of its assets in the United States, and small positions in Australia and Canada.

3-13. A *cumulative total return* measures the actual performance over a stated period of time, such as the past 3, 5 or 10 years. Standard practice in the mutual fund industry is to calculate and present the *average annual return*, a hypothetical rate of return that, if achieved annually, would have produced the same cumulative total return if performance had been constant over the entire period. The average annual return is a geometric mean (discussed in Chapter 6) reflecting the compound rate of growth at which money grew.

3-14. A **value fund** generally seeks to find stocks that are cheap on the basis of standard fundamental analysis yardsticks, such as earnings, book value, and dividend yield.

Growth funds, on the other hand, seek to find companies that are expected to show rapid future growth in earnings, even if current earnings are poor or, possibly, nonexistent.

3-15. The Morningstar ratings provide investors with a convenient, quickly understood rating system for mutual funds based on their performance. One knows immediately that a 5-star fund is a top-rated fund and a 1-star fund is a bottom-rated fund. Looking at a set of, say, 20 funds, one can easily pick out the good performers.

The weakness of this system is that the ratings are based on past performance, and there is a strong likelihood that performance will not continue as is. Therefore, many top-rated funds will subsequently stumble, and some poorly rated funds will subsequently perform better.

3-16. Mutual fund shares are typically purchased directly from the investment company that operates the fund. The investor contacts the company, obtains a prospectus and application, and buys and sells shares by mail and phone.

Alternatively, mutual funds can be purchased indirectly from a sales agent, including securities firms, banks, life insurance companies, and financial planners. Mutual funds may be affiliated with an "underwriter," which usually has an exclusive right to distribute shares to investors. Most underwriters distribute shares through broker/dealer firms.

3-17. When the investor is ready to sell the shares of Equity-Income Fund, he or she would contact Fidelity by phone or mail and instruct Fidelity to sell the shares. The company is obligated to do so under normal circumstances at the NAV prevailing at the time of sale.

3-18. An index fund is a passive portfolio, holding the securities of some index. No active management decisions are made involving what securities to buy and sell, and when to buy and sell.

Passive investing refers to making few if any decisions regarding the management of a portfolio. The investor holds some set or index of securities.

3-19. Mutual funds are corporations typically formed by an investment advisory firm that selects the board of trustees' directors for the company. The trustees, in turn, hire a separate management company, normally the investment advisory firm, to manage the firm.

The shareholders of a fund "own" the mutual fund in terms of the portfolio of securities.

3-20. Survivorship bias refers to the fact that when investors observe a set of mutual fund returns over time, they are seeing results for those mutual funds that survived over that period of time. Some poorly performing funds may be done away with, typically by merging them with another mutual fund in the same company. Alternatively, some are started by mutual fund companies but are never sold to the public because of poor performance. Thus, investors see only the "survivors."

Investors are not able to judge mutual fund performance fully because of the survivorship bias. The actual performance record for a set of mutual funds over time is overstated because only the record of the survivors is seen.

3-21. The "load" refers to the sales charge. A no-load fund has no sales charge, while a load fund has a sales charge, which may often be as much as 5-6 percent. A low-load fund has a lower sales charge, such as 2 percent.

3-22. *Passively managed country funds* are geared to match a major stock index of a particular country. Each of these offerings will typically be almost fully invested, have little turnover, and offer significantly reduced expenses to shareholders.

3-23. Once an investor buys a particular fund within an investment company, such as Vanguard or Fidelity, he or she can easily sell the shares of that fund and purchase shares of another fund within the same organization. This can be done by phone or mail.

3-24. Hedge funds are investment pools for wealthy investors, subject (traditionally) to little regulation. They are known for taking large risks in pursuit of large returns. They traditionally have invested in ways that most mutual funds cannot or do not, such as selling short or investing in less liquid investments. Furthermore, they often do not disclose as much information about their activities as do mutual funds.

Mutual funds, in contrast, are subject to significant regulation under the Investment Company Act of 1940. They cannot engage in the same activities as hedge funds. Their portfolios must be disclosed quarterly.

3-25. A fund supermarket is a mechanism by which investors can buy, own and sell the funds of various mutual fund families through one source, such as a brokerage firm. "Supermarket" refers to the fact that an investor has hundreds of choices available through one source.

COMPUTATIONAL PROBLEMS

3-1. for Equity-Income Fund: $\$5{,}000\ (1.1088)^{10} = \$14{,}044.37$
for Personal Strategy Fund: $\$5{,}000\ (1.1006)^{10} = \underline{\$13{,}039.62}$
$\$\ 1{,}004.75$

3-2. for Equity-Income Fund: $(1.4283)^{1/5} - 1 = 7.39\%$
for Personal Strategy Fund: $(1.2940)^{1/5} - 1 = 5.29\%$

3-3. NAV_{2004} = NAV_{2003} + net investment income + net gains or losses on securities – dividends – distributions from capital gains.

$NAV_{2004} = \$13.07 + \$0.03 + \$1.52 - \$0.04 - \$0.01 = \$14.57$

Chapter 4: Securities Markets

CHAPTER OVERVIEW

Chapter 4 is designed to cover the markets where financial assets trade, with particular emphasis on equity markets. This chapter is a follow-up to Chapter 2 which discussed the financial assets available to investors through direct investing, with primary emphasis on marketable securities.

Primary markets are discussed at the outset of the chapter for completeness and as a contrast to secondary markets, which are the main focus of Chapter 4. Investment banking functions are considered, with a detailed discussion of the underwriting function. Global investment banking is analyzed because of its increasing importance.

Chapter 4 provides an analysis of the structure of secondary markets, with securities organized by where they are traded. Terminology is explained, and the functioning of the markets, primarily the NYSE and Nasdaq, are considered in some detail. It is recommended that instructors spend some time developing the differences between the NYSE and Nasdaq, and discuss the possible future forms that markets may assume.

NOTE: In March, 2006 the NYSE became a publicly traded company. Rapid changes are occurring with the NYSE and Nasdaq, and the text cannot reflect these events.

Chapter 4 includes brief discussions of bond markets and derivatives markets, both of which are considered in more detail in their respective chapters. Foreign markets are discussed in some detail so that students will have some idea of what is happening around the world. Other trends are analyzed, such as "in-house" trading by institutional investors.

This chapter also contains a discussion of major market indices, including the Dow Jones Averages, the S&P Indexes, and brief descriptions of Amex, Nasdaq, and foreign stock indices. It is important for students to understand market indexes, particularly the DJIA and the S&P 500 Index. Therefore, the discussion emphasizes these two indexes.

The chapter contains a discussion of the changing securities markets. This begins with the stimulus for the many changes that have transpired in recent years--institutional pressure and the Securities Acts Amendments of 1975--and ends with the current and projected status of the markets. An up-to-the-minute analysis of the changing nature of Wall Street is presented here, including the globalization of securities markets and the NYSE's role in the global marketplace. Obviously, the structure of the securities markets continues to change, and instructors can update developments as they choose.

CHAPTER OBJECTIVES

To explain primary and secondary markets in terms of their components and organizational structure.

To explain terminology (e.g., broker, specialist, and so forth) pertaining to markets and participants.

To analyze the structure and functioning of the secondary markets, with emphasis on the NYSE and Nasdaq.

To discuss stock market indexes, both their uses and their construction.

MAJOR CHAPTER HEADINGS [Contents]

The Importance of Financial Markets

[allocationally efficient vs. operationally efficient]

The Primary Markets

Initial Public Offerings (IPOs)
[IPOs; number of IPOs; some details]

The Investment Banker
[definition; underwriting, syndicate, prospectus; shelf rule]

Global Investment Banking
[managing the global offering; Euro market]

Private Placements
[advantages and disadvantages of private placements]

The Secondary Markets

[difference between primary and secondary markets]

U. S. Securities Markets for the Trading of Equities
[equities trade in the United States in three major marketplaces: the New York Stock Exchange (NYSE), the American Stock Exchange (Amex), and the Nasdaq Stock Market (Nasdaq)]

The New York Stock Exchange
[organization; merges with Arca Ex; listing requirements; specialists; bid and ask quotes; block trades; program trading]

American Stock Exchange
[size; activities]

The Nasdaq Stock Market
[current structure; market segments; size]

Comparisons of the Three Major Equity Markets
[share volume comparisons]

Regional Exchanges
[scope; changes]

Over-the-Counter Stocks
[stocks not listed and traded on an organized exchange or market; companies registered with the SEC vs. those not]

Electronic Communications Networks (ECNs)
[definition; examples of ECNs; Instinet; after-hours trading]

In-House Trading
[large institutions with multiple funds do cross-trading]

Foreign Markets
[description of many foreign markets; relative sizes]

Stock Market Indexes

[stock index vs. total return index]

The Dow Jones Averages
[blue-chip stocks; price-weighted index; the Dow devisor; points and levels; criticisms]

Standard & Poor's Stock Price Indexes
[composition; capitalization-weighted index]

Understanding a Capitalization-Weighted Index
[stock splits; recent performance]

Nasdaq Indexes
[composition; performance]

Other Indexes
[short description of other indexes]

Relationships Between Domestic Stock Indexes
[similarities; differences]

Foreign Stock Market Indicators

Bond Markets

[the trading of each of the four major types of bonds]

Treasury Bonds
[widely purchased, held, and traded]

Agency Bonds
[good secondary markets]

Municipal Bonds
[a relatively thin market]

Corporate Bonds
[institutional market]

The Changing Bond Market
[price information; transaction costs]

Derivatives Markets

[where options and futures trade]

The Changing Securities Markets

The National Market System (NMS)
[what it means]

The Intermarket Trading System (ITS)
[scope]

Changes in U. S. Markets
[changes at Nasdaq and NYSE]

The Globalization of Securities Markets
[electronic trading; bonds]

POINTS TO NOTE ABOUT CHAPTER 4

Exhibits, Figures and Tables

Exhibit 4-1 organizes the secondary markets by type of security. It is based on a three-part classification of equities, bonds, and puts and calls.

Exhibit 4-2 is new for the 10th edition. It shows where both listed and unlisted stocks are traded in the secondary markets.

Exhibit 4-3 is part of the NYSE website and discusses the role of both brokers and specialists.

Exhibit 4-3 illustrates how bid and ask quotes work.

Figure 4-1 is useful for illustrating the underwriting process in a simple manner. It shows at a glance the major steps in the underwriting process.

Figure 4-2 shows percentage share volume comparisons for the major domestic markets for one recent year.

Table 4-1 illustrates how a value-weighted index is constructed and calculated. This methodology applies to most indexes such as the S&P 500 Index.

ANSWERS TO END-OF-CHAPTER QUESTIONS

4-1. Financial markets are essential for both businesses and governments in raising capital to finance their operations. Both experience demands for funds that are not in balance with their actual funds on hand. Financial markets are absolutely essential to the functioning of our capitalistic economy.

Technically, primary markets can exist without secondary markets since new securities can be sold to investors. For example, bonds could be sold to institutional investors to be held until they mature. However, investors would have difficulty reselling these securities if they needed to, and many would be discouraged from buying them because of this reason.

4-2. Investment bankers act as intermediaries between issuers and investors. They provide several functions, including:

(1) an *advisory* function, wherein they offer advice to clients concerning the issuance of new securities;

(2) an *underwriting* function, consisting of the purchase of securities from an issuer and their subsequent sale to investors;

(3) a *marketing* function, involving the sale of the securities to the investing public.

4-3. In a primary offering involving investment bankers, the potential issuer of the securities meets with an investment banking firm for advice on selling the new issue. In a negotiated bid arrangement, these two parties negotiate and work together on the issue. Subsequently, the investment banker, working with other investment banking firms (i.e., a syndicate), underwrites the issue; that is, the investment bankers purchase the securities from the issuer, thereby assuming the risk involved in actually selling the securities. After all legal requirements have been met (e.g., the issue is registered with the SEC), the selling group sells the securities to the public via brokers who contact their customers about the issue.

4-4. The **equity markets** in the United States consist primarily of the organized exchanges--the NYSE, the Amex, Nasdaq (approved to be an exchange in January, 2006), and the regional exchanges. Over- the-counter securities are now traded on the OTC Bulletin Board or the Pink Sheets LLC.

- *Auction markets*, involving the NYSE, Amex, and the regional exchanges, include a bidding (auction) process in a specific physical location with brokers representing buyers and sellers.

- The NYSE is now a hybrid market, following its merger with Archipelago, an ECN.

- Nasdaq is a negotiated market, where dealers make the market in securities by standing ready to buy from, and sell to, investors based on bid-ask prices. Nasdaq has been approved to be an exchange.

4-5. Commission brokers are members of brokerage houses with memberships on exchanges. They act as brokers for customers. Investment bankers act as middlemen between the issuers of the securities and the purchasers, in the same way that brokers do. Some firms offer both investment banking and retail brokerage services.

4-6. Specialists are members of exchanges who are assigned to particular stocks on an exchange. They are charged by the exchange with maintaining a continuous, orderly market in their assigned stocks. They do this by going against the market, buying (selling) when the public is selling (buying).

Specialists act as brokers by executing orders for other brokers for a commission. They act as dealers by buying and selling specific stocks for their own accounts.

4-7. Specialists should be, and are, closely monitored and regulated. Because they maintain the limit books, they have knowledge of all limit orders on either side of the current market price. They are charged with acting for the public interest by maintaining an orderly market; simultaneously, they buy and sell for their own accounts in hopes of profiting from the spread between purchases and sales. Clearly, specialists must be closely regulated because of these potentially conflicting roles.

4-8. A specialist on the exchange often acts as a dealer, buying and selling for his or her own account. Nasdaq market makers may do the same thing.

4-9. NASD stands for the **National Association of Security Dealers**, a self- regulating body of brokers and dealers that oversees OTC practices. NASD licenses brokers and handles the punishment for violators of its prescribed fair practices.

Nasdaq is a computerized system for trading by broker/dealer.

4-10. An ECN is an Electronic Communication Network. Basically, they are fully computerized trading networks that match buy and sell orders from investors without the use of a dealer.

4-11. ECNs offer the possibility of very quick execution, low costs, trading after the exchanges are closed, and anonymity.

4-12. The NYSE was seeking a way to offer its customers almost instantaneous execution of orders, which some institutional investors want. They probably also realized that the future of trading is going to more heavily emphasize this type of trading.

4-13. An OTC security today is an unlisted security not trading on an exchange. Nasdaq trades listed securities, and in January 2006 was approved by the SEC to become an exchange. OTC securities typically involve very small, relatively unknown companies.

4-14. Almost all stock price indices today are market value weighted indexes, or capitalization weighted. The exception is the DJIA, a price-weighted index. The price weighted procedure is a holdover from the 19th Century, when the Dow Jones Industrial Average was started. All price indexes created today are market-value weighted indexes.

4-15. The Dow-Jones Industrial Average is a price-weighted average of 30 large (blue-chip stocks) trading on the NYSE. The S&P 500 Composite Index is a market value index consisting of 500 stocks, with a base period set to 10 (1941-1943).

These measures are the two most often-used indicators of what stocks in general are doing. The Dow-Jones Averages are supported by *The Wall Street Journal*, while the S&P 500 Index is the indicator most often used by institutional investors.

4-16. **Blue chip stocks** are large, well-established and well-known companies with long records of earnings and dividends. They are typically traded on the NYSE. Examples include Coca-Cola, General Electric, and Exxon Mobil.

4-17. The **EAFE Index**, or the European, Australia, and Far East Index, is a value-weighted index of the equity performance of major foreign markets. It is, in effect, a non-American world index.

4-18. **Blocks** are defined as transactions involving at least 10,000 shares. Large-block activity on the NYSE is an indicator of institutional investor participation in equity trading. The total number of large-block transactions has increased over the years on the NYSE.

4-19. The NYSE has merged with Archipelago, an ECN. It now describes itself as a hybrid market because it can offer trading using the traditional specialist system, or trading using the fully computerized ECN technology, which offers very quick execution.

4-20. The NYSE has approximately 2,800 common stocks listed. Nasdaq typically has more, although the number has declined in recent years.

4-21. In-house trading refers to internal trading by fund managers within one company without the use of a broker or an exchange. Traders agree to buy and sell in-house, or cross-trade, perhaps at the next closing price. Fidelity Investments operates an in-house trading system for its own funds because of the large amount of buying and selling it does every day. Large international investors will benefit from in-house trading.

4-22. Although a few bonds trade on the NYSE and ASE, the bond market is primarily an OTC market. All federal, agency, and municipal bonds trade OTC, and most corporates.

4-23. Growth stocks are the most likely stocks to split. As high-priced stocks split and their prices decline, they lose relative importance in the DJIA, which is a price-weighted series. High-price stocks carry more weight than do low-priced stocks in such a series.

4-24. The divisor for the DJIA can be found in *The Wall Street Journal*, as well as other sources.

4-25. The price of Altria is much higher than the price of Pfizer (as of early 2006). Thus, a 10 percent change in Altria would have a larger impact.

4-26. Yes. This can be shown by constructing a simple example of price X number of shares for each stock.

4-27. Presumably, if you owned a portfolio of large cap stocks you would prefer to see both indexes moving in a similar manner, which would then be more reassuring as to how your own portfolio was performing. On the other hand, if you owned a portfolio of small and mid-cap stocks, you would probably prefer to see the S&P doing better because it might be more closely reflecting the performance of such stocks. The DJIA will reflect the performance of the large stocks in that index.

ANSWERS TO END-OF-CHAPTER PROBLEMS

4-1. This problem illustrates how stock splits can affect a price-weighted average.

a) If one of the stocks has a 2-for-1 split, the sum of the 15 stocks would be $1450. With an unchanged divisor of 15, the average would of course decrease, in this case to 96.67.

b) To keep the value of the index unchanged at 100, the divisor would obviously have to be lowered to 14.5, given a sum of 1450.

4-2. C

Value Weighted Index = [(50 X 10 + 20 X 12 + 40 X 9) /
(40 X 10 + 30 X 6 + 50 X 9)] X 100= 106.80

COMPUTATIONAL PROBLEMS

4-1. a) The sum of the prices is 10875 (.12493117) = 1358.63

b) 1/.12493117 = 8.00; 8 (4.40) = 35.20; 35.20 / 105 = .335. Therefore, Pfizer alone accounted for about 1/3 of the total movement in the DJIA that day.

c) 1358.63 – 23.75 = 1334.88; 1334.88 / 10875 = .122748

4-2. a) [11722.98 / 10872.48] – 1.0 = 7.8225%; [1527.46 / 1265.32] – 1.0 = 20.7173%.

b) 1265.32 (.09) = 113.88; 1265.32 – 113.88 = 1151.44

Chapter 5: How Securities Are Traded

CHAPTER OVERVIEW

Chapter 5 allows students to concentrate solely on the mechanics of securities trading after learning about financial markets in Chapter 4. This material typically is of great interest to most students, and instructors must decide how much time and effort to devote to it.

Chapter 5 devotes considerable attention to the major aspects of brokerage transactions. An important part of this discussion centers on brokers themselves, a subject which tends to interest students. The chapter discussion explains what brokers do, the types of brokerage operations (full-service vs. discount brokers), and other issues.

The remainder of the brokerage transaction discussion covers the major points that students need to know. These include the types of brokerage accounts, commissions, investing without a broker, how orders work, the types of orders, clearing procedures, using the internet, and so forth. Instructors will wish to vary their discussions of this material depending upon student knowledge, interest, time availability, and current discussions in the popular press.

There are numerous interesting illustrations that can be given of brokerage costs, how orders work, market orders versus limit orders, and so forth. The popular press regularly has articles that would be appropriate for class discussion.

Chapter 5 contains a thorough discussion of investor protection in the markets, a topic of concern to many investors. This covers not only federal legislation and the SEC but also self-regulation by the stock exchanges, including the latest measures on the NYSE such as trading halts and sidecars. The role of the NASD in regulating brokers and dealers also is covered.

The remainder of the chapter is devoted to margin trading and short selling. These are important subjects, and ones that many students have difficulty understanding, particularly short selling. Instructors should spend a reasonable amount of time on these concepts.

CHAPTER OBJECTIVES

To provide students with a good understanding of what brokers do, and how brokerage accounts work.

To explain the mechanics of securities trading, such as brokerage transactions, margin trading and short selling.

To provide an overview of how markets are regulated.

MAJOR CHAPTER HEADINGS [Contents]

Brokerage Transactions

Brokerage Firms
[full-service brokers, discount brokers, on-line discount brokers]

Brokerage Accounts
[cash vs. margin, asset management account, wrap account]

Commissions
[negotiated rates; examples]

Investing Without a Broker
[dividend reinvestment plans; direct stock purchase programs]

How Orders Work

Orders on the Organized Exchanges
[how orders work on the NYSE; specialists; automation on the NYSE]

Orders in the Nasdaq Stock Market
[role of the marketmakers; actual order trading in the markets]

Decimalization of Stock Prices
[NYSE and Nasdaq convert to decimals]

Types of Orders
[market, limit, stop]

Clearing Procedures
[settlement date; street name]

Investor Protection In The Securities Markets

Government Regulation
[Federal legislation; the SEC; insider trading]

Self-Regulation
[regulation by the NYSE--trading halts, sidecars, Rule 80A; the role of the NASD]

Other Investor Protections
[Securities Investor Protection Corporation (SIPC); mediation and arbitration]

Margin

How Margin Accounts Can Be Used

Margin Requirements and Obligations
[definition; initial margin; maintenance margin]

Margin Requirements on Other Securities

Some Misconceptions About Margin

Short Sales

[definition; examples; details of short selling]

Selling Short As An Investor
[popularity; short interest ratio]

POINTS TO NOTE ABOUT CHAPTER 5

Exhibits, Figures and Tables

Exhibit 5-1 outlines the details on types of orders: market, limit and stop orders. The intent is to present this material in a concise format, and illustrate it with examples.

Exhibit 5-2 contains a brief description of the major legislative acts regulating the securities markets. This material can be very tedious when presented as regular text. This presentation better allows instructors to devote as much, or as little, time as they desire.

Exhibit 5-3 is a detailed discussion of how short selling works. Many students have difficulty understanding exactly how one sells short.

Exhibit 5-4 presents the details of short selling. Such details are important, and this presentation helps to keep these details from being "lost".

Box Inserts

Box 5-1 discusses possible careers in the financial services industry, with primary emphasis on brokers. It is based on material from the Department of Labor.

ANSWERS TO END-OF-CHAPTER QUESTIONS

5-1. A **market order** ensures that a customer's order will be executed quickly, at the best price the broker can obtain. Thus, an investor who wants to be certain of quickly establishing a position in a stock (or getting out of a stock) will probably want to use a market order.

A **limit order** specifies a particular price to be met or bettered. The purchase or sale will occur only if the broker obtains that price, or betters it. Therefore, an investor can attempt to pay no more than a certain price in a purchase, or receive no less than a certain price in a sale; a completed transaction, however, cannot be guaranteed.

A **stop order** specifies a certain price at which a market order takes effect. The exact price specified in the stop order is not guaranteed, and may not be realized.

Limit orders are placed on opposite sides of the current market price of a stock from stop orders. For example, while a buy limit order would be placed below a stock's current market price, a buy stop order would be placed above its current market price.

5-2. Quoting prices in cents has generally lowered the spread on stocks, thereby helping investors.

5-3. **Margin** is the equity that a customer has in a transaction.

The Board of Governors of the Federal Reserve System sets the **initial margin**, which is the percentage of the value of a securities transaction that the purchaser must pay at the time of the transaction. The purchaser then borrows the remainder from the broker, traditionally paying as interest charges the broker loan rate plus 1-2% (approximately). Completion, however, may result in significantly different rates paid by the customer.

In addition to the initial margin, all exchanges and brokers require a **maintenance margin** below which the actual margin cannot go (this is typically 30% or more).

5-4. Actual margin between the initial and maintenance margins results in a restricted account where no additional margin purchases are allowed.

If the actual margin declines below the maintenance margin, a **margin call** results, requiring the investor to put up additional cash or securities (or be sold out by the brokerage firm).

5-5. If an investor sells short, he or she is (usually) selling a security that is not owned. The broker borrows the security from another customer (who owns it), and lends it to the short seller who must subsequently replace it. In effect, the investor from whom the security is borrowed never knows it since his or her monthly statement continues to reflect a long position.

5-6. Short sales on the exchanges are permitted at the last trade price only if that price equaled or exceeded the last price before it. Otherwise, the seller must wait for an uptick. This restriction does not apply to Nasdaq stocks.

5-7. A sell limit order and a buy stop order are above the current market price.

A buy limit order and a sell stop order are below the current market price.

5-8. The margin requirement for U. S. government securities is 10 percent or less.

5-9. With a **wrap account**, investors with large sums to invest use a broker as a consultant to choose an outside money manager from a list provided by the broker. All costs are wrapped in one fee--the cost of the broker-consultant, the money manager, and transactions costs.

For stocks, a typical fee is 3% of the assets managed (and less for larger accounts).

5-10. A discount broker offers reduced brokerage commissions relative to full-service brokers such as Merrill Lynch but also offers most of the same services, the exception generally being research reports and recommendations/advice.

Large discount brokers include Fidelity, Charles Schwab, and Quick and Reilly. Investors can visit an office, call a broker at one of these firms, or use their internet facilities.

Internet only discount brokers offer bare-bones brokerage commissions but less in the way of services. Many of these firms tend to be quite small relative to the major discount brokers.

5-11. More than 800 companies offer dividend reinvestment plans, whereby dividends can be used to purchase additional shares of the company paying the dividend.

Many companies now offer direct purchase stock plans, allowing investors to purchase shares directly from the company. Exxon Mobil is a good example. Investors can open a direct-purchase account with Exxon to buy its stock.

5-12. The role of specialists is critical on an auction market such as the NYSE. They are expected to maintain a fair and orderly market in those stocks assigned to them, often going against the market.

As brokers, specialists maintain the *limit book*, which records all limit orders. The commission brokers leave the limit orders with the specialist to be filled when possible, paying a specialist a fee to do this.

As dealers, specialists buy and sell shares of their assigned stocks to maintain an orderly market. The specialist will buy from commission brokers with orders to sell and sell to those with orders to buy, hoping to profit by a favorable spread between the two sides.

5-13. Both of these terms apply to limit orders. An open order remains in effect for six months unless canceled or renewed. A day order is effective for only one day.

5-14. The mission of the SEC is to administer laws in the securities field and to protect investors and the public in securities transactions. In general, it administers all securities laws.

5-15. The National Association of Securities Dealers (NASD) regulates brokers and dealers. All brokers must register with the NASD in order to trade securities. The NASD can bar individuals from association with any NASD member; having done so, it has no jurisdiction over the individual. The NASD can fine an individual. Penalties can be appealed to the SEC, which suspends the monetary penalties until resolution.

5-16. Investors are interested in margin accounts because such accounts permit the magnification of gains (but also losses). With a margin requirement of 50%, percentage gains are doubled (ignoring transaction costs and interest costs) because the investor only has 50% of the value of the transaction at stake; that is, his or her own equity is only 50% of the value of the transaction.

The risks are obvious. If the transaction goes against the investor, the percentage losses are doubled, and interest costs must still be paid.

Investors are required to have margin accounts for some transactions, such as short sales.

5-17. Short sales account for less than 10 percent of all reported sales. The public accounts for about one third of short sales on the NYSE, with NYSE members accounting for about two-thirds.

5-18. The basis of regulation of mutual funds is the Investment Company Act of 1940. This federal act has been incredibly successful in regulating the investment company industry, providing almost total confidence in investors as to the operations of investment companies.

5-19. The Investors Advisors Act of 1940 simply requires would-be investment advisors to fill out a form and pay a fee to register with the SEC. There are no education or competency requirements. Therefore, investors have no assurances as to the abilities of people offering advice.

5-20. Investors may choose to use a full-service broker for several reasons. First, they may have confidence in a particular broker and wish to have the personal contact implied in such a relationship. Second, they can seek, and obtain, advice from the broker, and by extension, the entire resources of a firm such as Merrill Lynch. Third, they can obtain

considerable research reports and investing information, which are often extensive in nature. Fourth, full-service brokers may offer a wider range of services than many discount brokers, and investors needing such services will want to have them available.

5-21. The SEC does not provide assurances to investors when an IPO is marketed in terms of being able to tell investors that the company will be successful. The SEC does ensure that the company selling the new securities has complied with various accounting and legal provisions, thereby hopefully preventing the sale of new securities based upon fraudulent or misleading information.

5-22. The specialist system on the exchanges assigns stocks to specialist firms, who then make a market in the stock. Specialists buy from and sell to the public to maintain an orderly market in the stock. The system has worked well over the years, and has provided some notable successes in maintaining orderly markets. For example, in the great crash of October 19, 1987, specialists remained at their posts, trading stocks and providing liquidity.

Dealers in the Nasdaq stock market make markets in stocks, buying from investors and selling to them from their inventory. Thus, they have a vested interest in each transaction, and in the spread between the bid and asked price. Investigations in the 1990s revealed that these spreads often were too wide relative to what should be expected. In most cases, these spreads have narrowed since these investigations.

5-23. The initial margin requirement is set by the Federal Reserve and has been 50% for stocks for many years. It can be used to curb speculative activity in the stock market. The maintenance margin is set by exchanges or brokerage houses to protect themselves in case the investor's position becomes severely weakened.

5-24. Marked to the market means that overnight each margin account is checked by the brokerage firm to see if it is in compliance with all margin requirements. If not, adjustments will have to be made.

5-25. A short seller must have a margin account.

5-26. Theoretically, a stock sold short could rise to any price, and in that sense the losses are "unlimited." In actuality, of course, this is not likely to occur. For example, very few stocks ever sell for more than $500, and fewer still ever sell for more than $1,000 per share.

ANSWERS TO END-OF-CHAPTER PROBLEMS

5-1. (a) A limit order to sell is placed above the current market price. If the limit order is set at $130, the investor will realize a gross profit of at least $30 (ignoring transaction costs).

(b) A sell stop order is placed below the market price. If the stop order is placed at $120, the investor should realize a profit of approximately $20 per share. Technically, to be certain of $20 per share, the stop order probably would have to be set slightly above $120 because a stop price is actually an activator that initiates a market order when the specified price is reached.

5-2. To realize a gross profit of $5000 on 200 shares sold short at $75, the investor must cover at (ignoring transaction costs):

$$\begin{aligned} 200(\$75) &= \$15{,}000 \\ &- \quad X \\ &= \$ \ 5000 \text{ profit} \end{aligned}$$

X is $10,000, which must be divided by 200 shares.

ANSWER: $50 per share

For a profit of $1000, the calculation is:

$$\begin{aligned} &\$15{,}000 \\ &- \quad X \\ &\$ \ 1000 \end{aligned}$$

X is $14,000, which again must be divided by 200 shares.

ANSWER: $70 per share.

5-3. 100 shares at $50 per share is a total cost of $5000. At 50% margin, the investor must put up $2500, resulting in a gross profit percentage relative to equity of

$1000/$2500 = 40%

At 40% margin, the investor must put up $2000, resulting in a gross profit percentage relative to equity of

$1000/$2000 = 50%

At 60% margin, the investor must put up $3000, resulting in a gross profit percentage relative to equity of

$$\$1000/\$3000 = 33.3\%$$

5-4. The initial margin is 50% of $6000, or $3000. The other $3000 is borrowed from the broker.

(a)

$$\text{actual margin} = \frac{\text{market value of securities - amount borrowed}}{\text{market value of securities}}$$

$$= \frac{\$5000 - \$3000}{\$5000}$$

$$= 40\%$$

(b) In a restricted account, the actual margin is between the initial margin (i.e., 50%) and the maintenance margin (i.e., 30%). The actual margin is now:

$$\text{actual margin} = \frac{\text{market value of securities - amount borrowed}}{\text{market value of securities}}$$

$$= \frac{\$5500 - \$3000}{\$5500}$$

$$= 45.5\%$$

Therefore, *the account* is restricted.

(c) A margin call results when the actual margin declines below the maintenance margin. At a stock price of $49, the actual margin is:

$$\text{actual margin} = \frac{\$4900 - \$3000}{\$4900}$$

$$= 38.8\%$$

Because the actual margin is not below the maintenance margin of 30%, there is no margin call.

(d) At a stock price of $45, the actual margin is

$$\text{actual margin} = \frac{\$4500 - \$3000}{\$4500}$$

$$= 33.3\%$$

There is no margin call at a price of $45.

At $35, however, the actual margin is

$$\text{actual margin} = \frac{\$3500 - \$3000}{\$3500}$$

$$= 14.3\%$$

The amount of the margin call is calculated as:

$$.3 = \frac{(x + \$3500) - \$3000}{(x + \$3500)}$$

$$= \$785.71$$

COMPUTATIONAL PROBLEMS

5-1. (a) The margin requirement is 50%.

Amount put up = .50 x 28,600 = $14,300

Amount borrowed = .50 x 28,600 = $14,300

Gross profit = $28,600 - $5,400 = $23,200

Net Profit = $23,200 – [$14,300 x .09] - $20 = $21,893
Gross pr. - Int. costs - 2 way transactions costs

(b) initial investment = $14,300 + $20 = $14,320

% return on investment = $21,893 / $14,320 = 1.5288, or 153% (rounded)

5-2. (a) initial cost of 100 shares = $15,600 + $20.

Initial investment put up by investor buying on 60% margin = .6 ($15,600) = $9,360 + $20 = $9,380

Margin cost for one year = $6,240 x .09 = $561.60

Dollar gain = $23,300 – $15,600 - $561.60 + 130 - 20 = $7,248.40

(b) % return on investment = $7,248.40/$9,380 = .7728 = 77.28%

5-3. (a)
$$\text{actual margin} = \frac{\$6,100 - \$4,100}{\$6,100} = 32.79\%$$

(b)
$$\text{actual margin} = \frac{\$5,950 - \$4,100}{\$5,950} = 31.09\%$$

No margin call because actual margin is greater than the maintenance margin.

(c)
$$\text{actual margin} = \frac{\$5,525 - \$4,100}{\$5,525} = 25.79\%$$

The actual margin is now below the maintenance margin, thereby generating a margin call.

(d) The amount of the margin call is calculated as:

$$.3 = \frac{(x + \$5,525) - \$4,100}{(x + \$5,525)}$$

$= \$332.14$

Chapter 6: The Returns and Risks from Investing

AN OVERVIEW

The purpose of Chapter 6 is to present an analysis of risk and return early enough in the text for these concepts to be used throughout the book. Return and risk are the key elements of investment decisions--in effect, everything else revolves around these two factors. It makes sense, therefore, to analyze and discuss these concepts in detail.

Chapter 6 focuses only on understanding and measuring realized returns and wealth. This allows students to concentrate on this one issue in a comprehensive manner. All of the equations for calculating the various types of returns needed in a basic Investments course are included in this chapter. Beginning students are unlikely to use anything beyond what is contained here with regard to realized returns.

Chapter 6 provides a complement to Chapter 7, which covers expected returns and risk and the basic calculations of portfolio theory. Thus, in Chapter 6 we analyze and calculate **realized returns**, while in Chapter 7 we analyze and calculate **expected returns**, based on probability distributions.

This discussion centers on the definition and meaning of return and risk including the components of return, the sources of risk, and types of risk. The emphasis is on how to both understand and measure return and risk. Considerable attention is devoted to explaining the **total return** (TR), **return relative** (RR), and **cumulative wealth** calculations, which are used throughout this text and are exactly comparable to the definitions used in such prominent sources as the Ibbotson Associates Yearbook. Numerous examples are presented.

The discussion of returns measures facilitates the presentation of the data on rates of return and wealth indexes. This data is both important (as benchmarks) and interesting (it can be the basis of lively class discussion). The data used here were collected and calculated by the author, and correspond closely with the Ibbotson data.

The use of the geometric mean is fully explored, along with wealth indexes. Although challenging, this material is important. Calculations include measuring the yield component and capital gains component of total returns and cumulative wealth separately, measures of inflation-adjusted returns, and risk premiums.

Definitions of risk are presented and discussed. While examples include calculating the standard deviation, the emphasis here is on understanding and using it.

This chapter contains an extensive problem set.

CHAPTER OBJECTIVES

To explain the meaning and measurement of both return and risk.

To illustrate the use of such measures as the geometric mean and standard deviation.

To present the well-known data on rates of return for major financial assets for long periods of time.

To present and illustrate virtually all the calculations needed for a thorough understanding of return and risk.

MAJOR CHAPTER HEADINGS [Contents]

An Overview

Return

The Two Components of Return
[Yield; Capital gain/loss; total return = the sum of these two; examples]

Risk

Sources of Risk
[sources include: interest rate; market; inflation; business; financial; liquidity; exchange rate; country]

Measuring Returns

Total Return
[definition; explanation; examples using the S & P 500 Index]

Return Relative
[definition; example]

Cumulative Wealth Index
[definition; example; relation between cumulative wealth and total return]

Taking a Global Perspective

International Returns and Currency Risk
[how currency changes affect investors; calculating currency-adjusted returns; the dollar and investors]

Summary Statistics for Returns

[arithmetic mean; geometric mean; examples; arithmetic mean versus geometric mean]

Arithmetic Mean

Geometric Mean

Arithmetic Mean Versus Geometric Mean

Inflation-Adjusted Returns
[definition; relation between nominal return and real return; the CPI]

Measuring Risk

Variance and Standard Deviation
[definition; formulas; example]

Risk Premiums
[definition; equity risk premium; calculation; the expected risk premium]

Realized Returns And Risks From Investing

Total Returns and Standard Deviations for the Major Financial Assets
[linkage between arithmetic and geometric mean; data on rates of return for major asset classes]

Cumulative Wealth Indexes
[cumulative wealth graph showing major financial assets; inflation-adjusted cumulative wealth; the yield and price change components of cumulative wealth; compounding and discounting]

The Components of Cumulative Wealth
[the cumulative price change; the cumulative dividend yield; how the components go together]

Compounding and Discounting

POINTS TO NOTE ABOUT CHAPTER 6

Exhibits, Figures and Tables

Exhibit 6-1 should be reviewed carefully with students as examples of how to calculate total returns and return relatives for three different securities. This is an important calculation for the entire course, and students should be very comfortable with doing such calculations.

Figure 6-1 shows the spread in returns for the major financial assets covered in Table 6-6. As we would expect, both stock categories have wider spreads than do bonds, and small stocks have a wider dispersion than does the S&P 500.

Figure 6-2 shows cumulative wealth indices for the major financial assets since the beginning of 1920. This is a good source of class discussion because students find this interesting—how much $1 can compound to over time. Instructors may wish to emphasize how these values are calculated (which is covered in the chapter).

Table 6-1 shows annual S&P 500 data--prices and dividends--from the beginning of 1920 through the latest year possible. Calculated total returns for each year are presented. This table provides a good source of data for discussions throughout the text involving market returns as measured by the S&P 500 Index. These data were calculated and compiled by Jack Wilson and Charles Jones, and have been used in several articles.

Table 6-2 illustrates the impact of currency movements on an investor's returns from.

Tables 6-3 and 6-4 involve the calculation and interpretation of the arithmetic and geometric means using TRs. Instructors should stress the meaning of the geometric mean.

Table 6-5 (for historical data) shows calculations for the standard deviation and can be handled by students on their own or emphasized by instructors to the extent thought necessary.

Table 6-6 is an important table on rates of return and should be used as a transparency for class discussion. This table is important for numerous reasons: investors need to know the historical return series for benchmark purposes, it illustrates the nature of the return--risk tradeoff, and it allows you to talk about the variability in returns over time by analyzing the arithmetic and geometric means as well as the standard deviations presented in the table. In addition, other points can be developed, such as the "small" stock effect, and so forth.

NOTE: This table corresponds quite well with the comparable table from Ibbotson Associates. Key differences include a start date at the beginning of 1920, and the use of more stocks for the years 1926-1956 than the 90 stocks which Ibbotson Associates uses.

Box Inserts

There are no box inserts for Chapter 6.

ANSWERS TO END-OF-CHAPTER QUESTIONS

6-1. Historical returns are realized returns, such as those reported by Ibbotson Associates.

Expected returns are returns expected to occur in the future. They are the most likely returns for the future, although they may not actually be realized because of risk.

6-2. A Total Return can be calculated for any asset for any holding period. Both monthly and annual TRs are often calculated, but any desired period of time can be used.

6-3. **Total return** for any security consists of an *income (yield) component* and a *capital gain (or loss) component*.

- The yield component relates dividend or interest payments to the price of the security.
- The capital gain (loss) component measures the gain or loss in price since the security was purchased.

While either component can be zero for a given security over a specified time period, only the capital change component can be negative.

6-4. **TR**, which is another name for **holding period yield**, is a decimal or percentage return, such as +.10 or -15%. The term "holding period return" is sometimes used instead of TR.

Return relative adds 1.0 to the TR in order that all returns can be stated on the basis of 1.0 (which represents no gain or loss), thereby avoiding negative numbers so that the geometric mean can be calculated.

6-5. The **geometric mean** is a better measure of the change in wealth over more than a single period. Over multiple periods the geometric mean indicates the *compound rate of return*, or the rate at which an invested dollar grows, and takes into account the variability in the returns.

The geometric mean is always less than the arithmetic mean because it allows for the compounding effect--the earning of interest on interest.

6-6. The **arithmetic mean** should be used when describing the average rate of return without considering compounding. It is the best estimate of the rate of return for a single period. Thus, in estimating the rate of return for common stocks for next year, we use the arithmetic mean and not the geometric mean. The reason is that because of variability in the returns, we will have to earn, on average, the arithmetic rate in order to achieve a rate of growth which is given by the smaller geometric mean.

6-7. See Equation 6-13. Knowing the arithmetic mean and the standard deviation for a series, the geometric mean can be approximated.

6-8. An **equity risk premium** is the difference between stocks and a risk-free rate (proxied by the return on Treasury bills). It represents the additional compensation, on average, for taking the risk of equities rather than buying Treasury bills.

6-9. As Table 6-6 shows, the risk (standard deviation) of all common stocks for the 1920-2004 period was 19.7%, about two and one-half times that of government and corporate bonds. Therefore, common stocks are clearly more risky than bonds, as they should be since larger returns would be expected to be accompanied by larger risks over long periods of time.

6-10. **Market risk** is the variability in returns due to fluctuations in the overall market. It includes a wide range of factors exogenous to securities themselves.

Business risk is the risk of doing business in a particular industry or environment. Interest rate risk and inflation risk are clearly directed related. Interest rates and inflation generally rise and fall together.

6-11. **Systematic risk**: market risk, interest rate risk, inflation risk, exchange rate risk, and country risk.

Nonsystematic risk: business risk, financial risk, and liquidity risk.

6-12. **Country risk** is the same thing as **political risk**. It refers to the political and economic stability and viability of a country's economy. The United States can be used as a benchmark with which to judge other countries on a relative basis.

Canada would be considered to have relatively low country risk although some of the separation issues that have occurred there have probably increased the risk for Canada. Mexico seems to be on the upswing economically, but certainly has its risk in the form of nationalized industries, overpopulation, and other issues. Mexico also experienced a dramatic devaluation of the peso.

6-13. The return on the Japanese investment is now worth less in dollars. Therefore, the investor's return will be less after the currency adjustment.

EXAMPLE: Assume an American investor in the Japanese market has a 30% gain in one year but the Yen declines in value relative to the dollar by 10%. The percentage of the original investment after the **currency risk** is accounted for is (0.9)(130%) = 117%. Therefore, the investor's return is 17%, not 30%. In effect, the investor loses 10% on the original wealth plus another 10% on the 30% gain, or a total of 13 percentage points of the before-currency-adjustment return of 130% of investment.

6-14. *Risk is the chance that the actual outcome from an investment will differ from the expected outcome*. Risk is often associated with the dispersion in the likely outcomes. Dispersion refers to variability, and the standard deviation is a statistical measure of variability or dispersion.

Standard deviation measures risk in an absolute sense.

Beta, discussed in Chapter 9, is a relative measure of the risk of an individual security in relation to the overall market, which has a beta of 1.0. Betas have intuitive meaning only in relation to the benchmark of 1.0 for the market beta.

6-15. A wealth index measures the cumulative effect of returns over time, typically on the basis of $1 invested. It measures the level rather than changes in wealth.

The geometric mean is the *nth* root of the cumulative wealth index. Alternatively, adding 1.0 to the decimal value of the geometric mean and raising this number to the nth power produces the cumulative wealth index.

6-16. You cannot validly compare an 85-year (1920-2004) mean return with recent return figures because of inflation premiums. The *expected* return on common stocks may be higher than the *historical* realized mean because of a higher inflation premium (at a minimum). The proper comparison is either between the historical returns on both stocks and bonds or the current expected returns on both stocks and bonds.

6-17. Dividing 1.0 + the geometric mean return for common stocks by 1.0 + the geometric mean for inflation for a given period, and subtracting out the 1.0, produce the inflation-adjusted rate of return.

6-18. The two components of the cumulative wealth index are the yield (income) component and the price change (capital gain or loss) component. Multiplying these two components together produces cumulative wealth. Knowing one of these components, the other can be calculated by dividing the known component into the cumulative wealth index number.

6-19. No. These relationships are not linear, nor is there any reason why they should be. The risk on common stocks relative to bonds has been more than twice as great.

6-20. This means that a loss occurred. An index number less than 1.0 connotes a loss. The capital gain component for bonds over some very long periods of time has, in fact, been less than 1.0, indicating a negative rate of return.

CFA

6-21. *Purchasing power risk* is the risk of inflation reducing the returns on various investments. One should look at the total return of equities on a price level adjusted basis.

Interest Rate Risk is a rise in the level of interest rates that depresses the prices of fixed income instruments and frequently causes lower prices for equities. Interest rate volatility and uncertainty are both relevant.

Business Risk includes the risks associated with the business cycle. Stock prices tend to go down in anticipation of a downturn in the business cycle. Factors affecting the business cycle include the impact of monetary policy, changes in technology, and changes in supply of raw materials. Attempting to correctly forecast the turning point in a business cycle and the factors that affect a business cycle can reduce the business risk.

Market Risk is the general risk associated with fluctuations in the stock market. When the stock market declines, most stocks go down. While a low beta for a stock or a defensive stock position may reduce the volatility, the stock market has a pervasive influence on individual stocks.

Exchange rate risk is the potential decline in investment value due to a decline in the currency in which the shares or bonds are held.

Regulatory risk is the risk of an unanticipated change in the regulation of factors that affect investments such as changes in tax policy.

Political risk is the unanticipated change in investment environment due to a change in political parties or a change of view of the current political party.

CFA 6-22. A

CFA 6-23. C

Expected Value = 0.25 X 0.08 + 0.50 X 0.12 + 0.25 X 0.16 = 0.12
Variance = 0.25 X $(0.08 - 0.12)^2$ + 0.50 X $(0.12 - 0.12)^2$ + 0.25 X $(0.16 - 0.12)^2$
= 0.0008

Standard deviation = $(.0008)^{1/2}$ = 0.0283

ANSWERS TO END-OF-CHAPTER PROBLEMS

6-1. Using Extell data from Demonstration Problem 6-1:

Year	capital gain (loss)	total $ return
2001	-$10.30	-$6.86
2002	3.40	6.84
2003	-11.00	-7.56
2004	39.55	42.99
2005	25.75	29.46

TR for 2003 = ($3.44 + ($56.70 - $67.70)) / $67.70

= -.1117 or -11.2%

TR for 2004 = ($3.44 + ($96.25 - $56.70)) / $56.70

= .7582 or 75.8%

NOTE: These two years were chosen specifically for their contrast. This is a good opportunity for instructors to point out how TRs for a company can fluctuate violently from year-to-year. This shows dramatically the risk of common stocks as well as the opportunities for large returns.

6-2. This investor would have a (short-term) capital gain, with a tax liability of

$5000 - $4000 = $1000 (.28) = $280

6-3. Calculating Total Returns (TRs) for these assets:

(a) $TR_{ps} = (D_t + (P_E - P_B)) / P_B$

where D_t = the preferred dividend
P_E = ending price or sale price
P_B = beginning price or purchase price

TR = (5 + -7) / 70
= -2.86%

(b) $TR_w = (Ct + PC) / PB$

where C_t is any cash payments paid (there are none for a warrant)

PC = price change during the period

TR = (0 + 2)/11

= 18.18% for the three month period

(c) $TR_b = (I_t + PC) / P_B$

= (240* + 60) / 870

= 34.5% for the two year period.

*interest received is $120 per year (12% of $1000) for two years.

Calculating Return Relatives (RRs) for these examples:

(a) a TR of -2.86% is equal to a RR of .9714 or (1.0+ [-.0286])

(b) a TR of 18.18% is equal to a RR of 1.1818

(c) a TR of 34.5% is equal to a RR of 1.345

6-4. Calculate future values using tables at end of text: @12%

$100 (1.762) = $176.20 after 5 years
$100 (3.106) = $310.60 after 10 years
$100 (9.646) = $964.60 after 20 years
$100 (29.96) = $2996.00 after 30 years

Calculate present values using tables at end of text: @12%

$100 (.567) = $56.70 after 5 years
$100 (.322) = $32.20 after 10 years
$100 (.104) = $10.40 after 20 years
$100 (.033) = $3.30 after 30 years

6-5. (a) The arithmetic rate of return is
[.3148 + (4.847) + 20.367 + 22.312 + 5.966 + 31.057] / 6 = 17.72

The geometric mean rate of return for the S&P 500 Composite Index for 1980-1985 (from Table 6-1) is:

$G = (1.3148 \times .95153 \times 1.20367 \times 1.22312 \times 1.05966 \times 1.31057)^{1/6} - 1.0$

$= (2.5579111)^{1/6} - 1.0$

= 1.1694 - 1.0 = .1694 or 16.94%

6-6. Refer to Equation 6-12 for the standard deviation formula.
NOTE: We use n-1 in the calculation.

Year	TR(%),X	$X-\bar{X}$	$(X-\bar{X})^2$
1980	31.480	13.7575	189.2688
1981	-4.847	-22.5695	509.3823
1982	20.367	2.6445	6.9934
1983	22.312	4.5895	21.0635
1984	5.966	-11.7565	138.2153
1985	31.057	13.3345	177.8089
	106.335		1042.7322

$\bar{X} = 17.7225$

1042.7322/5 = 208.5464 = variance

$(208.5464)^{1/2}$ = 14.44%

6-7. \$100(1.3148)(.95153)(1.20367)(1.22312)(1.05966)(1.31057)(1.18539)(1.05665) (1.16339) (1.31229) = 4.89140 = the cumulative wealth index for this period.

$(4.89140)^{1/10}$ = 1.17204

1.17204 - 1.0 = .17204 or 17.204%

6-8. There are 85 years for the period Jan. 1920 through Dec. 2004.

Cumulative wealth = $(1.10259)^{85}$ = \$4,028.97

6-9. Cumulative wealth = $(1.0608)^{84}$ = \$142.30

6-10. $(1.0532)^{84}$ = \$98.06

NOTE: the data start at the beginning of 1920; therefore, there are 84 years, or (2003 - 1920) + 1

This provides practice for periods other than the 85 years from 1920 through 2004.

6-11. $(26.965)^{1/83}$ = 1.0405; 1.0405 - 1.0 = .0405 or 4.05%

6-12. First, raise 3.00 to the 73rd power;

$(1.0300)^{73}$ = 8.652

Second, divide nominal cumulative wealth by the cumulative inflation index.

$13,293.14 / 8.652 = $1,536.42 = inflation-adjusted CWI for small common stocks, 1926-1998.

6-13. $(8.54/1)^{1/78} = 1.0279$

1.0279 - 1.0 = .0279 or 2.79%

NOTE: For a problem such as this, always divide the ending value by the beginning value. There are 78 years here [(2003-1926) +1]

6-14. $(1.0446)^{85} = 40.81$ = cumulative wealth index for the yield component

From Figure 6-2, 4,029 is the cumulative wealth index value for stocks at the end of 2004.

4,029 / 40.81 = 98.73 = cumulative wealth index value for the capital gain or price change component.

NOTE: 40.81 X 98.73 = 4,029.17 (rounding errors account for the difference).

6-15. Obviously, we must put the two components of cumulative wealth on the same basis. Converting the geometric mean for the yield component to cumulative wealth, we have

$(1.01)^{79} = 13.4852$ NOTE: [(1998-1920) +1] = 79 years

Cumulative wealth index = 13.4852 X 6056.65 = $81,675.14.
The CWI for this (or any other financial asset) series is the product of the two components.

NOTE: The numbers here are made-up, and clearly not realistic. They are for illustration purposes only.

6-16. The two ways to calculate inflation-adjusted returns are:

1. 1.05316 / 1.02496 = 1.0275; $(1.0275)^{84} = 9.7756$

2. $(1.05316)^{84} = 77.54$; $(1.02496)^{84} = 7.9320$;

   77.54 / 7.932 = 9.7756

6-17. Using a spreadsheet package, enter the 5 TRs from Table 6-1 for the years 1927-1931 as Return Relatives. Round the returns to two decimal places. The program should calculate the geometric mean as -4.46%.

Knowing that the ending wealth index for 1931 is 0.79591, the same result can be obtained by calculating the geometric mean. Taking the fifth root of the wealth index using a calculator produces a result of .955, which is a geometric mean of -4.46% (after subtracting from 1.0 and multiplying by 100).

6-18. Any set of TRs that are identical will produce a geometric mean equal to the arithmetic mean; for example, 10%, 10% and 10%, or any other set of three identical numbers.

6-19. The calculated results are:

Arithmetic Mean	15.77%
Standard Deviation	13.15%
Geometric Mean	15.07%

As we can see, the standard deviation for the shorter period was less than that of the entire period. This is because of the good years in the 1980s that were more similar than in a typical 10 or 11 year period. Also, there were only two negative years during this period, whereas the historical norm for many years was 3 negative years out of 10 (this did not occur in the 1990s).

6-20. Using a spreadsheet should verify that the standard deviation is calculated as 19%.

Changing the 1975 value from 36.92 to 26.92 changes the standard deviation from 19% to 17.48%. This is obviously because the dispersion is reduced. This value moves closer to the mean.

COMPUTATIONAL PROBLEMS

6-1. First, convert the TRs to Return Relatives: .909, .881, .779, 1.287, and 1.107. Multiply these RRs together to obtain .8888, the cumulative wealth for the first 5 years.

The cumulative wealth for the 1970s was $(1.0588)^{10} = 1.7707$. Divide this result by .8888 to obtain 1.9922. Take the 5^{th} root of this result to obtain 1.1478. Subtract the 1.0 to obtain .1478 or 14.78%.

Thus, the geometric mean for the last 5 years must be 14.78% if the entire decade is to equal the performance of the 1970s.

6-2. Cumulative wealth for the first 5 years is .8888 (from Problem 6-1).
Cumulative wealth for 10 years, given a geometric mean of 10.35,
$= (1.1035)^{10} = 2.6775$.
If one of the next 5 years has a loss of 10%, the cumulative wealth for 6 years would be .8888 X .9 = .7999.

Therefore, divide 2.6775 by .7999 to obtain 3.3473.
Take the 4^{th} root of 3.3473 to obtain 1.3526; subtract 1.0 to obtain 35.26%.

Therefore, the geometric mean of the remaining 4 years must be 35.26% in order for the decade to match the 20^{th} Century geometric mean of 10.35%.

6-3. Knowing these two items, the geometric mean for the total return and the geometric mean for the dividend yield component, we can calculate the other component of total return.

(a) The other component is the price change component.

(b) A total return index for common stocks of \$4,028.97 (calculated as $(1.10259)^{85}$) and a yield component index of 29.45, calculated as $(1.0406)^{85}$, implies an ending wealth for the price change component of \$138.81 (calculated as 4028.97 / 29.45).

6-4. The linkage between the geometric mean and the arithmetic mean is given, as an approximation, by Equation 6-12.

$$(1 + G)^2 \approx (1 + A.M.)^2 - (S.D.)^2$$

G = the geometric mean of a series of asset returns
A. M. = the arithmetic mean of a series of asset returns
S. D. = the standard deviation of the arithmetic series of returns

Thus, if we know the arithmetic mean of a series of asset returns and the standard deviation of the series, we can approximate the geometric mean for this series. As the standard deviation of the series increases, holding the arithmetic mean constant, the geometric mean decreases.

Using the data given

$$(1 + G)^2 \approx (1.184395)^2 - (.379058)^2$$
$$(1 + G)^2 \approx 1.4028 - .1437$$
$$(1 + G)^2 \approx 1.2591$$
$$1 + G \approx 1.1221; G = 12.21\%$$

In this example, the very high standard deviation for this category of stocks results in a very low geometric mean annual return despite the high arithmetic mean. Variability matters!

Chapter 7: Portfolio Theory

CHAPTER OVERVIEW

Chapter 7 is a complement to Chapter 6 in that it is a discussion of expected return and risk, whereas Chapter 6 focuses exclusively on realized return and risk. This organization allows the reader to focus on expected return and risk in Chapter 7 where portfolio theory, which is based on expected returns, is developed.

Chapter 7 covers basic portfolio theory, allowing students to be exposed to the most important, basic concepts of diversification, Markowitz portfolio theory, and capital market theory relatively early in the semester. They can then use these concepts throughout the remaining chapters. For example, it is very useful to know the implications of saying that stock A is very highly correlated with stock C, or with the market.

Chapter 7 serves as an introduction to portfolio theory, centering on the important building blocks of the Markowitz model. Students learn about such well known concepts as diversification, efficient portfolios, the risk of the portfolio, covariances, and so forth.

The first part of the chapter discusses the estimation of individual security return and risk, which provides the basis for considering portfolio return and risk in the next section. It begins with a discussion of uncertainty, and develops the concept of a probability distribution. The important calculation of expected value, or, as used here, expected return, is presented, as is the equation for standard deviation.

The next part of the chapter presents the Markowitz model along the standard dimensions of efficient portfolios, the inputs needed, and so forth. The discussion first examines expected portfolio return and risk. The portfolio risk discussion shows why portfolio risk is not a weighted average of individual security risks, which leads directly into a discussion of analyzing portfolio risk. The concept of risk reduction is illustrated for the cases of independent returns (the insurance principle), random diversification, and Markowitz diversification.

Correlation coefficients and covariances are explained in detail. This is a very standard discussion.

The calculation of portfolio risk is explained in two stages, starting with the two-security case and progressing to the n-security case. Sufficient detail is provided in order for students to really understand the concept of calculating portfolio risk using the Markowitz model, and why the problem of a large number of covariances is significant.

Efficient portfolios are explained and illustrated in brief fashion, which sets the stage for a more thorough discussion in Chapter 8.

CHAPTER OBJECTIVES

To explain the meaning and calculation of expected return and risk for individual securities using probabilities.

To fully explain the concepts of expected return and risk for portfolios based on correlations and covariances.

To present the basics of Markowitz portfolio theory, with an emphasis on portfolio risk.

MAJOR CHAPTER HEADINGS [Contents]

Dealing With Uncertainty

Using Probabilities
[random variable; point estimates]

Probability Distributions
[discrete vs. continuous; the normal distribution]

Calculating Expected Return for a Security
[expected value = expected return; formula]

Calculating Risk for a Security
[variance and standard deviation using probabilities; realized and expected standard deviations]

Introduction to Modern Portfolio Theory (MPT)

[Markowitz's contribution; concept of diversification]

Portfolio Return And Risk

Portfolio Expected Return
[portfolio weights; portfolio expected return is a weighted average of individual security returns; calculation and example]

Portfolio Risk
[portfolio risk is not a weighted average of individual security risks]

Analyzing Portfolio Risk

Risk Reduction—The Insurance Principle
[insurance principle—risk sources are independent]

Diversification
[random diversification; benefits of diversification kick in immediately]

The Components Of Portfolio Risk

The Correlation Coefficient
[description; graphs of perfect positive correlation, perfect negative correlation, 0.55 positive correlation]

Covariance
[description; relation with correlation coefficient]

Relating the Correlation Coefficient and the Covariance

Calculating Portfolio Risk

The Two-Security Case
[detailed example and explanation; the importance of the correlation coefficient; the impact of portfolio weights]

The n-Security Case
[formula; explanation; the importance of covariance]

The Importance of Covariance
[the asset's own risk vs. covariance between it and the portfolio]

Obtaining The Data

Simplifying the Markowitz Calculations
[need for estimates; the variance—covariance matrix illustrated; the problem with the Markowitz model]

POINTS TO NOTE ABOUT CHAPTER 7

Exhibits, Figures and Tables

NOTE: The figures and tables in this chapter are either the standard figures typically seen in portfolio theory or illustrate calculations and examples. As such, they can be referred to directly or instructors can substitute their own figures and examples without any loss of continuity.

Figure 7-1 illustrates a discrete and a continuous probability distribution.

Figure 7-2 illustrates the concept of risk reduction when returns are independent. Risk continues to decline as the number of observations increase.

Figures 7-3, 7-4 and 7-5 illustrate, respectively:

the case of perfect positive correlation,
the case of perfect negative correlation,
the case of partial positive correlations between the returns for two securities based on the average correlation for NYSE stocks of approximately +0.55.

Table 7-1 illustrates the calculation of standard deviation when probabilities are involved.

Table 7-2 shows the expected standard deviation of annual portfolio returns for various numbers of stocks in a portfolio.

Table 7-3 illustrates the variance-covariance matrix involved in calculating the standard deviation of a portfolio of two securities and of four securities. The point illustrated is that the number of covariances involved increases quickly as more securities are considered.

Box Inserts

Box 7-1 is an interesting discussion of risk, and how best to understand it. It was written by Peter Bernstein, a well-known investments professional.

ANSWERS TO END-OF-CHAPTER QUESTIONS

7-1. *Historical returns* are realized returns, such as those reported by Ibbotson Associates and Wilson and Jones in Chapter 6 (Table 6-6).

Expected returns are ex ante returns--they are the most likely returns for the future, although they may not actually be realized because of risk.

7-2. The *expected return for one security* is determined from a probability distribution consisting of the likely outcomes, and their associated probabilities, for the security.

The *expected return for a portfolio* is calculated as a weighted average of the individual securities' expected returns. The weights used are the percentages of total investable funds invested in each security.

7-3. The basis of portfolio theory is that the whole is not equal to the sum of its parts, at least with respect to risk. Portfolio risk, as measured by the standard deviation, is not equal to the weighted sum of the individual security standard deviations. The reason, of course, is that the covariances must be accounted for.

7-4. In the Markowitz model, three factors determine portfolio risk: individual variances, the covariances between securities, and the weights (percentage of investable funds) given to each security.

7-5. The Markowitz approach is built around return and risk. The return is, in effect, the mean of the probability distributions, and variance is a proxy for risk. Efficient portfolios, a key concept, are defined on the basis of return and risk--that is, mean and variance.

7-6. A stock with a large risk (standard deviation) could be desirable if it has high negative correlation with other stocks. This will lead to large negative covariances which help to reduce the portfolio risk.

7-7. The correlation coefficient is a relative measure of risk ranging from -1 to +1. The covariance is an absolute measure of risk. Since $COV_{AB} = \rho_{AB}\, \sigma_A\, \sigma_B$,

$$\rho_{AB} = \frac{COV_{AB}}{\sigma_A\, \sigma_B}$$

7-8. Markowitz was the first to formally develop the concept of portfolio diversification. He showed quantitatively why, and how, portfolio diversification works to reduce the risk of a portfolio to an investor. In effect, he showed that diversification involves the relationships among securities.

7-9. The expected return for a portfolio of 500 securities is calculated exactly as the expected return for a portfolio of 2 securities--namely, as a weighted average of the individual security returns. With 500 securities, the weights for each of the securities would be very small.

7-10. Each security in a portfolio, in terms of dollar amounts invested, is a percentage of the total dollar amount invested in the portfolio. This percentage is a weight, and the general assumption is that these weights sum to 1.0, accounting for all of the portfolio funds.

7-11. The expected return for a portfolio must be between the lowest expected return for a security in the portfolio and the highest expected return for a security in the portfolio. The exact position depends upon the weights of each of the securities.

7-12. Naive or random diversification refers to the act of randomly diversifying without regard to relevant investment characteristics such as expected return and industry classification.

7-13. For 10 securities, there would be n (n-1) covariances, or 90. Divide by 2 to obtain unique covariances; that is, [n(n-1)] / 2, or in this case, 45.

7-14. With 30 securities, there would be 900 terms in the variance-covariance matrix. Of these 900 terms, 30 would be variances, and n (n - 1), or 870, would be covariances. Of the 870 covariances, 435 are unique.

7-15. This statement is CORRECT. As the number of securities in a portfolio increases, the importance of the covariance relationships increases while the importance of each individual security's risk decreases.

7-16. The correlation coefficient is more useful in explaining diversification concepts because it is a relative measure of association between security returns--we always know the boundaries of the association.

7-17. Investors should typically expect stock and bond returns to be positively related, as well as bond and bill returns. Note, however, that correlations can change depending upon the time period used to measure the correlation. Stocks and gold have been negatively related, and stocks and real estate are typically negatively related.

7-18. The number of unique covariances needed for 500 securities using the Markowitz model is:

$$\frac{n(n-1)}{2} = \frac{500(499)}{2} = \frac{249{,}500}{2} = 124{,}750$$

The total pieces of information needed:

$$[n(n+3)]/2 = [500(503)]/2 = 251{,}500$$

CFA

7-19. c

7-20. No—their systematic risk differs, and they should priced in relation to their systematic risk

7-21. c

7-22. d (note: for answer b, expected return is always a weighted average)

7-23. c (30 securities would have 30 x 30 = 900 terms)

7-24. a, b, and d

7-25. b

ANSWERS TO END-OF-CHAPTER PROBLEMS

7-1. (.15)(.20) = .030
(.20)(.16) = .032
(.40)(.12) = .048
(.10)(.05) = .005
(.15)(-.05) = -.0075
.1075 or 10.75% = expected return

To calculate the standard deviation for General Foods, use the formula

$$VAR_i = \sum_{i=1}^{n} [PR_i - ER_i]^2 P_i$$

$$VAR_{GF} = [(.20-.1075)^2.15] + [(.16-.1075)^2.20] + [(.12-.1075)^2.40] + [(.05-.1075)^2.10] + [(-.05-.1075)^2.15]$$

$$= .00128 + .00055 + .00006 + .00033 + .00372$$
$$= .00594$$

Since $\sigma_i = (VAR)^{1/2}$
the σ for GF $= (.00594)^{1/2} = .0771 = 7.71\%$

7-2. (a) (.25)(15) + (.25)(12) + (.25)(30) + (.25)(22) = 19.75%

(b) (.10)(15) + (.30)(12) + (.30)(30) + (.30)(22) = 20.70%

(c) (.10)(15) + (.10)(12) + (.40)(30) + (.40)(22) = 23.50%

7-3. (a) (1) {3 decimal places}

	$(1/3)^2(10)^2 =$	11.089
+	$(1/3)^2(8)^2 =$	7.097
+	$(1/3)^2(20)^2 =$	44.360
+	$(2)(1/3)(1/3)(.6)(8)(10) =$	10.645
+	$(2)(1/3)(1/3)(.2)(20)(10) =$	8.871
+	$(2)(1/3)(1/3)(-1)(20)(8) =$	-35.485
		46.577

variance = 46.577; σ = 6.82%

(2) variance $= (.5)^2(8)^2 + (.5)^2(20)^2 + 2(.5)(.5)(-1)(20)(8)$
$= 16 + 100 - 80$
$= 36$
$\sigma = 6\%$

(3) variance = $(.5)^2(8)^2 + (.5)^2(16)^2 + 2(.5)(.5)(.3)(8)(16)$
$= 16 + 64 + 19.2$
$= 99.2$
$\sigma = 9.96\%$

(4) variance = $(.5)^2(20)^2 + (.5)^2(16)^2 + 2(.5)(.5)(8)(20)(16)$
$= 100 + 64 + 128$
$= 292$
$\sigma = 17.09\%$

(b) (1) variance = $(.4)^2(8)^2 + (.6)^2(20)^2 + 2(.6)(.4)(-1)(8)(20)$
$= 10.24 + 144 - 76.8$
$= 77.44$
$\sigma = 8.8\%$

(2) variance = $(.6)^2(8)^2 + (.4)^2(20)^2 + 2(.6)(.4)(-1)(8)(20)$
$= 23.04 + 64 - 76.8$
$= 10.24$
$\sigma = 3.2\%$

(c) In part (a), the minimum risk portfolio is 50% of the portfolio in B and 50% in C. But this may not be the highest return. For the combinations in (a) above, the return/risk combinations are:

Portfolio	ER	SD
(1) A, B, C	19%	6.82%
(2) B&C	21%	6.00%
(3) B&D	17%	9.96%
(4) C&D	26%	17.09%

Combination (BC) is clearly preferable over (ABC) and (BD), because there is a higher ER at lower risk. The choice between (BC) and (CD) would depend on the investor's risk-return tradeoff.

CFA
7-4. d

CFA
7-5. c

CFA
7-6. b

CFA
7-7. b

CFA
7-8. a (Expected Return on equities = $18,000; subtract T-bill expected return)

COMPUTATIONAL PROBLEMS

NOTE: Problems 7-1 through 7-4 are based on the same data.

7-1. We will confirm the expected return for the third case shown in the table-- 0.6 weight on EG&G and 0.4 weight on GF. Each of the other expected returns in column 1 are calculated exactly the same way.

$$ERp = 0.6\ (25) + 0.4\ (23) = 24.2$$

7-2. We will confirm the portfolio variance for the third case, 0.6 weight on EG&G and 0.4 weight on GF. Each of the other portfolio variances in column 2 are calculated exactly the same way.

$$\begin{aligned} \text{variance}_p &= (.6)^2(30)^2 + (.4)^2(25)^2 + 2(.6)(.4)(112.5) \\ &= 324 + 100 + 54 \\ &= 478 \end{aligned}$$

7-3. Knowing the variance for any combination of portfolio weights, the standard deviation is, of course, simply the square root. Thus, for the case of 0.6 and 0.4 weights, respectively, using the variance calculated in Problem **7-2**, we confirm the standard deviation as

$(478)^{1/2} = 21.86$ or 21.9 as per column 3.

7-4. The lowest risk portfolio would consist of 20% in EG&G and 80% in GF.

Chapter 8: Portfolio Selection

CHAPTER OVERVIEW

Chapter 8 is a follow-up to Chapter 7, which discussed the basics of Markowitz portfolio theory in terms of the expected return and risk of a portfolio. Chapter 8 concludes this discussion by analyzing the efficient frontier, global diversification considerations, the Single Index Model simplification of the efficient frontier, and asset allocation considerations. This organizational structure allows students to concentrate on the efficient frontier itself because the basic details of the Markowitz analysis were covered in Chapter 7.

Chapter 8 begins by discussing the steps involved in building a portfolio of financial assets. The first step is to use the Markowitz portfolio selection model to choose an efficient portfolio. The efficient set of portfolios is explained in detail, including the necessary information about indifference curves. This discussion concludes with matching indifference curves (preferences) with the efficient set (possibilities). Important points about the Markowitz analysis that often cause confusion are explained.

Alternative methods of obtaining the efficient frontier via the Single Index Model are noted. This model is developed in some detail. Multi-index models are also considered.

This discussion includes an analysis of selecting optimal asset *classes* (rather than individual assets) with the Markowitz model. This topic is considered in detail because it is a good illustration of the usefulness of the Markowitz analysis. With relatively few asset classes, as opposed to individual stocks, the Markowitz model can be implemented relatively easily.

CHAPTER OBJECTIVES

To supplement the brief analysis of portfolio theory in Chapter 7 by showing the details of Markowitz portfolio theory, and the Single Index Model.

To outline and describe the steps involved in building an efficient portfolio.

To present the concept of asset allocation in detail.

To show how total risk can be broken into two components.

MAJOR CHAPTER HEADINGS [Contents]

Building A Portfolio Using Markowitz Principles

Identify Optimal Risk-Return Combinations
[assumptions; the attainable set of portfolios; efficient portfolios; the efficient frontier; understanding the Markowitz solution]

Selecting an Optimal Portfolio of Risky Assets
[indifference curves; selecting the optimal portfolio]

The Global Perspective—International Diversification
[foreign stocks reduce overall volatility]

Some Important Conclusions about the Markowitz Model
[five important points about the Markowitz model]

Alternative Methods Of Obtaining the Efficient Frontier

The Single-Index Model
[the single-index model simplification; details of the model; examples]

Multi-Index Models
[description; pros and cons; conclusions about the Single-Index Model]

Selecting Optimal Asset Classes—The Asset Allocation Decision

[applying Markowitz model to asset classes; the asset allocation decision]

Some Major Asset Classes
[international investing; bonds; TIPS; real estate]

Combining Asset Classes
[calculating efficient portfolios using the Markowitz technique; efficient frontiers for traditional and nontraditional portfolios]

Asset Allocation and the Individual Investor
[using asset classes]

Owning Stocks and Bonds

Return and Risk Combinations
[improvement from owing more than one asset class]

Life Cycle Analysis

The Impact Of Diversification On Risk

Systematic and Nonsystematic Risk
[dividing total risk into systematic and nonsystematic risk]

How Many Securities Are Enough to Diversify Properly?
[diagram; evidence on the number of securities needed to diversify properly]

The Implications Of Reducing Risk By Holding Portfolios

POINTS TO NOTE ABOUT CHAPTER 8

Exhibits, Figures and Tables

Figure 8-1 shows the feasible set of portfolios and the efficient frontier.

Figure 8-2 illustrates indifference curves.

Figure 8-3 shows how a portfolio on the efficient frontier is selected.

Figure 8-4 illustrates the Single Index Model, including the difference between the actual return and the estimated return.

Figure 8-5 illustrates the application of the Markowitz technique to asset classes by showing a traditional and nontraditional frontier.

Figure 8-6 illustrates the division of total risk into systematic and nonsystematic risk.

Figure 8-7 illustrates the number of securities needed to adequately diversify.

Table 8-1 shows an example of calculating efficient portfolios using the Markowitz optimization technique.

Table 8-2 shows the geometric mean return and risk combinations for bonds and stocks for the two most recent 20-years periods ending in 2002.

Box Inserts

Box 8-1 illustrates how one large retirement fund manager explains the value of asset allocation to investors using model portfolios diversified among five asset classes.

ANSWERS TO END-OF-CHAPTER QUESTIONS

8-1. The number of **unique** covariances needed for 200 securities using the Markowitz model is:

$$\frac{n(n-1)}{2} = \frac{200(199)}{2} = \frac{39,800}{2} = 19,900$$

The total pieces of information needed:

$[n(n+3)]/2 = [200(203)]/2 = 20,300$

8-2. The number of covariances needed for 200 securities with the Sharpe model is 200. The total pieces of information needed are:

$3n + 2 = 3(200) + 2 = 602$

8-3. The vertical axis of the efficient frontier is expected return. The horizontal axis is risk, as measured by standard deviation.

8-4. There are many portfolios on the Markowitz efficient frontier, depending on how precise one wishes to be. For example, an efficient frontier could be calculated using one percentage point intervals for expected return, or one-tenth of a percent intervals. Regardless, there are many portfolios on the efficient frontier.

The Markowitz efficient set consists of those portfolios dominating the feasible set of portfolios that could be attained. It is described by a curve, as opposed to a straight line.

8-5. Rational investors seek efficient portfolios because these portfolios promise maximum expected return for a specified level of risk, or minimum risk for a specified expected return.

8-6. Using the Markowitz analysis, an investor would choose the portfolio on the efficient frontier that is tangent to his/her highest indifference curve. This would be the optimal portfolio for him/her.

8-7. An indifference curve describes investor preferences for risk and return. Each indifference curve represents all combinations of portfolios that are equally desirable to a particular investor given the return and risk involved. Thus, an investor's risk aversion would be reflected in his or her indifference curve.

The curves for all risk-averse investors will be upward-sloping, but the shapes of the curves can vary depending on risk preferences.

8-8. In recent years, the correlations among stocks of different countries have gone up. These correlations increased significantly starting in 1995. The immediate benefits of risk reduction by adding stocks with lower correlations have been reduced.

8-9. Investors should not ignore international diversification. The correlations could become somewhat lower in the future, although as the world economy becomes more integrated, this is less and less likely. However, there should always be opportunities for investors in the stocks of other countries, and they should be looking for these opportunities.

8-10. The purpose of the Single Index Model is to simplify the calculations needed in the Markowitz model in order to obtain the efficient set of portfolios. This is accomplished by reducing the number of covariances to the number of securities being considered, which in turn reduces the total number of pieces of data needed to carry out the analysis.

8-11. The SIM divides a security's return into a part explained by the market's return, and a part unique to each individual security.

8-12. The key assumption of the SIM is that securities are related only in their common response to the return on the market.

8-13. The covariance between any two securities is calculated as the product of each security's beta and the variance for the market portfolio.

8-14. The two components are market risk (systematic risk) plus company-specific risk (nonsystematic risk).

8-15. Multi-index models were found not to work better ex-ante, which is the more important consideration for investors.

8-16. The asset allocation decision involves the percentages of one's investable funds to be placed in each category of financial assets such as stocks, bonds, real estate, and so forth. It is believed by many to be the most important decision an investor can make, and this is particularly true for large institutional investors.

8-17. When more asset classes are involved, the efficient frontier often improves. This is because there are more opportunities for low correlations between asset classes, and even negative correlations.

8-18. As we add securities to a portfolio, the total risk of the portfolio declines rapidly, but then levels off and at some point will not decline a noticeable amount.

8-19. Diversification works extremely well in reducing part of the risk of a portfolio, but it cannot eliminate all of the risk because diversification cannot eliminate market risk.

There are clearly limits to diversification because it cannot eliminate market risk. The effects of diversification kick in immediately—-normally, two securities are better than

one, three are better than two, etc. The effects of diversification are both immediate and dramatic.

8-20. The traditional beliefs about diversification, popularized by Evans and Archer in the 1960s, was that something like 8-16 securities provided most of the diversification benefits that could be obtained. In round numbers, call it 20 stocks. Malkiel's evidence suggests that many more securities are required to achieve adequate diversification. In round numbers, call it 50 stocks.

CFA
8-21. a

CFA
8-22. b

8-23. d

CFA
8-24. d

CFA
8-25. c

ANSWERS TO END-OF-CHAPTER PROBLEMS

8-1. b (12 X 20 X .30)

8-2. a (50% X 16% + 50% X 22% = 19%)

8-3. b

Chapter 9: Asset Pricing Models

CHAPTER OVERVIEW

Chapter 9 follows Chapter 8 because capital market theory builds on portfolio theory by examining how asset prices are determined in a world of Markowitz diversifiers. Chapter 9 also contains some important concepts relevant to a better understanding of such topics as systematic and nonsystematic risk and beta.

The first part of Chapter 9 outlines the necessary assumptions to derive capital market theory and introduces the concept of equilibrium in the capital markets. Important related concepts are introduced and discussed, primarily the market portfolio. Both its importance and its composition are considered.

Using the concepts developed to this point, the equilibrium risk--return tradeoff is analyzed in detail. The capital market line is developed and illustrated. This line applies to efficient portfolios, with the slope of the line showing the market price of risk for efficient portfolios. The equation is explained, and certain points about the line are emphasized.

The security market line is developed next. The equation is developed, and beta as a measure of volatility is considered in some detail. The CAPM's expected return--beta relationship is analyzed, with each of the components of the required rate of return analyzed and explained. The process of identifying undervalued and overvalued securities using the SML follows this discussion.

Problems in estimating the SML are described, and this leads into a detailed discussion of the accuracy of beta estimates and tests of the CAPM. The characteristic line is also explained.

The chapter concludes with a thorough discussion of Arbitrage Pricing Theory in terms of what beginners need to know. Although this concept probably has not advanced in terms of being widely used in the investments world as much as some have predicted, it is an important development that can be used for discussion purposes if the instructor so chooses. Factor models are explained as part of this discussion. A reasonably detailed discussion on understanding the APT is included. Consistent with the emphasis in this text, the use of APT in investment decisions is considered. Students should be able to see how the model could be applied in actual practice.

NOTE: The discussion of APT contains all that beginners need to know and can reasonably handle.

CHAPTER OBJECTIVES

To develop the concept of asset pricing theory as a natural extension of portfolio theory.

To develop the concepts of the CML and SML, explain what they mean, and consider how they can be used.

To discuss related issues such as what beta measures and the problems with estimating beta, systematic and nonsystematic risk, problems in testing asset pricing models, and so forth.

To provide the necessary information about APT, including what it means and how it could be used to make investment decisions.

MAJOR CHAPTER HEADINGS [Contents]

Capital Market Theory

Capital Market Theory Assumptions
[assumptions used to derive capital market theory; the CAPM is robust]

Introduction of the Risk-Free Asset
[definition of a risk-free asset]

Risk-Free Borrowing and Lending
[the new efficient frontier is a straight line when lending and borrowing are allowed]

The Equilibrium Return-Risk Tradeoff

The Capital Market Line
[definition—involves only efficient portfolios; diagram of the CML; the slope of the CML; important points about the CML; the market portfolio—what it is, composition, importance; the separation theorem—what it means, implications, applications]

The Security Market Line
[applies to all assets; beta—what it is; the CAPM's expected return—beta relationship; the CAPM diagram (SML) and CAPM equation; how to use it; required rate of return and market risk premium; under and over-valued securities]

Beta

The CAPM's Expected Return—Beta Relationship

Over-and-Undervalued Securities

Estimating the SML

Estimating Beta
[use of the market model; the characteristic line; use of regression; problems in estimating beta; stability of individual security betas vs. portfolio betas]

Tests Of The CAPM

[predictions of the model; findings]

Arbitrage Pricing Theory

[basic description of the model; assumptions; factor models; characteristics of factors; example of factor model]

The Law of One Price

Assumptions of APT

Factor Models

Understanding the APT Model

[equations for actual return and expected return; factors that have been identified through research]

Identifying the Factors

Using APT in Investment Decisions
[possible strategies when using APT to make decisions]

Some Conclusions About Asset Pricing

[controversy remains]

POINTS TO NOTE ABOUT CHAPTER 9

Exhibits, Figures and Tables

The major figures in this chapter are all standard figures of the efficient frontier with borrowing and lending, the CML, the SML, and so forth. As such, they are interchangeable with virtually any other comparable figures that an instructor may already have developed. They are not unique although they are keyed to the discussion in the text in terms of points on the graph, etc.

Figure 9-1 shows the Markowitz efficient frontier and the borrowing and lending possibilities resulting from introducing a risk-free asset.

Figure 9-2 shows the efficient frontier with a risk-free borrowing and lending rate. The important point is that the Markowitz efficient frontier, which is an arc, now becomes a straight line.

Figure 9-3 shows the capital market line and the components of its slope. It is important to emphasize that standard deviation is on the horizontal axis and to emphasize what the slope of this line measures.

Figure 9-4 illustrates different betas—the higher the beta, the steeper the line.

Figure 9-5 shows the SML. The emphasis now is on beta as the measure of risk on the horizontal axis.

Figure 9-6 illustrates how an overvalued and an undervalued security can be identified by using the SML. It could be pointed out here that in some sense this is how to think of modern security analysis--the search for securities not on the equilibrium tradeoff that should exist.

Figure 9-7 shows the characteristic line for Coca-Cola, using monthly data.

There are no tables in Chapter 9.

Box Inserts

There are no box inserts in Chapter 9.

ANSWERS TO END-OF-CHAPTER QUESTIONS

9-1. **Lending possibilities** change part of the Markowitz efficient frontier from an arc to a straight line. The straight line extends from RF, the risk-free rate of return, to M, the market portfolio. This new opportunity set, which dominates the old Markowitz efficient frontier, provides investors with various combinations of the risky asset portfolio M and the riskless asset.

Borrowing possibilities complete the transformation of the Markowitz efficient frontier into a straight line extending from RF through M and beyond. Investors can use borrowed funds to lever their portfolio position beyond point M, increasing the expected return and risk beyond that available at point M.

9-2. Under the CAPM, all investors hold the market portfolio because it is the optimal risky portfolio. Because it produces the highest attainable return for any given risk level, all rational investors will seek to be on the straight line tangent to the efficient set at the steepest point, which is the market portfolio.

9-3. The basic difference between graphs of the SML and the CML is *the label on the horizontal axis*. For the CML, it is standard deviation while for the SML, beta. Also, the CML is applicable to portfolios while the SML applies to individual securities and to portfolios.

9-4. In theory, the **market portfolio** (portfolio M) is the portfolio of all risky assets, both financial and real, in their proper proportions. Such a portfolio would be completely diversified; however, it is a risky portfolio.

In equilibrium, all risky assets must be in portfolio M because all investors are assumed to hold the same risky portfolio. If they do, in equilibrium this portfolio must be the market portfolio consisting of all risky assets.

9-5. The *slope of the CML* is

$$\frac{ER_M - RF}{SD_M}$$

where ER_M is the expected return on the market M portfolio, RF is the rate of return on the risk-free asset, and SD_M is the standard deviation of the returns on the market portfolio.

The slope of the CML is the market price of risk for efficient portfolios; that is, it indicates the equilibrium price of risk in the market. It shows the additional return that the market demands for each percentage increase in a portfolio's risk.

9-6. The CML extends from RF, the risk-free asset, through M, the market portfolio of all risky securities (weighted by their respective market values). This portfolio is efficient, and the CML consists of combinations of this portfolio and the risk-free asset. All asset combinations on the CML are efficient portfolios consisting of M and the risk-free asset.

9-7. The contribution of each security to the standard deviation of the market portfolio depends on the size of its covariance with the market portfolio. Therefore, investors consider the relevant measure of risk for a security to be its covariance with the market portfolio.

9-8. Using some methodology (such as the dividend valuation model) to estimate the expected returns for securities, investors can compare these expected returns to the required returns obtained from the SML. Securities whose expected returns plot above the SML are undervalued because they offer more expected return than investors require; if they plot below the SML, they are overvalued because they do not offer enough expected return for their level of risk.

9-9. When a security is recognized by investors as undervalued, they will purchase it because it offers more return than required, given its risk. This demand will drive up the price of the security as more of it is purchased. The return will be driven down until it reaches the level indicated by the SML as appropriate for its degree of risk.

9-10. The difficulties involved in estimating a security's beta include deciding on the number of observations and the length of the periods to use in calculating the beta. The regression estimate of beta is only an estimate of the true beta, and subject to error. Also, the beta is not perfectly stationary over time.

9-11. The major problem in testing capital market theory is that the theory is formulated ex-ante, concerning what is expected to happen. The only data we typically have are ex-post.

9-12. The CAPM can be tested empirically by regressing the average return on security i over some number of periods on security i's beta. This is usually done for a large number of securities. The equation involved is:

$$\bar{R}_i = a_1 + a_2\beta_i$$

where R_i is the average return on security i over some number of periods and βi is the estimated beta for security i.

The expected results of regressing average returns on beta are that a_1 should approximate the average risk-free rate during the period studied and a_2 should approximate the average market risk premium during the period studied (R_M - RF).

9-13. The *law of one price* states that two otherwise identical assets cannot sell at different prices.

9-14. Roll has argued that the CAPM is untestable because the market portfolio, which consists of all risky assets, is unobservable.

9-15. The CAPM is a useful model for estimating required returns. These required returns can be used in conjunction with independently derived expected returns to determine overvalued and undervalued securities. This model is also useful in estimating the cost of equity capital for a security. And, as we shall see in Chapter 22, the CAPM provides a basis for measuring portfolio performance.

9-16. The CML is drawn tangent to the Markowitz efficient frontier. When this is done, it can be seen that the CML dominates the Markowitz efficient frontier. The CML is a straight line tangent to the efficient frontier at point M, the market portfolio, and with an intercept of RF.

9-17. Investors decide where they are to be on the new efficient frontier (the straight line dominating the Markowitz efficient frontier) by their risk preferences. If they are conservative, they will be on the lower end of the line toward RF; if aggressive, they will be on the upper end, which represents larger expected returns and larger risks.

9-18. The CML is the trade off between expected returns and risk for efficient portfolios. The slope of the CML indicates the equilibrium price of risk in the market.

9-19. A diagram of the SML is simply an upward-sloping tradeoff between expected return on the vertical axis and risk as measured by beta on the horizontal axis. In effect, this is a diagram of the whole concept of investing, which is, in fact, best described simply as an upward-sloping tradeoff between expected return and risk.

(a) If the risk-free rate shifts upward, and nothing else changes, the diagram would show a new upward sloping line above the old line, running parallel with it. The difference between the two vertical intercepts would reflect the increase in the risk free rate.

(b) In this case, the SML would rotate upward to the left to reflect a greater tradeoff. As investors become pessimistic, the line becomes steeper (rotates upward to the left); as they become optimistic, the line rotates downward to the right, approaching a horizontal line at the extreme.

9-20. Unlike the CAPM, APT does not assume:

1. a single-period investment horizon
2. the absence of taxes
3. borrowing and lending at the rate RF
4. investors select portfolios on the basis of expected return and variance

APT, like the CAPM, does assume:

1. investors have homogeneous beliefs
2. investors are risk-averse utility maximizers
3. markets are perfect
4. returns are generated by a factor model

9-21. A **factor model** is based on the view that there are underlying *risk factors* that affect realized and expected security returns. These risk factors represent broad economic forces and not company-specific characteristics and, by definition, they represent the element of surprise in the risk factor--the difference between the actual value for the factor and its expected value.

9-22. The factors must possess three characteristics:

1. Each risk factor must have a pervasive influence on stock returns. Firm-specific events are not APT risk factors.
2. These risk factors must influence expected return, which means they must have non-zero prices. This issue must be determined empirically, by statistically analyzing stock returns to see which factors pervasively affect returns.
3. At the beginning of each period, the risk factors must be unpredictable to the market as a whole.

9-23. Most empirical work suggests that three to five factors influence security returns and are priced in the market. For example, Roll and Ross identify five systematic factors:

1. changes in expected inflation
2. unanticipated changes in inflation
3. unanticipated changes in industrial production
4. unanticipated changes in the default-risk premium
5. unanticipated changes in the term structure of interest rates

9-24. A factor model makes no statement about equilibrium.

9-25. A portfolio manager could design strategies that would expose them to one or more types of these risk factors, or "sterilize" a portfolio such that its exposure to the unexpected change in the growth rate of profits matched that of the market as a whole. Taking an active approach, a portfolio manager who believes that he or she can forecast a factor realization can build a portfolio that emphasizes or deemphasizes that factor. In doing this, the manager would select stocks that have exposures to the remaining risk factors that are exactly proportional to the market. If the manager is accurate with the forecast--and remember that such a manager must forecast the unexpected component of the risk factor--he or she can outperform the market for that period.

9-26. APT is not critically dependent on an underlying market portfolio as is the CAPM, which predicts than only market risk influences expected returns. Instead, APT recognizes that several types of risk may affect security returns.

9-27. An arbitrage profit, in the context of the APT, refers to a situation where a zero investment portfolio can be constructed that will yield a risk-free profit. If arbitrage profits arise, a relatively few investors can act to restore equilibrium.

9-28. We can evaluate how each security affects the standard deviation of the market portfolio by evaluating the way it would change if the proportion invested in a particular security changes. (In effect, we take the partial derivative of the standard deviation of the market portfolio with respect to the proportion of portfolio funds invested in that particular security.)

The result is that a security's contribution to the risk of the market portfolio is given by:

$$\frac{\sigma_{i,M}}{\sigma_M}$$

where $\sigma_{i,M}$ = the covariance between stock i and the market portfolio.

9-29. The separation theorem states that the investment decision (what portfolio of assets to hold) is separate from the financing decision (how much of one's funds to put in risky assets vs. riskless assets). The separation theorem leads to the idea that one portfolio of risky assets is optimal for all investors.

9-30. The separation theorem rejects the tailored approach, which basically says that each investor could have a portfolio of risky assets designed specifically for him/her. Instead, there is one portfolio of risky assets that are optimal for all investors.

CFA

9-31. Any three of the following are criticisms of beta as used in CAPM.

1. Theory does not measure up to practice. In theory, a security with a zero beta should give a return exactly equal to the risk-free rate. But actual results do not come out that way, implying that the market values something besides a beta measure of risk.

2. Beta is a fickle short-term performer. Some short-term studies have shown risk and return to be negatively related. For example, Black, Jensen and Scholes found that from April 1957 through December 1965, securities with higher risk produced lower returns than less risky securities. This result suggests that (a) in some short periods, investors may be penalized for taking on more risk; (b) in the long run, investors are not rewarded enough for high risk and are overcompensated for buying securities with less risk; and (c) in all periods, some nonsystematic risk is being valued by the market.

3. Estimated betas are unstable. Major change in a company affecting the character of the stock, some unforeseen event not reflected in past returns may decisively affect the security's future returns.

4. Beta is easily rolled over. Richard Roll has demonstrated that by changing the market index against which betas are measured, one can obtain quite different measures of the risk level of individual stocks and portfolios. As a result, one would make different predictions about the expected returns, and by changing indexes, one could change the risk-adjusted performance ranking of a manager.

CFA
9-32. Under CAPM, the only risk that investors should be compensated for bearing is the risk that cannot be diversified away (systematic risk). Because systematic risk (measured by beta) is equal to one for both portfolios, an investor would expect the same return for Portfolio A and B.

Since both portfolios are fully diversified, it doesn't matter if the specific risk for each individual security is high or low. The specific risk has been diversified away for both portfolios.

CFA
9-33. b

CFA
9-34. d

CFA
9-35. b (the returns and risk are not proportionate)

CFA
9-36. d (note that APT involves systematic factors)

CFA
9-37. The following comments are presented in the same order as the points made by Statdud:

1. This statement is incorrect. Since monthly observations (returns) are employed, the constant (alpha) value of .59 indicates that if the return on the S&P 500 were zero in a given *month*, the *monthly* return on the stock would tend to be .59%. During a year when the return on the S&P 500 is zero, the annual return on the stock can be approximated as: (.59%) x (12) = 7.08%.

2. This statement is incorrect. The alpha value of .59 is the y-intercept and represents a return on CCE that is unrelated to the return on the market. Variability of the market is measured by variance or standard error of the estimate.

3. The statement regarding the slope coefficient and the volatility of the return on CCE's common stock relative to the market is correct, assuming that the S&P 500 represents the average stock.

4. This statement is incorrect. The high t-statistic for the slope coefficient (beta) suggests the value is statistically significant at the .01 level.

5. This statement is incorrect. The R^2 of .215 indicates that 21.5% of the dependent variable (return on CCE common stock) is explained by the independent variable (return on the market).

6. This statement is incorrect. The slope term (beta) is statistically significant in this problem and alpha is not. Beta values found by regressing stock returns against market returns tend to be more stable over time than alpha values.

7. This statement is incorrect. While rerunning the regression using data over a longer period should improve the statistical reliability of the estimated coefficients, it is not without a price. The new regression would be constructed using data that may be so old that it does not reflect the current situation.

CFA
9-38. c

ANSWERS TO END-OF-CHAPTER PROBLEMS

9-1. $k = 5 + .9[11-5] = 10.4$

9-2. $k = 5 + .8[12-5] = 10.6$

9-3. $k = 5 + 1.5[7] = 15.5$

9-4. (a) From the SML:

Stock 1 $8 + .9(4) = 11.6\%$
2 $8 + 1.3(4) = 13.2\%$
3 $8 + .5(4) = 10.0\%$
4 $8 + 1.1(4) = 12.4\%$
5 $8 + 1.0(4) = 12.0\%$

(b) Funds 1, 3, and 4 are undervalued because each has an expected return greater than its required return as given by the SML.

(c) The slope of the SML, or (12-8) = 4.

9-5. $E(R_i) = 7.0 + (13.0-7.0)\beta_i = 7.0 + 6.0\beta_i$

GF	$7 + 6(.8) = 11.8\% < 12\%$		undervalued
PepsiCo	$7 + 6(.9) = 12.4\% < 13\%$		undervalued
IBM	$7 + 6(1.0) = 13.0\% < 14\%$		undervalued
NCNB	$7 + 6(1.2) = 14.2\% > 11\%$		overvalued
EG&G	$7 + 6(1.2) = 14.2\% < 21\%$		undervalued
EAL	$7 + 6(1.5) = 16.0\% > 10\%$		overvalued

CFA
9-6. d

COMPUTATIONAL PROBLEMS

9-1. Characteristic Line

ß = 3061.185/3946.285 = .7757131

$\bar{Y} = 11.61$ $\bar{X} = 8.45$
$\alpha = 11.61 - (.7757131)(8.45) = 5.055224$
$Y = 5.055 + 0.776X$

9-2. If Exxon is in equilibrium, the relationship is:

$.14 = RF + [E(R_M) - RF]$ ß

$= 6 + [E(R_M) - 6]\ 1.1$

Therefore,

a. the slope of the SML must be $[E(R_M) - 6]$ or approximately 7.3% in order for the relationship to hold on both sides

b. the expected return on the market is 7.3% + 6% or 13.3% (approximately)

9-3. (a) In order to calculate the beta for each stock, it is necessary to calculate each of the covariances with the market, using the correlation coefficient for the stock with the market, the standard deviation of the stock, and the standard deviation of the market.

Stock A:

$cov = (.8)(25)(21) = 420$

$beta = 420/(20)^2 = 1.05$

Stock B:

$cov = (.6)(30)(21) = 378$

$beta = 378/(20)^2 = .945$

(b) From the SML, $R_i = 8 + (12-8)\beta_i$

Stock A $= 8 + (12-8)(1.0) = 12\%$
Stock B $= 8 + (12-8)(.9) = 11.6\%$

9-4. (a) CML slope = (12-8) / 20 = .2

(b)

Affiliated	8 + .2 (14) = 10.8%
Omega	8 + .2 (16) = 11.2%
Ivy	8 + .2 (20) = 12.0%
Value Line	8 + .2 (25) = 13.0%
New Horizons	8 + .2 (30) = 14.0%

(c) The rank order is the same as in (b), which is from low risk to high risk.

(d) Ivy does because it has the same risk as measured by the standard deviation.

Chapter 10: Common Stock Valuation

CHAPTER OVERVIEW

Similar to the two chapter sequence on bonds, there are two chapters on common stocks involving first the valuation of the asset, followed by analysis and management. In addition, the chapter on efficient markets follows here because the concept is almost entirely concerned with stocks as far as students in a beginning Investments course are concerned.

Chapter 10 is one of the most important chapters in the text. It covers the valuation of common stocks in detail, including both the discounted cash flow approach and the P/E ratio approach. Clearly, students should know how to find the intrinsic value of a stock using the capitalization of income approach--that is, they should know how to use the Dividend Discount Model--as well as the P/E ratio approach.

The chapter opens by explaining the present value approach to valuation. This capitalization of income method seeks to determine the value of a security (its intrinsic value) by discounting all expected future cash flows using a required rate of return. This discussion also includes a brief consideration of the required rate of return (explained in detail in Chapter 11) and the expected cash flows.

The chapter centers around the traditional Dividend Discount Model (DDM), which is fully developed, including the three growth rate cases: zero growth, constant growth, and multiple growth. Numerous examples are provided throughout. The purpose of this analysis is to provide students with the necessary knowledge to work valuation problems, which are found at the end of the chapter.

NOTE: While the DDM has its limitations, and may in many cases not be used by practicing security analysts and investors, it is essential that students understand this model as the basis for valuation. It is the classic, time-honored approach, and should be the beginning point when learning common stock valuation techniques. Furthermore, major providers of stock information and recommendations, such as Standard & Poor's, regularly calculate an intrinsic value for a stock and talk about this intrinsic value. Morningstar does the same using different terminology. Therefore, using the DDM to illustrate the concept of intrinsic value is useful.

The essential points about the Dividend Discount Model are discussed in detail, including dividends vs. price in the model and the concept of intrinsic value itself. A detailed analysis of the constant growth model is highlighted in the Appendix by an example showing the present value of the first 60 years of dividends, year by year. The multiple growth model is fully described, with examples.

The P/E ratio approach is explained as an alternative way of doing fundamental analysis, and one that many practicing analysts use. The determinants of the P/E ratio, using the constant

growth model, are examined. The relationship between P/E ratios and interest rates is considered. Finally, this approach is contrasted to the Dividend Discount Model.

Other valuation techniques are briefly examined, including price to book and the price/sales ratio. These other techniques deserve some discussion, but the principal focus remains on the discounted cash flow techniques and the P/E ratio model.

CHAPTER OBJECTIVES

To explain the nature of fundamental security analysis as it applies to common stocks.

To explain the Dividend Discount Model in detail, as well as other cash flow approaches.

To explain several relative valuation approaches, with particular emphasis on the P/E ratio.

MAJOR CHAPTER READINGS [Contents]

Overview

Discounted Cash Flow Techniques

[the discounted cash flow (present value) equation]

Two DCF Approaches

The Dividend Discount Model
[the equation; the 3 growth rate cases; detailed illustration of the constant growth case; the multiple-growth model equation; detailed example showing step-by-step how to calculate estimated price using this version]

Dividends, Dividends--What About Capital Gains?
[how dividends plus a terminal price are equivalent to the estimated stream of all future dividends]

The Dividend Discount Model in Practice
[using it to calculate the expected rate of return on a stock]

Other Discounted Cash-Flow Approaches

Intrinsic Value and Market Price
[what it is and what it means; rules for stock selection]

Relative Valuation Techniques

The P/E Ratio or Earnings Multiplier Approach

Price/Book Value
[definition; support; example of actual use]

Price/Sales Ratio (PRS)
[definition; support]

Economic Value Added

Which Approach to Use?

[both approaches, the DDM and relative valuation techniques, can be used and both involve subjective judgments]

Bursting The Bubble On New Economy Stocks—A Lesson In Valuation

[what happened with the dot.com companies; the need for rational valuation techniques]

Some Final Thoughts on Valuation

[subjective nature of valuation]

POINTS TO NOTE ABOUT CHAPTER 10

Exhibits, Figures and Tables

Figure 10-1 is designed to illustrate the present value approach to valuation for organizational purposes. The emphasis is on the determination of intrinsic value, which can then be compared to current market price.

Figure 10A-1 in the on-line Appendix for Chapter 10 illustrates the constant growth model using a specific example developed in the text (see Table 10-1). The point here is to show how the nominal value of dividends grows over time as compared to the present value of the dividends.

Figure 10-2 illustrates the valuation process for a multiple growth company and could be used as a transparency for the purpose of working through these calculations in class. Most students have genuine difficulty in understanding supergrowth (multiple growth) models.

Table 10-1 shows the relationship between yields on bonds and P/E ratios. The primary point is that interest rates are directly related to required rates of return, and that as the required rate of return increases (decreases), **other things equal**, the P/E ratio decreases (increases). Therefore, bond yields and P/E ratios are usually inversely related.

Table 10A-1 in the on-line Appendix illustrates in detail the constant growth version of the Dividend Discount Model by showing year-by-year results for a particular set of inputs. Shown are the dollar dividend, the PV factor, and the PV of the dollar dividend. Because of the format of the equation, many students fail to recognize that the constant growth version involves a present value process and accounts for all dividends from now to infinity.

ANSWERS TO END-OF-CHAPTER QUESTIONS

10-1. The **intrinsic value** of an asset is its fair economic value as estimated by investors. This value is a function of underlying economic variables--specifically, expected returns and risk.

Traditionally, intrinsic value is determined through a present value process. The future expected cash flows on an asset are discounted at a required rate of return.

10-2. The **required rate of return for a stock** is the minimum expected rate of return necessary to induce an investor to purchase a stock. It accounts for opportunity cost and the risk involved for a particular stock. If an investor can expect to earn the same return elsewhere at a lesser risk, why buy the stock under consideration? Or, put another way, if your opportunity cost for a given risk level is 15%, you should not purchase a stock with that risk level unless you can expect to earn 15% or more from that stock.

10-3. Earnings cannot be used directly in the present value approach because reinvested earnings would be double counted, first as earnings reinvested currently and later as dividends paid. If properly defined and separated, these two variables will produce the same results. Dividends, however, can be used directly.

10-4. The **Dividend Discount Model** is a widely used method to value common stocks. A present value process is used to discount expected future dividends at an appropriate required rate of return to determine intrinsic value. The equation is:

$$IVcs = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \ldots + \frac{D_\infty}{(1+k)^\infty}$$

10-5. The problems encountered in the dividend discount model, which is stated as Equation 10-2 in the text, and shown above in 10-4, include:

(a) The last term indicates we are dealing with infinity.
(b) The dividend stream is uncertain.
(c) The required rate of return has to be determined.

10-6. The three possibilities for dividend growth are:

(a) no growth--the dollar dividend will remain fixed.

(b) constant growth--the dividend will grow at a steady (constant) rate over time.

(c) multiple (super growth)--at least two different growth rates are involved. Many multiple-growth-rate companies grow rapidly for some years and then slow down to a more normal growth rate.

The constant growth model is probably the most applicable to the typical large common stock, and certainly is more often used, rightly or wrongly (because of its simplicity). The no-growth case is the least likely to apply.

10-7. Although dividends are paid to infinity, they can be modeled as either (ignoring the no-growth case) a constant growth rate or a supergrowth situation involving rapid growth for some years plus a constant growth situation for the remainder. In either case, the infinity sign is eliminated.

On a practical basis, dividends discounted at rates of 10% to 20% (or higher) for 35-40 years will have insignificant value and can be ignored.

10-8. The dividend discount model can be stated as:

$$\text{(a)}\quad P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

where P_0 is the current market price of the stock. Alternatively, we could say

$$\text{(b)}\quad P_0 = \sum_{t=1}^{n} \frac{D_t}{(1+k)^t} + \frac{P_n}{(1+k)^n}$$

In (b), P_n is a function of all dividends to be paid from n+1 to infinity, or

$$\text{(c)}\quad P_n = \sum_{n+1}^{\infty} \frac{D_t}{(1+k)^t}$$

Substituting the right-hand side of (c) into (b) for P_n produces (a), putting us back to where we started. Therefore, the combination of a specified number of dividends and a terminal price is exactly equivalent to an infinite number of dividends because the terminal price takes up where the specified number of dividends stopped (i.e., it is equal to the discounted value of all future dividends).

10-9. The two investors are likely to derive different prices because:

(a) They will probably use different estimates of g, the expected growth rate in dividends.

(b) They are likely to use different required rates of return.

10-10. Investors compare intrinsic value (IV) to the current market price (CMP) of the stock.

If IV > CMP, the stock is undervalued -- buy

If IV < CMP, the stock is overvalued -- sell

If IV = CMP, the stock is correctly valued and in equilibrium.

10-11. P/E ratios shown daily in *The Wall Street Journal* reflect the current market price of the stock divided by the latest 12 month earnings. Therefore, they show only the current multiple for a stock. While this can be a useful reference point, investors seeking to value a stock will need an estimate of the future multiplier.

10-12. The P/E ratio is affected by:

(a) The expected dividend payout ratio (D/E).
(b) The required rate of return.
(c) The expected growth rate of dividends.

The P/E ratio is quite sensitive to a change in these factors. A one percentage point change in the required rate of return, for example, can easily change the price of a stock 30 or 40%. A one percentage point change in g, the expected growth rate of dividends, also has a significant impact, but not as large as a change in the required rate of return. Both of these factors usually have more impact than the payout ratio.

10-13. Some analysts argue that the dividend discount model is unrealistic because it requires a forecast of dividends into the distant future (technically, infinity). Also, many investors are seeking capital gains, while this model seemingly focuses on dividends. In response, it should be noted that the dividend growth rate can be modeled in a workable manner, avoiding the infinite horizon problem. Furthermore, investors can structure a stream of dividends and a terminal price (which allows for capital gains) and have an alternative that is equivalent to the basic model.

Perhaps the most important point here is that either model, the dividend discount model or the multiplier model, requires estimates of the future. These estimates cannot be avoided! Whether the inputs for one model as opposed to the other model are more realistic is probably an irresolvable argument.

10-14. This analysis is based on the equation (D/E)/(k-g).

(a) decline

(b) decline

(c) increase

(d) increase*

*the riskless rate of return is a component of the required rate of return, which has an inverse relationship with the P/E.

10-15. Price to book value could be used for a company with no earnings. Price to sales could also be used.

10-16. Two advantages of using the Price/Sales ratio are:

1. It can be used to value a company with no earnings.
2. Sales are much less likely to be "managed" as compared to earnings.

Without using per share numbers, it can be calculated as total market value (price times number of shares) divided by annual sales.

ANSWERS TO END-OF-CHAPTER PROBLEMS

10-1. We must compound the stated dividend, D_0, up one period to obtain D_1,

$P_0 = D_1/(k-g)$

$= D_0(1+g)/(k-g)$

$= \$2.25(1+.08) / (.13-.08)$

$= \$2.43/.05$

$= \$48.60$

10-2. Using the constant growth version of the Dividend Discount Model:

$k = D_1/P_0 + g$

$= \$2.00/\$45 + .09$

$= .1344$ or 13.44%

10-3. Again using the constant growth version of the Dividend Discount Model, solve for g

$k = D_1/P_0 + g$
$k-g = D_1/P_0$
$-g = D_1/P_0 - k$
$g = k - D_1/P_0$
Or: $g = k - [(D_0(1+g))/P_0]$

Therefore:

$g = .15 - [(\$3.00(1+g))/50]$
$50g = 7.50 - 3 - 3g$
$53g = 7.50 - 3$
$53g = 4.50$
$g = .0849$ or 8.49%

10-4. $P = D_0/k = 1.50/.15 = \$10.00$

10-5. (a) $k = D_0/P_0 = \$3.00/\$40 = 7.5\%$

(b) The price will decline because required rates of return rise while dividends remain fixed.

Specifically,

$P = \$3.00/.09 = \$33.33$

10-6. Given a one year horizon, this problem can be formulated as

$$P_0 = \frac{D_1}{(1+k)} + \frac{P_1}{(1+k)}$$

$$\$25 = \$3.00/(1+k) + \$30/(1+k)$$
$$(1+k)25 = 3 + 30$$
$$1+k = 33/25 = 1.32$$
$$k = 32\%$$

10-7. (a) (1) Stock A $k_A = RF + ß_A (R_M - RF)$
$= .10 + 1.0(.15 - .10)$
$= .15$

(2) Stock B $k_B = .10 + 1.7(.15-.10)$
$= .185$

(3) Stock C $k_C = .10 + .8(.15-.10)$
$= .14$

(b) If RF increases to .12, required rates of return are:

$k_A = .12 + 1.0(.03) = .15$

$k_B = .12 + 1.7(.03) = .171$

$k_C = .12 + 0.8(.03) = .144$

(c) If RM increases to 17%, the required rates of return also rise. RF remains 10%.

$k_A = .10 + 1.0(.17-.10) = .17$

$k_B = .10 + 1.7(.17-.10) = .219$

$k_C = .10 + 0.8(.17-.10) = .156$

10-8. (a) It is necessary to calculate the growth rate since it is not given. Referring to a future (compound) value table, and reading across the 12 year row, we find a factor of about 2.0 (actually, 2.0122) at the intersection of the 6% column (or, using the rule of 72, 72/12 = 6%). Therefore g = 6% and

k = [$3.00(1.06)]/$60 + .06
= 053 + .06
= .113 or 11.3%

(b) Using the same table to find a factor of 3.0 on the 6 year row, we find g to be approximately 20% (the exact factor at 20% is 2.986). Therefore, using g = 20%,

k = [$3.00(1.20)]/$60 + .20
= .06 + .20
= .26 or 26%

10-9. (a) Solving for k as the expected rate of return,

k = [$1.80(1.08)]/$36 + .08
= .054 + .08
= .134 or 13.4%

Since the expected return of 13.4% is less than the required rate of return of 14%, this stock is not a good buy.

(b) $P_0 = D_1/(k-g)$
= [$1.80(1.08)]/[.14-.08]
= $32.40

An investor should pay no more than $32.40 if his or her required rate of return is 14%.

If the required rate of return is 15%, the maximum an investor should pay is obviously less than in the previous problem. Specifically,

P_0 = [$1.80(1.08)]/[.15-.08]
= $27.77

10-10. (a) The current P/E ratio is $32/$4 = 8

(b) E_0 = $4

$E_1 = E_0(1+g)$
= $4(1+.10)
= $4.40

With an unchanged P/E of 8, the new price will be

8 x $4.40 = $35.20

(c) D/E = 50% -- payout ratio
g = 10% -- expected growth rate of dividends
k = 16% -- required rate of return

expected rate of return = $D_1/P_0 + g$
= \$2.20/\$32 + .10
= .169 or 16.9%

Alternatively,

$P_0 = D_1/(k-g)$
= \$2.20/(.16-.10)
= \$36.66

This stock is a good buy because the expected return exceeds the required return or, alternatively, the estimated value (price) of the stock exceeds the current market price.

(d) If interest rates are expected to decline, the likely effect is an increase in the P/E ratio.

10-11. $$\frac{\$1.30\ (1.11)}{15.75 - .11} = \$30.38$$

10-12. $$\frac{\$1.30\ (1.16)}{15.75 - .16} = \text{no solution}$$

This problem cannot be solved using this equation because the growth rate is greater than the discount rate (required rate of return).

10-13. Using any computer package that solves stock valuation problems, the correct price of \$32.29 should be produced.

10-14. $D_0 = \$1.60$; k = 16%; g = 8%

$$P_0 = \frac{\$1.60\ (1.08)}{.16 - .08} = \frac{\$1.73}{.08} = \$21.63$$

10-15. $\$2.00\ (.40) = \$0.80 = D_1$

The correct growth rate to use is the **expected** growth rate of 7%.

$$P_0 \quad \frac{\$0.80}{.15 - .07} = \$10$$

10-16. $P_0 = \$0.60\ (.847) + \$1.10\ (.718) + \$1.25\ (5.556)\ (.718)$
$= \$0.51 + \$0.79 + \$4.99$

$= \$6.29$

NOTE: 5.556 is 1/.18 (to account for the perpetuity). This value must then be discounted back to today using the 2-year factor since the perpetuity is valued as of the beginning of year three, which is the same as the end of year two.

10-17. $D_1 = \$1.80\ (1.06) = \$1.91$

$\beta = .90$ (since the stock is 10% less risky than the market)

$k = 5\% + .9\ (7\%) = 11.3\%$

$$P_0 = \frac{\$1.91}{.113 - .06} = \$36.04$$

10-18. $k = D_0 / P_0$

$$k = \frac{\$1.00}{\$12} = 8.33\%$$

10-19. $k = (D_1 / P_0) + g$

$k = [\$2.00(1.07)/\$40] + 7\% = 12.35\%$

10-20. $P_0 = (\$3.00/.25)(.328) = \$3.94$

10-21. $k = D_1/P_0 + g$

$g = k - D_1/P_0$

$g = .10 - \$2.00/\$50$

$= .06$

10-22. $P_0 = \$10\ (4.192) + \$15\ (5.00)\ (.162)$

$= \$41.92 + \$12.15 = \$54.07$

NOTE: 4.192 is the present value of an annuity factor for 10 periods at 20%. 5.00 is the perpetuity factor for 20%, and .162 is the present value factor for 10 periods, 20%.

10-23. This is a 2-stage growth model, or supergrowth. Find the present value of all dividends from now to infinity.

$$P_0 = \sum_{t=1}^{n} \frac{D_0(1+g_1)^t}{(1+k)^t} + \frac{D_n(1+g_c)}{k-g_c} \frac{1}{(1+k)^n}$$

where g_1 is the supergrowth rate in dividends, g_c is the constant growth rate, and n is the number of years of supernormal growth. Solving for the present value of the dividends for the first five years of supergrowth:

		PVIF$_{.18}$	PV in \$
D_0 = \$1.00			
$D_1 = 1.00(1.25) =$	\$1.25	.847	\$1.06
$D_2 = 1.00(1.25)^2 =$	1.56	.718	1.12
$D_3 = 1.00(1.25)^3 =$	1.95	.609	1.19
$D_4 = 1.00(1.25)^4 =$	2.44	.516	1.26
$D_5 = 1.00(1.25)^5 =$	3.05	.437	1.33

PV of dividends for first 5 years = \$5.96

$$P_6 = \frac{D_5(1+g_c)}{k-g_c} = \frac{\$3.05(1.07)}{.18 - .07} = \frac{\$3.26}{.11} = \$29.67$$

We must discount P_6 back to time period zero and add this value to the present value of the first five years of dividends.

NOTE: P_6 is the price at the beginning of year 6, which is equivalent to the end of year 5; therefore, we use the discount factor for 5 years, not 6 years.

P_6 discounted to time period zero:
P_6 (PVIF$_{.18,5}$) = \$29.67(.437) = \$12.97
P_0 = \$5.96 + \$12.97 = \$18.93

10-24. This is a case of three years of zero dividends, followed by a no-growth period of infinite length. Note that the year prior to the start of the constant dividend of \$1 is the end of year 3. Therefore, we discount back 3 periods.

$P_3 = D/k = \$1/.14 = \$7.14$

$P_0 = P_3\ (PVIF_{.10,3}) = \$7.14\ (0.675) = \$4.82$

CFA

10-25. a. $VALUE_0 = \dfrac{D_1}{k - g}$

D_1 = next year's dividend

k = required rate of return

g = constant growth rate

$D_1 = (EPS_0)(1 + g)(P/0) = (4.50)(1.045)(.55) = \$2.59$

k = given at 11% or .11

g = (ROE)(1 - P/0) = (.10)(1 - .55) = .045

$$VALUE_0 = \frac{\$\ 2.59}{.11-.045} = \frac{\$2.59}{.065} = \$39.85$$

b. Multistage Dividend Discount Model (where g_1 = .15 and g_2 is .045):

$$VALUE_1 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3/(k-g_2)}{(1+k)^2}$$

$D_1 = (EPS_0)(1 + g_1)(P/0) = (4.50)(1.15)(.55) = \$2.85$

$D_2 = (D_1)(1 + g_1) = (\$2.85)(1.15) = \$3.27$

k = given at 11% or .11

g_2 = .045

$D_3 = (D_2)(1 + g_2) = (\$3.27)(1.045) = \$3.42$

$$VALUE_0 = \frac{\$2.85}{(1.11)} + \frac{\$3.27}{(1.11)^2} + \frac{3.42/(.11-.045)}{(1.11)^2}$$

$$\frac{\$2.85}{(1.11)} + \frac{\$3.27}{(1.11)^2} + \frac{\$52.62}{(1.11)^2}$$

$$= \$2.56 + \$2.65 + \$42.71$$

$$= \$47.92$$

CFA
10-26.

(a) The dividend discount model is: $P = \frac{d}{k - g}$

Where P - value of the stock today
d - annual dividend one year forward

k - discount rate
g - constant dividend growth rate

Solving for k: $(k - g) = \frac{d}{p}$; then $k = \frac{d}{p} + g$

So k becomes the estimate for the long-term return of the stock.

$$k = \frac{\$.60}{\$20.00} + 8\% = 3\% + 8\% = 11\%$$

(b) Many professional investors shy away from the dividend discount framework analysis due to its many inherent complexities.

(1) The model cannot be used where companies pay very small or no dividends and speculation on the level of future dividends could be futile. (Dividend policy may be arbitrary.)

(2) The model presumes one can accurately forecast long term growth of earnings (dividends) of a company. Such forecasts become quite tenuous beyond two years out. (A short-term valuation may be more pertinent.)

(3) For the variable growth models, small differences in g for the first several years produce large differences in the valuations.

(4) The correct k or the discount rate is difficult to estimate for a specific company as an infinite number of factors affect it which are themselves difficult to forecast,

e.g., inflation, riskless rate of return, risk premium on stocks and other uncertainties.

(5) The model is not definable when g > k as with growth companies, so it is not applicable to a large number of companies.

(6) Where a company has low or negative earnings per share or has a poor balance sheet, the ability to continue the dividend is questionable.

(7) The components of income can differ substantially, reducing comparability.

(c) Three alternative methods of valuation would include:

(1) Price/Earnings ratios
(2) Price/Asset value ratios (including market and book asset values)
(3) Price/Sales ratios
(4) Liquidation or breakup value
(5) Price/cash flow ratios

COMPUTATIONAL PROBLEMS

10-1. This is a three stage growth model. Nevertheless, the process remains the same.

		$PVIF_{.21}$	PV in $
	D_0 = $1.20		
	$D_1 = 1.20(1.30) = \$1.56$	.826	$1.29
30% = g_1	$D_2 = 1.20(1.30)^2 = 2.03$	.683	1.39
	$D_3 = 1.20(1.30)^3 = 2.64$	.565	1.49
	$D_4 = 1.20(1.30)^4 = 3.43$	.467	1.60
	$D_5 = 1.20(1.30)^5 = 4.46$	.386	1.72
	$D_6 = \$4.46(1.20) = \$5.35$	.319	1.71
	$D_7 = 5.35\ (1.20) = 6.42$	.263	1.69
20%= g_2	$D_8 = 6.42\ (1.20) = 7.71$	.218	1.68
	$D_9 = 7.71\ (1.20) = 9.25$	.180	1.67
	$D_{10} = 9.25\ (1.20) = 11.10$	.149	1.65
			$15.89

$$P_{11} = \frac{D_{10}(1.06)}{.21 - .06} = \frac{\$11.10(1.06)}{.15} = \frac{\$11.77}{.15} = \$78.47$$

Discount P_{11} back 10 periods because the price at the beginning of year 11 = the price at the end of year 10:

$78.47(.149) = $11.69

$P_0 = \$15.89 + \$11.69 = \$27.58$

NOTE: Depending on rounding procedures, answers will vary a few cents.

10-2. Lowering the growth rate in the first supernormal growth period from 30% to 25% will clearly result in a lower price because of the lesser growth rate in dividends and the lesser dollar value of the resulting dividend stream. Making this one change (obviously, no other changes are necessary) results in a new price of $23.08.

10-3. This is a three stage growth model. It is unusual in that in the second stage of growth, the growth rate is equal to the discount rate. The process remains the same.

		$PVIF_{.20}$	PV in $
	$D_0 = \$2.00$		
	$D_1 = 2.00(1.30) = \$2.60$	.833	$ 2.17
$30\% = g_1$	$D_2 = 2.00(1.30)^2 = 3.38$	.694	2.35
	$D_3 = 2.00(1.30)^3 = 4.39$	.579	2.54
	$D_4 = D_3(1.20) = \$4.39(1.20) = \$5.27$	.482	2.54
	$D_5 = D_4(1.20) = 5.27(1.20) = 6.32$	.402	2.54
$20\% = g_2$	$D_6 = D_5(1.20) = 6.32(1.20) = 7.58$	.335	2.54
	$D_7 = D_6(1.20) = 7.58(1.20) = 9.10$	.279	2.54
	$D_8 = D_7(1.20) = 9.10(1.20) = 10.92$	.233	2.54
			$19.76

$$P_9 = \frac{D_8(1.06)}{.20 - .06} = \frac{\$10.92(1.06)}{.14} = \frac{\$11.58}{.14} = \$82.71$$

Discounting P_9 back eight periods:*

$82.71(.233) = $19.27

$P_0 = \$19.76 + \$19.27 = \$39.03$

*P_9 is the price at the beginning of year 9; therefore, it is discounted back 8 periods.

Chapter 11: Common Stocks: Analysis And Strategy

CHAPTER OVERVIEW

Chapter 11 completes a two-chapter sequence on the analysis, valuation, and management of common stocks. This chapter concentrates on issues important to the analysis and management of common stocks, given that the valuation of stocks was discussed in Chapter 10.

This arrangement allows us to efficiently cover common stocks by discussing valuation in Chapter 10, analysis and management in Chapter 11, and market efficiency in Chapter 12. This provides an in-depth discussion of common stocks that in many cases will suffice for an introductory course; that is, instructors may choose to forego Part IV on security analysis, or cover it in less detail. Students will be exposed to the basic terminology, ideas, and concepts involving common stocks by covering these three chapters.

Chapter 11 begins by analyzing common stocks in terms of the impact of the market on common stocks (obviously a major consideration) and in terms of the required rate of return for common stocks (a very important concept covered briefly in earlier chapters). Now that we are analyzing stocks in detail, a full discussion of these two key topics is extremely valuable.

Earlier chapters defined and briefly discussed systematic risk and beta, and we can now emphasize that all investors who plan to analyze and manage a portfolio of stocks must be keenly aware of market risk, both domestic and foreign. In a similar manner, in Chapter 10, in order to concentrate on the techniques of valuation, we assumed that we knew the discount rate or required rate of return. Here we consider it in detail because of its importance to any successful understanding of stocks.

Chapter 11 relates to themes developed in Chapter 8, where it is noted that investors often consider the investment decision as consisting of two steps, asset allocation and security selection. We are assuming here that the asset allocation decision has been made.

The discussion of how investors should approach the analysis and management of stocks is divided into the two major alternatives, passive strategies and active strategies. This division is an effective and realistic way to organize this discussion, and once again allows the instructor flexibility in bringing up such topics as Efficient Markets.

The passive strategy discussion covers the buy-and-hold strategy and index funds. The active strategy discussion covers the major alternatives investors have when pursuing an active approach--security selection, sector rotation, and market timing. This discussion is followed by a consideration of how Efficient Markets concepts affect active strategies, and opens up numerous possibilities for discussion.

CHAPTER OBJECTIVES

To concentrate only on the analysis and management of common stocks.

To describe some major concepts and issues that investors should understand when analyzing stocks.

To outline investors' alternatives in terms of passive and active strategies.

MAJOR CHAPTER HEADINGS [Contents]

Taking a Global Perspective

Analyzing Some Important Issues Involving Common Stocks

The Impact of the Overall Market on Individual Stocks
[significance of impact on a well-diversified portfolio; international examples]

The Required Rate of Return
[what it is; components; risk and required rate of return]

Building Stock Portfolios

[the asset allocation decision; security selection]

The Passive Strategy

[passive strategies seek to do as well as the market]

Buy-And-Hold Strategy
[description]

Index Funds
[stock-index funds]

The Active Strategy

[assumes an investor possesses some advantage relative to others]

Security Selection
[the importance of stock selection; forecasting EPS; cross-sectional variation in common stocks; the role of the security analyst, including accuracy, impact of their recommendations, recent controversy about their conflicts, and new SEC rules]

Sector Rotation
[what it involves; examples; use of mutual funds; industry momentum]

Market Timing
[what is involved; evidence on likelihood of success]

Rational Markets And Active Strategies
[brief description of the EMH; implications to investors]

A Simple Strategy—The Coffeehouse Portfolio

POINTS TO NOTE ABOUT CHAPTER 11

Exhibits, Figures and Tables

Figure 11-1 illustrates, for an actual large, well-diversified mutual fund, how closely the fund's performance tracks that of the S&P 500.

Figure 11-2 shows the ex-ante trade-off between required rate of return and risk, as measured by beta. This is always an important figure to stress to students. The greater the expected risk, the greater the required rate of return.

Figure 11-3 shows the impact of security analysts on stock prices following an upgrade and a downgrade. The impact has increased in recent years despite the controversy about analysts.

Figure 11-4 shows market timing results, contrasting being in the market for 20 years versus leaving out the best 15 months of performance.

There are no tables in Chapter 11.

ANSWERS TO END OF CHAPTER QUESTIONS

11-1. The market has a major impact on the average stock. For a well-diversified portfolio, which has little or no nonsystematic risk (attributable to individual company factors), the market is the dominant influence on the portfolio, explaining most of the variation in its returns. Since most mutual funds are very diversified, they will tend to move very much like the market.

11-2. Common stock investors recognize that returns will be quite variable on a year-to-year basis. One has only to examine the S&P data given in the text to verify this. Nevertheless, owning common stocks is a prudent thing to do because of their larger returns. Diversification is an absolute essential, which helps to reduce the risk. Also, owning stocks over a long period helps to reduce the risk in the sense that a portfolio does not have to be liquidated during bear market periods. Based on the historical evidence, it would not be prudent to own a portfolio of fixed-income securities over a long period of time because of their much lower returns (and ending wealth), particularly on an inflation-adjusted basis.

11-3. The ownership of foreign stocks is a natural, and important, part of the diversification process as well as the process of seeking the best returns possible, given the risk involved. Investors must operate in an international environment in today's world.

The fact that Japanese stock prices dropped drastically simply means that for new investors a significant opportunity exists. The question, of course, has been when to buy. For example, Japanese stocks rallied sharply in 1993 from the low point reached but also had problems after that time. As of mid-1999, a small improvement had occurred, but stocks remained depressed.

All stock markets are risky, domestic and foreign.

11-4. The required rate of return for IBM is the minimum expected rate of return necessary to induce investors to purchase IBM shares. The required rate of return takes into account the opportunity cost involved of investing in a particular stock with a given level of risk. In the case of IBM, an investor can justify purchasing shares if he or she can expect to earn a level of return that will adequately compensate for the risk involved as measured by the stock's beta coefficient.

11-5. The two components of the required rate of return are:

- the **risk-free rate of return**--available to all investors by buying risk-free assets
- the **risk premium**--compensation for the particular risk of an asset--the larger the risk, the larger the risk premium

11-6. There are many financial assets and, therefore, many different required rates of return. Within a particular asset category such as common stocks, there are many required rates of return. The level of required rates changes over time.

11-7. The shape of the tradeoff between the required rate of return and risk is upward sloping because the relationship is formulated on an ex-ante basis. That is, investors purchase assets to hold based on their expectations of the future. Ex post, for relatively short periods, this relationship can, and does, slope downward. It does not, however, when long periods of time are considered--for example, data since 1920 clearly shows that stocks return about twice what bonds return over long periods.

11-8. Since the market has a beta of 1.0 by definition, the required rate of return is simply the expected rate of return on the market.

11-9. Passive strategies are based on the proposition that an investor does not possess either the knowledge or the ability to outperform the market as a whole. These strategies simply seek to do as well as the market. Passive strategies are related to the concept of efficient markets.

11-10. Three active strategies for common stocks include:

stock selection--searching for undervalued or overvalued stocks

sector rotation--shifting the sector weights in a portfolio to take advantage of those sectors expected to do relatively better and avoid those expected to do relatively worse

market timing--the attempt to earn excess returns by varying the percentage of portfolio assets in equity securities.

11-11. In evaluating common stocks, according to one study, security analysts rely on presentations from top management of companies, annual reports, and Form 10-K reports that the companies must file with the SEC.

11-12. The cross-sectional variation in common stocks is large. In a given year, there is a wide range in performance of stocks. Investors who can confine stock selection to the stocks in the highest quartile in a given year would largely avoid losing years. However, about 25 percent of the time even the best stocks would have lost money. Cross-sectional variation of returns has been increasing steadily over the decades.

11-13. Sector rotation is an active strategy involving shifting sector weights in the portfolio in order to take advantage of those sectors that are expected to do relatively better, and avoid or de-emphasize those sectors that are expected to do relatively worse. Investors using this strategy are betting that particular sectors will repeat their price performance relative to the current phase of the business and credit cycle.

The key to effective strategies involving sector rotation is an accurate assessment of current economic conditions.

11-14. The evidence on market timing suggests that there is little evidence of many investors doing this successfully on a consistent basis. The evidence from mutual funds is particularly persuasive in this regard.

11-15. Ten of the largest brokerage firms must now provide their clients with a source of research that is independent of their analysts. Investors can obtain these reports from their broker.

11-16. *The Value Line Investment Survey*; S&P's *Outlook*; and *Morningstar*.

11-17. The Efficient Market Hypothesis has to do with the adjustment of stock prices to new information. If the market is efficient, stock prices adjust quickly, and on balance accurately, to new information. This hypothesis has obvious implications for the strategies and approaches discussed in this chapter.

11-18. The implication of the EMH is that it is difficult to outperform the market regardless of approach.

11-19. Investment companies basically sell active approaches. If more investors became passive investors, there would be less demand for investment company shares.

11-20. Active investors should determine if their results, net of costs, are superior to what could be obtained from passive investing. Ideally, they should factor in the time involved in pursuing an active approach.

11-21. Morgan Stanley charges a much higher annual expense ratio, thereby decreasing the investor's return.

11-22. Overall, health care stocks performed better than the market as a whole, leading to better performance for Vanguard's fund.

ANSWERS TO END OF CHAPTER PROBLEMS

11-1. 11% – 1.5% = 9.5% on a net basis; \$10,000 $(1.095)^{20}$ = \$61,416.12

11-2. The front load is 5.25%. Therefore, you would have, on the first day following deduction of the load charge, (1 - .0525) \$10,000 = \$9,475.

11-3. The total returns from 2000 to 2005 are: -26.2, -30.1, -30.6, 32.7, 10,1, and 9.9. Return relatives are: .738, .699, .694, 1.327, 1.101, and 1.099. The product of these six numbers is 0.5748. The geometric mean is 0.9119. Subtracting from 1.0, the result is -0.0881 or -8.81%.

COMPUTATIONAL PROBLEM

11-1. For the Vanguard fund, subtract .0018 (which is 0.18 percent) from each return relative, resulting in: 0.9082, 0.8792, 0.7782, 1.2822, 1.1052, and 1.0475.

Multiplying these 6 numbers together produces 0.9224. Multiplying by the initial \$10,000, the final result is \$9,223.83.

For the Morgan Stanley fund, subtract .014 (which is 1.4 percent) from each return relative, resulting in: 0.896, 0.867, 0.766, 1.270, 1.093, and 1.0353.

Multiplying these 6 numbers together produces 0.8552. Multiplying by the initial \$10,000, the final result is \$8,551.57.

While both funds experienced a loss over this 6 year period, Vanguard showed a smaller loss because of its much lower annual operating expense.

Chapter 12: Market Efficiency

CHAPTER OVERVIEW

A chapter on market efficiency is a natural sequence to the other two chapters in Part III dealing with common stocks. It is also desirable for students to be familiar with this topic at this point so that market efficiency can be referred to when discussing other topics, such as technical analysis or fundamental security analysis.

Chapter 12 begins by explaining the rationale for arguing that the market is efficient. It then proceeds to outline the classic three forms of market efficiency laid out by Fama in 1970: weak, semi-strong, and strong.

Evidence on market efficiency is presented in some detail, starting with weak form efficiency and concluding with strong form efficiency. Within the weak form section the distinction is made between statistical tests and trading rule tests. In the semi-strong form section the concept of event studies is developed, along with abnormal returns. Strong form evidence is developed in appropriate detail.

Chapter 12 presents a thorough analysis of the implications of the EMH. This is necessary to get students to think about the important issues involved with the concept of market efficiency. The implications for both technical analysis and fundamental analysis are considered, along with those for money managers. This discussion serves as a good introduction to the last part of the chapter on possible market anomalies.

Chapter 12 concludes with a thorough discussion of possible market anomalies or evidence of possible market inefficiency. This evidence is divided into earnings announcements (which is related to the unexpected earnings concept in Chapter 15), low P/E ratios, the size effect, the January effect, and the Value Line results.

Behavioral finance is discussed in Chapter 12. The chapter ends with some conclusions about market efficiency. It is important for students to think about what they have learned and the implications for their approach to investing in general and to such areas as technical analysis in particular.

Overall, most instructors will want to leave their students with a balanced view of the efficient market controversy. The evidence on market efficiency is well documented and augmented by such factors as the mediocre performance of professional fund managers. On the other hand, to date no one has conclusively explained why at least some of the anomalies exist. There may in fact be explanations, but they have not been widely accepted. Students must realize that in the area of efficient markets, as in numerous other areas of investing, there is no definitive answer, which is universally agreed upon and no definitive, universal statement that can be made.

CHAPTER OBJECTIVES

To explain the rationale for efficient markets and what the concept means.

To present the three forms of market efficiency and well known empirical evidence concerning each of the three forms.

To introduce the concept of behavioral finance.

To consider the possible market inefficiencies (anomalies) that have been widely discussed to date.

MAJOR CHAPTER HEADINGS [Contents]

Overview

The Concept of an Efficient Market

What is an Efficient Market?
[definition; what is relevant information?; diagram and explanation of adjustments to information]

Why the U. S. Market Can Be Expected to Be Efficient
[many participants, widely available information randomly generated, investors react quickly to the new information]

The International Perspective
[some evidence that other markets are less efficient; evidence of a one-day lead in the markets by the United States]

Forms of Market Efficiency
[weak, semistrong, strong; definitions and discussion]

How To Test For Market Efficiency

Weak-Form Test
[statistical tests of price changes, technical trading rules tests, weak-form contra evidence]

Semistrong-Form Test
[explanation of event study, explanation of abnormal return and the cumulative abnormal return; review of evidence involving stock splits (a 2003 study reported here), money supply changes, accounting changes, dividend announcements, reactions to other announcements]

Strong-form Evidence
[corporate insiders]

Behavioral Finance And Market Anomalies

[behavioral finance basics]

Earnings Announcements

[unexpected earnings, SUE analysis; unexpected earnings concept is widely used]

Low P/E Ratios
[Basu studies, Dreman arguments]

The Size Effect
[small firms outperform large firms on risk-adjusted basis]

The January Effect
[the strong performance in January by small-company stocks]

The Value Line Ranking System
[the performance of the 5 ranking categories; graphs showing performance of ranks as well as performance of Group 1 vs. other selection techniques]

Other Anomalies
[brief mention of others, such as the neglected firm effect]

Some Conclusions About Market Efficiency

Data Mining

Some Remaining Issues

Behavioral Finance and Efficient Markets

A Final Argument for Market Efficiency

POINTS TO NOTE ABOUT CHAPTER 12

Exhibits, Figures and Tables

Figures 12-1 and 12-2 are designed to help students visualize the adjustment process of stock prices to information and the cumulative levels of efficiency, respectively.

Figure 12-3 illustrates how apparent patterns in stock prices can be generated randomly.

Figure 12-4 illustrates some patterns for cumulative abnormal returns. Part (a) shows a situation where the announcement is unanticipated in an efficient market. Part (b) illustrates the case of an anticipated favorable event in an efficient market.

Figure 12-5 on SUE categories is a striking figure. It shows that stocks do not fully adjust to quarterly earnings on the day of announcement, or shortly after. It also suggests that insiders are at work before the earnings are announced.

Figure 12-6 shows the record for Value Line ranks over the period Value Line has been making recommendations. The record shows that the Value Line ranks perform as one would hope, with Group 1 doing well, Group 2 doing less well, etc.

Figure 12-7 shows Value Line's Group 1 performance plotted against other selection techniques such as small size, low P/E and low Price to Book. The Group 1 stocks significantly outperform the other categories.

Boxed Inserts

Box 12-1 provides a perspective on the interaction between behavioral activities and market efficiency. It discusses how some people find patterns in stock prices when none exist.

ANSWERS TO END-OF-CHAPTER QUESTIONS

12-1. An **efficient market** is defined as one in which the prices of securities fully reflect all known information quickly and accurately.

12-2. The three (cumulative) forms of market efficiency are:

(a) The weak form, which states that market data (price and volume information) are reflected in current prices and should be of no value in predicting future price changes.

(b) The semistrong form, which states that all publicly known and publicly available data are incorporated into stock prices.

(c) The strong form, which states that prices fully reflect all information, public and nonpublic (i.e., information that can be restricted to certain groups)

12-3. The conditions for an efficient market to exist are:

(a) A large number of profit-maximizing investors who actively participate in the market.

(b) Information that is costless and widely available to all at approximately the same time.

(c) Information that is generated in a random fashion such that announcements are basically independent of one another.

(d) Investors that react quickly and accurately to new information.

These conditions, which appear strict, are met quite closely in reality. For example, while information is not costless to produce, many market participants receive it "free" (of course, it has to be paid for in the commissions investors pay).

12-4. Technical analysis relies heavily on known price and volume data to predict future price changes. The weak form of the EMH states that such data should already be reflected in current prices and therefore is of no value in predicting future price changes.

12-5. Semistrong form tests are tests of the speed of price adjustments to public information. They seek to determine if investors can use publicly available information to earn excess returns.

12-6. Two different ways to test for weak form efficiency are:

(a) Statistically test the independence of stock price changes, using such techniques as the serial correlation test and the signs test.

(b) Test specific trading rules that attempt to use past price and volume data. One well-known technical trading rule is the filter rule.

12-7. *Statistical significance* results from formal tests in statistics, such as the calculation of the *t* statistic or the F statistic. Such significance relates to the probability of accepting or rejecting certain hypotheses.

Economic significance refers to the possibility of being able to actually exploit a statistical dependence. After all costs are accounted for, can excess returns be earned through such exploitation?

12-8. If the EMH is true, there are several implications for investors:

(a) Technical analysis has no validity or, at the very least, is seriously in doubt.

(b) Conventional fundamental analysis--the type done by the majority of analysts--is of little value, producing, at best, average results. What is necessary is to perform clearly superior fundamental analysis.

(c) As for money management activities, passive strategies would receive much more emphasis. Nevertheless, several tasks must still be performed, such as diversifying, establishing and maintaining the risk level, and being concerned with the tax status of the investor and his or her transaction costs.

12-9. The performance of mutual fund investors can be a test of semistrong efficiency in the sense that the managers may be using nothing other than the publicly available information to which all investors have access. The semistrong form is concerned with publicly available information. If the managers are unable to outperform the market (after all proper adjustments) using this information, semistrong efficiency is supported.

12-10. The money management activities for a portfolio manager who believes that the market is efficient will include at least the following:

(a) ascertain that the correct amount of diversification has been achieved

(b) achieve a level of risk appropriate for the portfolio

(c) maintain the desired risk level over time

(d) be constantly aware of the tax implications of the portfolio

(e) seek to reduce transaction costs.

12-11. Market anomalies are research findings that do not support market efficiency; that is, they are evidence that inefficiencies do exist. These results are in contrast to what would be expected in a totally efficient market.

Well known anomalies include:

(a) the SUE effect, or the proposition that the adjustment of stock prices to quarterly earnings announcements occurs with a lag

(b) the P/E effect, or the proposition that low P/E stocks will, on average, outperform high P/E stocks

(c) the size effect, or the proposition that small capitalization stocks have earned higher risk-adjusted returns than have large capitalization stocks

(d) the seasonal effect, or the proposition that stocks have exhibited higher returns than expected in January. This could also include the monthly effect, the weekend effect, and so forth.

(e) the Value Line results, which seem to indicate that this investment advisory service has classified stocks into five groups that have performed in a monotonic fashion, with very impressive results for the top (expected best performers) two groups

12-12. If all investors believed that the market is efficient, and numerous participants ceased the pursuit and study of information about stocks, the result could be less market efficiency. Obviously, this statement would depend upon who is left to do the analysis, and how much they do. The point of this question is to stimulate thinking about what is going on in the market in the way of information gathering and processing.

12-13. SUE is directly related to fundamental analysis. First, earnings are a primary component of fundamental analysis. Second, stock prices should be expected to adjust to any unexpected information contained in the earnings, and SUE captures this unexpected element. The question is how long this adjustment takes.

12-14. Numerous types of events or information have been used in semistrong form tests. The text discusses the following: stock splits, money supply changes, accounting changes, dividend announcements, and reactions to various announcements such as major world events and the information in the "Heard in the Street" column of *The Wall Street Journal*.

Of course, earnings announcements have been studied in regard to semistrong efficiency. Because SUE is discussed in other sections of the book, it was not included in the list discussed above; however, earnings announcements are one of the major items to be studied in this regard. Furthermore, the other anomalies discussed later in the chapter, such as the P/E ratio, involve tests of semistrong efficiency.

Other studies have examined management forecasts, new issues, and options. Finally, as discussed elsewhere, tests of mutual fund performance can be regarded as semistrong efficiency tests.

12-15. In an efficient market, prices reflect information quickly and accurately. Investors could expect to buy and sell stocks at "fairly-valued" prices. Corporations could assume that when they make good decisions, or experience favorable events, the corporation's stock price will reflect this. Funds will be better allocated in such a market. Furthermore, resources would not be devoted to pursuits of dubious or no value, such as technical analysis.

12-16. No! Upward trends are not inconsistent with weak form efficiency. Price changes can be random around an upward trend. Any random series can show clear trends.

12-17. Security analysts are still needed in an efficient market to disseminate information and value securities based on their estimates. If this were not being done, the market could become inefficient. The important question here involves the number of analysts needed to perform this role, and the type of analysis they do.

12-18. The fact that a mutual fund, or any portfolio, has outperformed the market for the last four years is not a very significant finding. To be potentially significant, we must show first of all that the results are on a risk-adjusted basis, and that all expenses relative to a buy-and-hold strategy has been accounted for. Until this is done, the statement is basically meaningless.

12-19. To conduct a fair test of a technical trading rule, certain adjustments must be made, including:

(a) risk

(b) transaction and other costs

(c) consistency

(d) out-of-sample validity

12-20. **Filter rules** are related to timing strategies, indicating when to be long or short. Filter rules should be compared with a buy-and-hold strategy.

12-21. An analysis of specialists is a test of strong form efficiency. They possess information (such as a knowledge of limit orders) not publicly available, and the issue is whether they can earn excess returns.

12-22. Some researchers writing about the size anomaly, in particular Banz and Reinganum, have attributed it to a misspecification of the CAPM. Size may be a proxy for some other

variable, or may be highly correlated with other variables and be picking up part of their effects.

12-23. Directly testing the profitability of insider trading involves strong form efficiency. And tests of insider activity indicate that they do earn returns in excess of those expected.

Investors can use the insider reports that must be filed with the SEC and are, therefore, publicly available. Several advisory services report these transactions. A test of whether investors can use such publicly available information to earn excess returns is a test of semistrong efficiency.

12-24. Mutual fund data can be used to test strong form efficiency by assuming that mutual fund managers are in possession of non-public information. Since they are full-time managers with staffs to assist them, have adequate resources for research, and offer the potential for brokers to earn large commissions, it is reasonable to expect them to discover information more quickly than the average investor.

Mutual fund data can also be used to test semistrong form efficiency. If all publicly available information is quickly reflected in stock prices, and mutual funds use only publicly available information, they should not be able to earn excess returns.

12-25. *If the market is semistrong efficient*, you would expect to see an immediate adjustment at the time the information becomes available. On a graph with stock price as the vertical axis and time as the horizontal axis, think of the price between period 0 and period 1 as a horizontal line extending from the stock price on the vertical axis.

At time period 1, the price would adjust immediately to the new (and assumed) higher price; therefore, on the graph there would be a small vertical line representing this immediate adjustment to the new and higher justified level. For completeness in this simple situation, you could then draw a new horizontal line representing the price between period 1 and period 2.

If there is a lag in the adjustment of the price to this information, there would not be the sharp, immediate adjustment at period 1. Rather, this adjustment would be gradual.

12-26. The SUE analysis is **not** related to technical analysis, which uses market data in an attempt to forecast future price changes. SUE is part of fundamental analysis because it is concerned with the adjustment of stock prices to earnings announcements, and earnings are a primary fundamental variable.

12-27. The standard definition of an *operationally efficient* market is one with the lowest possible prices for transactions services. This is different from the *informational efficiency* discussed in this chapter.

CFA

12-28. a.

The notion that stock prices already reflect all available information is referred to as the efficient market hypothesis (EMH). It is common to distinguish among three versions of the EMH: the weak, semi-strong, and strong forms. These versions differ by their treatment of what is meant by "all available information."

The weak-form hypothesis asserts that stock prices already reflect all information that can be derived from studying past market trading data. Therefore, "technical analysis" and trend analysis, etc., are fruitless pursuits. Past stock prices are publicly available and virtually costless to obtain. If such data ever conveyed reliable signals about future stock performance, all investors would have learned already to exploit such signals.

The semi-strong form hypothesis states that *all publicly-available information* about the prospects of a firm must be reflected already in the stock's price. Such information includes, *in addition to past prices*, all fundamental data on the firm, its products, its management, its finances, its earnings, etc., that can be found in public information sources.

The strong-form hypothesis states that stock prices reflect *all information* relevant to the firm, *even including information available only to company "insiders."* This version is an extreme one. Obviously, some "insiders" do have access to pertinent information long enough for them to profit from trading on that information before the public obtains it. Indeed, such trading - not only by the "insiders" themselves, but also by relatives and/or associates - is illegal under rules of the SEC.

For the weak-form or the semi-strong forms of the hypothesis to be valid does not require the strong-form version to hold. If the strong-form version was valid, however, both the semi-strong and the weak-form versions of efficiency would also be valid.

b.

Even in an efficient market, a portfolio manager would have the important role of constructing and implementing an integrated set of steps to create and maintain appropriate combinations of investment assets. Listed below are the necessary steps in the portfolio management process:

1) Counseling the client to help the client to determine appropriate objectives and identify and evaluate constraints. The portfolio manager together with the client should specify and quantify risk tolerance, required rate of return, time horizon, tax considerations, and the form of income needs, liquidity, legal and regulatory constraints, and any unique circumstances that will impact or modify normal management procedures/goals.

2) Monitoring and evaluating capital market expectations. Relevant considerations, such as economic, social, and political conditions/expectations are factored into the decision making process in terms of the expected risk/reward relationship for the various asset categories. Different expectations may lead the portfolio manager to adjust a client's systematic risk level even if markets are efficient.

3) The above steps are decisions derived from/implemented through portfolio policy and strategy setting. Investment policies are set and implemented through the choice of optimal combinations of financial and real assets in the marketplace - i.e., asset allocation. Under the assumption of a perfectly efficient market, stocks would be priced fairly, eliminating any added value by specific security selection. It might be argued that an investment policy which stresses diversification is even more important in an efficient market contest because the elimination of specific risk becomes extremely important.

4) Market conditions, relative asset category percentages, and the investor's circumstances are monitored.

5) Portfolio adjustments are made as a result of significant changes in any or all relevant variables.

CFA
12-29. c

CFA
12-30. a

CFA
12-31. d

CFA
12-32. d

ANSWERS TO END-OF-CHAPTER PROBLEM

12-1. SUE = (Actual Earnings - Expected Earnings) / Standard Error of Estimate

= (.50 - .30) / .05 = 4.0

This would be a good buy on the basis of the research that has been done because SUE values over 3.0 have, on average, been associated with positive excess returns, and the higher the SUE value, other things equal, the better. A SUE of 4 or better would put this stock in the top decile of SUE stocks based on previous studies.

PART V SECURITY ANALYSIS

Chapter 13: Economy/Market Analysis

CHAPTER OVERVIEW

Chapter 13 is the first of four chapters explaining security analysis, and the first of three explaining the top-down approach to fundamental analysis of common stocks by proceeding from market analysis to industry analysis to company analysis. All three of these chapters stress the same model of valuation: use a discounted cash flow analysis, or, for illustrative purposes here, a P/E ratio model. In other words, estimate an expected return in the form of dividends or next year's earnings, and apply an appropriate capitalization rate or multiplier, respectively.

Chapter 13 begins by considering relationships between the economy and the stock market, with emphasis on the business cycle. It is important to emphasize that the market typically leads the economy. Macroeconomic forecasts of the economy are also considered.

The next part of the chapter focuses on understanding the stock market. It begins with an analysis of what is meant by the "market." Given the information in Chapter 4 on market indexes, the discussion here involves the simple point that the "market" generally refers to a market index such as the Dow or the S&P 500. The remainder of this discussion focuses on the uses of market measures.

To understand the stock market, think in terms of the expected returns and risk for the market. One can use the framework of the constant growth version of the Dividend Discount Model to illustrate the important points about what determines stock prices. Alternatively, we can use expected earnings and the P/E ratio.

To value the market, we use a framework involving corporate earnings and a multiplier. Using ex post data for the market, we can examine what did happen as these variables changed from year to year. Such an exercise is useful to make students think about the logic of what is going on.

To forecast changes in the market, economic variables can be used as clues. This involves analysis of the business cycle and of such factors as monetary variables. Specific relationships between economic activity and market advances or declines have been noted, and may be useful for helping to forecast the market.

The so-called Fed model is also examined.

CHAPTER OBJECTIVES

To examine the relationships between the economy and the stock market.

To explain conceptually how the market can be understood and forecasts made of possible future movements in the market.

To illustrate fundamental analysis as it applies to the aggregate stock market using the same types of models developed in Chapter 10.

MAJOR CHAPTER HEADINGS [Contents]

Taking A Global Perspective

Assessing The Economy

The Business Cycle
[definition; composite indexes; relationships to market; the stock market and the business cycle; has the business cycle been tamed?]

Forecasts of the Economy

Understanding The Stock Market

What Do We Mean by the "Market"?
[most investors are referring to some market index; reasons why we need measures of the stock market]

Making Market Forecasts

Focus on the Important Variables

Using the Business Cycle to Make Market Forecasts
[relationships between stages of the business cycle and stock prices]

Other Approaches to Assessing the Market's Direction

POINTS TO NOTE ABOUT CHAPTER 13

Exhibits, Figures and Tables

Figure 13-1 shows the percent change year-to-year in real GDP. GDP is an important factor in assessing the economy.

Figure 13-2 shows Treasury yield curves for selected periods. The yield curve is related to the stage of the business cycle.

Figure 13-3 shows S&P 500 P/E ratios since 1947. It illustrates the point that P/E ratios fluctuate dramatically over time, making it very difficult to forecast the market even if an investor has a good estimate of earnings for the next period. The P/E ratio has hovered around different levels for extended periods of time, as shown in Figure 13-3. For example, in the 1960s and early 1970s it was around 17, while in the late 1970s it tended to hover around 10. In the 1990s, the P/E underwent a strong upward movement. It has since declined.

Figure 13-4 shows corporate earnings. Earnings are one of the two key variables in understanding the aggregate stock market. It also shows total returns on the S&P 500. Figure 13-4 also shows yields on high-grade corporate bonds as well as total returns on the S&P 500. Interest rates as a proxy for required return is the other key variable in understanding changes in the overall market.

Table 13-1 shows annual corporate interest rates and annual appreciation for the S&P 500 Index. Declining interest rates are often associated with good stock performance.

ANSWERS TO END-OF-CHAPTER QUESTIONS

13-1. Market analysis is important because some 30% to 50% of the variability in an individual stock's return is attributable to aggregate market effects. Not only is the market the largest single factor explaining fluctuations in individual stock returns, it has an even greater impact on a diversified portfolio.

13-2. The Euro strengthened against the dollar in 2002-2004. This benefited U.S. investors when they converted the foreign currency into dollars because they could buy more dollars.

13-3. GDP ups and downs directly affect companies, thereby affecting investors.

13-4. Since WWII expansions have typically been longer than before, and contractions shorter.

13-5. Historically, a close *direct* relationship has existed between corporate profits and stock prices. A parallel between the two series can often be seen, both upward and downward, although stock prices may move first.

An *inverse* relationship exists between stock prices and interest rates. Because interest rates are closely tied to discount rates, a rise in interest rates will have a negative impact on stock prices.

13-6. To value the market, investors need to analyze the expected earnings (or dividends) for a market index as well as an expected P/E ratio (or discount rate). These values are difficult to accurately predict; however, the concept is simple and intuitive. If earnings are expected to rise and the P/E to at least remain constant, the market should rise. If a decline is expected, ceteris parabus, a drop in value can be expected. And so forth.

It is desirable for instructors to impress upon students the basic nature of this process, even if exact estimates are difficult to obtain. No one is ever going to be able to forecast the market accurately on a consistent basis, but it is possible to make some astute judgments periodically (such as in 1982 before the peak in interest rates) and benefit from them.

13-7. The primary cause of a rise in stock prices in 1982 was a dramatic decline in interest rates, and therefore discount rates. While it is not likely that many investors caught the exact bottom, a sizeable number did benefit by expecting such a decline sometime in 1982 and using this expectation in the manner suggested in the previous answer.

13-8. Stock prices tend to lead the economy's turning points, both peaks and troughs. However, there are finer points to consider:

(a) Stock prices almost always rise as the business cycle is *approaching* a trough. Furthermore, these increases have been large.

(b) Stock prices often drop suddenly as the business cycle enters into the initial phase of recovery. Prices stabilize, or even decline, as the economy moves ahead.

13-9. • Stocks should be purchased before a bottoming of the economy occurs because prices almost always rise before the trough.

• As the economy recovers, be prepared for a leveling off, or even a decline.

13-10. Considerable evidence suggests that investors cannot use past changes in money supply to forecast stock prices. Stock price movements may lead changes in money supply. As in numerous other areas of research in investments, this relationship has been controversial, and the evidence presented has been mixed.

13-11. The market P/E is higher at the end of the slump than at its low point of the slump; in other words, the P/E ratio usually rises toward the end of each slump relative to its low point during the downturn. It then remains roughly unchanged over the next year.

13-12. The data suggest rather clearly that the P/E ratio declined over much of the 1970's. Profits, on the other hand, trended up over the last half of the decade. (Note, however, that "real" profits may have acted differently-- adjusted for inflation, inventory effects, etc. Controversy exists about the true performance of corporate profits.) Regardless, the sharp drop in P/E ratios in the mid-to-late 1970s clearly had a negative impact on the market.

13-13. You cannot answer this question with the information provided. The reason is that the value of stocks is dependent upon both components of the valuation model-- returns and risk. Therefore, while you may know with certainty what corporate earnings will do, you do not know what the discount rate (or, alternatively, the P/E ratio) will do. It could easily change more than enough to negate the favorable impact of the increase in corporate earnings.

13-14. A steepening yield curve suggests that the economy is accelerating in terms of activity as monetary policy stimulates the economy. An invested yield curve carries expectations of an economic slowdown. Virtually every recession since WWII has been preceded by a downward-sloping yield curve.

13-15. It is reasonable to expect corporate earnings to grow, on average, at about the rate of the economy as a whole. Of course, in some periods earnings may grow at a much faster rate. This occurred in the last years of the 20th Century.

13-16. Using the so-called Fed model, stocks are relatively attractive when the earnings yield on the S&P 500 is greater than the 10-year Treasury yield. Alternatively, estimate the fair value level of the S&P 500 Index by dividing the estimated earnings for this index by the current 10-year Treasury bond yield. If the estimated fair value of the market is greater than the current level of the market, stocks are undervalued.

13-17. Consumer spending is the largest single component driving the economy, and therefore warrants detailed attention.

CFA

13-18. a. A basic premise of the business cycle approach to investing is that stock prices and bond prices tend to move in cycles and those cycles tend to relate over time in a reasonably uniform way to the business cycle. For example, there is evidence that stock prices tend to move about six months ahead of the economy. In fact, stock prices are a leading indicator for the economy.

Over the course of a business cycle this approach to investing would work as follows. As the top of a business cycle is perceived to be approaching, stocks purchased should not be vulnerable to a recession. When a downturn is perceived to be at hand, stock holdings should be lightened with proceeds invested in high-quality, short-term instruments which should be yielding reasonably well with a reasonably flat yield curve. Once the recession is clearly underway interest rates should be at a peak and holdings should be switched to high-quality, long-term bonds. Once the recession has matured to some extent, a switch should be made to lower quality debt instruments as yield spreads should have widened. As it's perceived the recession is about to end, profits should be taken in the bonds and reinvested in stocks, particularly those in cyclical industries or with a high beta.

Excess returns generally will only be earned if the above switches precede these turning points by several months. Switches made after the turning points may not lead to excess returns.

b. Based on the business cycle approach to investment timing, the ideal time to invest in a cyclical stock like a passenger car company would be just before the end of a recession. If the recovery is underway, Adam's recommendation would be late. The equities market generally anticipates the changes in the economic cycle. Therefore, since the "recovery is underway," the price of Universal Auto should reflect the anticipated improvements in the economy.

However, since recoveries typically last for an extended period, there may still be upside left in Universal Auto's stock price as the recovery works its way through Universal Auto's operations. Adam will want to analyze the current valuation and operating potential of Universal Auto relative to the economic recovery to determine further potential appreciation.

ANSWERS TO END-OF-CHAPTER PROBLEMS

13-1.

Nasdaq Composite	Nasdaq 100
2260.63	1701.70
-2246.69	1683.35
-13.94	-18.35
-13.94/2260.63 = -.0062 = -.62%	-18.35/1701.70 = -.0108 = -1.08%

13-2. A 75 percent loss will require a 400% gain to make up for the loss. Assume an index value of 100. A 75% loss reduces the index to 25. A 400% gain is required to return the index to 100.

COMPUTATIONAL PROBLEM

13-1. **NOTE:** The earnings ($15.24) and dividends ($6.97) for 2006 are given, as is the year-end price of 186.24.

a) P/E = 186.24/15.24 = 12.22
D/E (100) = 100(6.97/15.24) = 45.73%
D/P (100) = 100(6.97/186.24) = 3.74%

As an additional piece of information,

TR_{2006} = 100[(186.24-157.62+6.97)/157.62] = 22.58%

b) k = 6.97/186.24 + .095 = .132425

c) calculated in a) above.

d) E_{2007} = (1.25)(15.24) = 19.05

e) (.40)(19.05) = 7.62

f) $$P/E = \frac{7.62/19.05}{.132425 - .095} = \frac{.40}{.037425} = 10.69$$

g) P = 7.62/.037425 = 203.61, or

P = 10.69(19.05) = 203.64

h) 1. P/E = .40/(.14-.095) = .40/.045 = 8.89

P = 7.62/.045 = 169.33

2. P/E = .40/(.13-.095) = .40/.035 = 11.43

P = 7.62/.035 = 217.71

3. P/E = .40(.12-.095) = .40/.025 = 16

P = 7.62/.025 = 304.80

Chapter 14: Sector/Industry Analysis

CHAPTER OVERVIEW

Chapter 14 covers sector/industry analysis, the intermediate or second step in the fundamental analysis of common stocks which starts with economy/market analysis and concludes with company analysis. As such, it is designed to cover the essentials of thinking about and analyzing sectors and industries without being overly technical. The term **sector** is used here to denote a broader classification than simply one industry; for example, it typically refers to several industries. In turn, an industry could involve several sub industries.

The philosophy behind Chapter 14 is important to note. Beginning students in Investments are unable to do detailed fundamental analysis, both because of knowledge limitations and time constraints. The author thinks it is unrealistic to ask students in a first Investments course to do detailed industry analysis, involving tax rates, depreciation charges, and so forth. Therefore, the emphasis in Chapter 14 is on the *conceptual* issues: Why perform sector and industry analysis, what are the problems involved, and how should we *conceptually* go about doing sector and industry analysis?

In the final analysis, the point is made that industry analysis, like all aspects of fundamental analysis, comes down to estimating the future expected cash flows and discounting these cash flows at a proper discount rate, or using the estimated earnings for the industry next year and an appropriate P/E ratio. It is more important that students think about the conceptual issues involved in doing security analysis rather than concern themselves with details that most will not understand or use again unless they pursue the subject of investing further.

Chapter 14 first documents the importance of industry analysis by showing how some industries outperform others over various time periods. There is no doubt that some industries outperform others over long periods of time. The discussion next demonstrates that short-term consistency is difficult to find, which means that we cannot simply buy the industries that performed well last year and expect them to perform well this year. In many cases the opposite is true--bad performers for one year become good performers in the next year or the year after that. Therefore, investors interested in both long-term performance and shorter-term performance must do industry analysis.

Chapter 14 also examines such issues as the definition of industries and the problem with classifying a particular company in one industry. The industry life cycle, which is often used as part of industry analysis, is explained as a conceptual method of analyzing industries. The implications of business cycle analysis for industries are considered, which provides useful classifications for industries such as growth industries, defensive industries, cyclical industries, and interest-sensitive industries.

Qualitative aspects of industry analysis are presented, including brief excerpts from the well-known Porter material on industry analysis. Porter's diagram on industries showing the five

competitive forces that determine industry profitability is included in the discussion. Once again, this analysis is consistent with the approach emphasized on the CFA examinations, particularly at Level II.

CHAPTER OBJECTIVES

To demonstrate why sector/industry analysis is an important component of fundamental analysis, and why we must do this type of analysis.

To explain conceptually how to analyze industries. The emphasis is on the broad conceptual approach, and not the specific details which cannot readily be understood by beginners.

To discuss various aspects involved in industry analysis that beginners can use.

MAJOR CHAPTER HEADINGS [Contents]

What Is an Industry?

[problems in determining what industry a company is in]

Classifying Industries
[SIC codes]

A New Classification System—NAICS
[a 6 digit coding system]

Other Industry Classifications
[S&P, Value Line]

The Importance of Sector/Industry Analysis

Why Industry Analysis Is Important Over The Long Run
[comparisons of S&P industry price indices over various periods]

Industry Performance Over Shorter Periods
[5-year performance comparisons show how sectors and industries perform very differently]

How One Industry Can Make a Major Impact on Investors—The Telecom Industry
[The rise of the telecom sector, and its spectacular collapse]

Cross-Sectional Volatility Has Increased
[a Russell Company study found that cross-sectional volatility increased significantly in the 1990s]

Analyzing Sectors/Industries

The Industry Life Cycle
[stages: pioneering, expansion, stabilization, decline; assessing the industry life cycle--implications for investors]

Qualitative Aspects of Industry Analysis
[historical performance; competition; government; structural changes; the Porter analysis—the five competitive forces that determine industry profitability]

Using Sector/Industry Analysis as an Investor

Sector Rotation
[investors try to spot important changes in a sector/industry and act accordingly]

Evaluating Future Industry Prospects
[assessing longer-term prospects]

Business Cycle Analysis
[growth industries; defensive industries; cyclical industries; interest-sensitive industries; investors analyze the stage of the business cycle and likely movements in interest rates]

Picking Industries for Next Year
[earnings estimates even one year ahead are often inaccurate; P/E ratios are difficult to forecast]

POINTS TO NOTE ABOUT CHAPTER 14

Exhibits, Figures and Tables

Figure 14-1 illustrates the well-known industry life cycle. This is a simple but often-mentioned part of industry analysis which does provide some valuable insights.

Figure 14-2 shows Porter's five competitive forces that determine industry profitability. This discussion is based on well-known work by Porter on the issue of competitive strategy, which involves the search for a competitive position in an industry. Suffice it to say that most discussions of industry analysis cite Porter's work.

Table 14-1 is useful for discussing the performance of various industries over time and the consistency of performance over short periods. This table illustrates the large differences that occur in industry performance over time, both over long periods and over shorter periods.

Table 14-2 uses the new S&P GSIC sector and industry classification system to report on the performance of selected sectors and industries over a 5-year period. Substantial differences are apparent

Two points should be emphasized. It clearly matters which industries an investor buys into over long periods of time because some industries are going to perform very well, and some very poorly. A second important issue is whether future performance can be predicted from past performance. The evidence presented here suggests that while some continuation occurs, it is not readily apparent that the future strong performers can be predicted from past performance. This should come as no surprise in investing.

Box Inserts

Box 14-1 is an interesting discussion of a technique suggested by S&P in its publication, *The Outlook*. It indicates that picking industries on the basis of their prior year's performance relative to the S&P 500 Index can produce superior results. What is interesting about this is that both last year's leaders and last year's laggards are recommended, as long as they are exhibiting upward momentum.

ANSWERS TO END-OF-CHAPTER QUESTIONS

14-1. It is difficult to classify industries because of the problem of determining in which industries particular companies belong. Companies often cross traditional industry lines. Industries continue to become more mixed in their activities and less identifiable with one product or service. At best, industries cannot be identified casually.

14.2. The NAICS system uses a production-oriented conceptual framework. It uses more sectors, providing greater flexibility relative to SIC codes. More industries are identified.

14-3. *Industry analysis is valuable* because industries have turned in widely-varying performances in the past, and undoubtedly will continue to do so in the future. Investors' results have been greatly affected by the industries in which they invested. Some industries' price performance have been virtually flat over long periods, while others show very large gains.

14-4. Obviously, differences of opinion will exist about industries expected to perform well in the future. In the next five years (i.e., roughly 2007-2012), such industries as alternative energy sources and medical technology (artificial organs, genetic engineering, etc.) may do well. Over the next 10 to 15 years, instructors and students are free to make their own choices.

14-5. The stages of the industry life cycle are the pioneering stage, the expansion stage, the stabilization stage, and the declining stage.

14-6. New internet-related activities are in the pioneering stage. The medical service industry is in the expansion stage as is cellular phones. The supermarket industry is in the stabilization stage, as is the chemical industry. Declining industries could include, as possibilities, textiles and furniture.

14-7. The pioneering stage offers the greatest risk.

14-8. Cyclical industries, such as autos, appliances, and houses, are the most sensitive to the business cycle. Defensive industries, such as the food industry, are the least affected by recessions and economic adversity.

14-9. Investors should analyze the stage of the business cycle and the likely movements in interest rates. As the economy approaches a recession, cyclical industries are likely to be more affected than other industries while defensive industries will be least affected. An expected rise in interest rates will have adverse consequences for such industries as homebuilding and savings and loans.

14-10. Porter identifies the threat of new entrants; the bargaining power of buyers; rivalry between existing competitors; threat of substitute products or services; and the bargaining power of suppliers.

14-11. The *reverse* statement is correct; profitability is a function of structure.

14-12. The *fundamental valuation of industries* is based on the same concept of valuation used throughout the text. Specifically, it is necessary to estimate the expected returns (earnings or dividends) and a multiplier (or, alternatively, a discount rate) for industries, as was done in the preceding chapter with the market, or as will be done in the next chapter with individual companies.

14-13. Several sources of information would be useful to an investor doing a detailed industry analysis.

- Standard & Poor's *Industry Survey* provides basic data.
- *Dun & Bradstreet Key Business Ratios* provides ratio information.
- The *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations*, a government publication, provides timely information on individual industries.
- *Forbes* magazine rates industry performance annually in its January issue. This gives investors' calculated information for a five year period.
- *The Value Line Investment Survey* estimates industry statistics for both the current year and the coming year, and ranks all industries covered in terms of timeliness (probable performance over the next 12 months).

14-14. The industry life cycle is useful in helping investors to assess both the return potential and the risk of investing in various companies, depending upon the stage of the industry life cycle. If investors buy companies in the pioneering stage, they may realize large payoffs, but they may also lose a substantial part, or even all, of their investment in some companies because the risk of failure is high. Conversely, investors may choose to invest in very large, well known companies in the stabilization phase of the industry life cycle, accepting moderate returns with moderate risks. For example, Coca-cola has been a good stock to own for most of the last 20 or so years. Finally, investors may choose to find companies in the expansion stage because the potential returns will be larger than for those companies in the stabilization stage, while the risks, although larger, are still acceptable.

CFA

14-15. **Note:** Candidates could select any three of the following five competitive forces and then relate those selected to both Ford and Merck.

1. *Rivalry among existing firms*.

   a) Ford faces intense competition from other domestic and foreign auto manufacturers.

b) Merck has a dominant market share in many of its product lines because a limited number of companies can supply specific drugs. For many of its most profitable drugs, Merck faces no competition for an extended period of time because of patent protection. Hence, Merck's dominant market share and limited competition allow it to develop strategies of product differentiation and focusing on market segments.

2. *Threat of new entrants*.

   a) Despite substantial capital requirements and technological barriers to entry, domestic auto manufacturers have seen foreign manufacturers establish strong market positions.

   b) The drug industry has natural barriers to entry as years of research are required to develop competing products and receive FDA approval to market. Once patent protection has been achieved, Merck can take advantage of product differentiation and focus on market segments.

3. *Threat of substitute products*.

   a) A Lexus can be substituted for a Lincoln and a Chevy for a Ford. In addition, some buyers can substitute other products such as motorcycles for cars.

   b) Some drugs provide unique therapy while others have limited prescription substitutability. Again, Merck can focus on market segments and differentiate its products.

4. *Power of buyers*.

   a) A car buyer has several alternatives among different brands and modes of transportation. In addition, the potential buyer can defer purchase by repairing an older car. Accordingly, manufacturers are often forced to provide rebates to stimulate sales, cutting profit margins.

   b) Drugs, on the other hand, are aimed at specific ailments, and potential purchasers are unlikely to defer purchase once the drug has been prescribed by a doctor. Frequently, insurance companies or the government picks up the cost of the prescription. Accordingly, drug companies have a great ability to increase prices with little consumer resistance. Again, Merck can focus on market segments.

5. *Power of suppliers*.

   a) In theory, Ford should have an advantage here because auto manufacturers exercise great control over their suppliers. Some of these suppliers have Ford as their major customer. This could be important in cost containment. However, there are no hints in the financial statements that Ford has been able to exploit its power over suppliers in recent years.

   b) Merck has no special advantages in dealing with its suppliers.

CFA

14-16. A. The concept of an industrial life cycle refers to the tendency of most industries to go through various stages of growth somewhat resembling those of a person. Generally four stages are talked about with no uniformity in the length of each stage. The rate of growth, the competitive environment, profit margins and pricing strategies tend to shift as an industry moves from one stage to the next although it is usually difficult to pinpoint exactly when one stage has ended and the next has begun.

The initial stage is characterized by perceptions of a large market and by a high optimism for potential profits. Little or no profits are usually achieved, however, in this stage and there is usually a high rate of failures. In the second stage, often called rapid expansion or follow-through, growth is high and accelerating, the markets are broadening, unit costs are declining and quality is improving. The third stage, usually called mature growth, is characterized by decelerating growth caused by such things as maturing markets and/or competitive inroads by other products. Finally, an industry reaches a stage of full maturity in which growth slows or even declines.

Product pricing, profitability and industry competitive structure often (though not necessarily) vary by phase. Thus, for example, the first phase usually encompasses high product prices, high costs (R&D, marketing, etc.) and a (temporary) monopolistic industry structure. In phase two (rapid expansion), new entrants appear and costs fall rapidly due to the experience curve. Prices generally don't fall as rapidly allowing profit margins to increase. In phase three (mature growth), growth begins to slow as the product or service begins to saturate the market, and significant price reductions become less common. There's a choking out of competitors as quality and other non-price factors become more important as competitive tools. In the final stage, industry cumulative production is so high that production costs have stopped declining, profit margins are thin (assuming competition exists), and the fate of the industry depends on the extent of replacement demand and the existence of substitute products/services.

B. The passenger car business in the United States has probably entered the final stage in the industrial life cycle because normalized growth is quite low. The information processing business, on the other hand, is undoubtedly earlier in the cycle. Depending on whether or not growth is still accelerating or not, it is either in the second or third stage.

C. Cars: In the final phases of the life cycle, demand tends to be price elastic. Thus, Universal can't raise prices without losing volume. Moreover, given the industry's maturity, cost structures are likely to be similar across all competitors, and any price cuts are likely to be matched immediately. Thus, Universal's car business is boxed-in--product pricing is determined by the market--the company is a "price-taker."

Idata: Idata should have much more pricing flexibility given its phase in the industrial life cycle. Demand is growing faster than supply, and, depending on the presence and/or actions of an industry leader (umbrella or experience curve pricing), Idata may price high to maximize current profits and generate cash for product development or price low in an effort to gain market share.

Chapter 15: Company Analysis

CHAPTER OVERVIEW

Chapter 15 concludes the three chapter sequence on fundamental security analysis by discussing the analysis of individual companies. It expands on the discussion in Chapter 10 involving valuation methods by examining more closely the components involved when implementing either the Dividend Discount Model or the P/E ratio model.

Starting with a discussion of what fundamental analysis is, the chapter devotes considerable space to understanding earnings, one of the two components of the multiplier valuation model. This is done by examining the financial statements for Coca-Cola, and analyzing the determinants of accounting EPS.

Ratio analysis is used to show how the firm's variables interact in determining EPS, with particular emphasis on ROE and its determinants. This analysis of the financial statements, involving the calculation of ROA and ROE, can be useful information for the CFA examinations. This shows students that what they are learning here parallels the type of knowledge they are expected to have when seeking a CFA designation, which is widely recognized in the money management business.

A thorough discussion is included of which earnings are important (future earnings), and how one might go about forecasting earnings and earnings growth. Both security analysts' estimates and mechanical estimates are examined. The concept of unexpected earnings is explained and illustrated. Chapter 15 contains an up-to-date discussion of the earnings "process," including whispers, consensus estimates, the management of earnings, and more.

The remainder of the chapter is devoted to the P/E ratio, the other half of the valuation equation when using a multiplier model. Each of the three determinants of the P/E ratio are examined in detail. Coke's P/E is examined, and the reasons why P/Es vary from company to company are discussed. Additional company analysis, including the beta, is considered.

Chapter 15 will help students to better understand the components of a valuation model--what they are, why they are being used, how they are determined, and so forth. In Chapter 10 students learn to calculate intrinsic values for stocks but do not have the opportunity to go behind the calculations. This chapter provides that opportunity.

When covering Chapter 15, it is strongly recommended that instructors emphasize such daily issues as earnings surprises, which drive stock price changes to a significant extent. There are plenty of examples available in the press each day on earnings surprises, and from major websites such as *CBS.Marketwatch* and *Yahoo!Finance*.

This text follows the top-down approach to fundamental security analysis, and that means company analysis is the last step. On the other hand, by the time students get to Chapter 15 they

should have a good feel for the subject matter and be able to really start understanding conceptually what fundamental security analysis is all about.

CHAPTER OBJECTIVES

To explain fundamental security analysis at the company level.

To examine the details behind the valuation models used in Chapter 10.

To use approaches for analyzing earnings that are comparable to those used on CFA examinations, thereby allowing actual CFA examination questions to be used as part of the problem set.

To stress the importance of both understanding and making forecasts of EPS and P/E ratios.

MAJOR CHAPTER HEADINGS [Contents]

Fundamental Analysis

[two alternative ways of calculating intrinsic value; the dividend discount model and the P/E ratio model; the importance of earnings as shown by a close relationship between change in earnings per share and change in stock price]

The Accounting Aspects Of Earnings

[the importance of EPS]

The Financial Statements
[the balance sheet and income statement; the cash flow statement; illustrations of both using Coca-Cola's financial statements; certifying the statements on the basis of GAAPs; reading the footnotes]

The Problem with EPS
[how different accounting methods can produce varying EPS; the FASB; Sarbanes-Oxley; the role of accountants and management; the concept of earnings quality; pro forma earnings; what investors can do]

Has the Situation Improved?

The Global Arena—International Accounting
[International accounting standards; differences]

Analyzing A Company's Profitability

[EPS, ROE, ROA, and leverage based on ratio analysis; the accounting definition of EPS]

Analyzing Return on Equity (ROE)
[definition of Return on Equity]

Analyzing Return on Assets (ROA)

Using ROE—Estimating the Internal (Sustainable) Growth Rate
[formula; possible problems]

Earnings Estimates

A Forecast of EPS
[security analysts' estimates; quantitative estimates]

The Accuracy of Earnings Forecasts
[evidence on analysts vs. quantitative estimates]

Earnings Surprises
[unexpected earnings or earnings surprises; SUEs; the earnings "game"]

Earnings Guidance

The Earnings Game

Useful Information for Investors About Earnings Estimates
[summarizes the discussion about earnings forecasts]

Sales Growth-An Alternative to Earnings

The P/E Ratio

Which P/E Ratio Is Being Used?

Determinants of the P/E Ratio
[discussion of each of the three components: payout, required rate of return, expected growth rate; analyzing the P/E ratio]

Why P/E Ratios Vary Among Companies
[expectations about future growth rates; variability in P/Es; illustration of P/Es from Value Line]

The PEG Ratio

Fundamental Security Analysis In Practice

[the beta coefficient; relationships expected on average; a page from *The Value Line Investment Survey*]

POINTS TO NOTE ABOUT CHAPTER 15

Exhibits, Figures and Tables

Exhibits 15-1, 15-2 and 15-3 show the balance sheet, income statement, and cash flow statement respectively for Coke to facilitate the discussion of accounting data as it is needed for security analysis. Only a very basic and brief review of accounting terms is included here. These financial statements can easily be replaced by those for other companies or bypassed if it is felt the student does not need this review. Thus, instructors have considerable flexibility in using this material.

Exhibit 15-4 shows a typical company coverage (in this case, Coca-Cola) from *The Value Line Investment Survey*. This is useful both to illustrate the analysis of Coke as is done in this chapter and to show students what is available and widely used when doing security analysis. The use of this figure in Chapter 15 is in keeping with the theme of this text of using material where it is needed, rather that simply presenting it in a separate chapter as a source of information.

Box Inserts

Box 15-1 is a good example of security analysis, with one person saying to buy Time Warner and one saying don't buy. This is what investing is all about, differences of opinion. This type of exhibit gives instructors a good opportunity to emphasize how investors differ on the future prospects of companies, which in turn makes trading in the markets viable.

ANSWERS TO END-OF-CHAPTER QUESTIONS

15-1. In fundamental analysis, the intrinsic value of a stock is its justified price; that is, it is the price justified by investors' evaluations of a company's fundamental financial variables. It is also thought of as an estimated value or a formula value.

15-2. A stock's intrinsic value can be estimated by using the dividend discount model or the earnings multiplier model.

15-3. Equation 10-2 states that the intrinsic value of a stock is the discounted value of all future dividends. The limitations of using the dividend valuation model are:

(a) The model is only applicable if dividends are being paid or can be expected to be paid.

(b) It is necessary to estimate g, the expected growth rate in dividends. Obviously, different users of the model will (legitimately) come up with different estimates of the future growth rate(s), and it is impossible to determine beforehand who is correct.

(c) k, the investor's required rate of return, must be estimated, an imprecise process.

15-4. "GAAP" refers to Generally Accepted Accounting Principles, a standard set of rules developed by the accounting profession primarily on the basis of historical costs. These principles assure some uniformity in the financial statements produced by companies.

15-5. The problem with accounting earnings is that alternative accounting principles can be used to prepare financial statements. Numerous combinations of these principles are possible. It is probably impossible to estimate the true performance of a company in one accounting figure.

15-6. The auditor's report signifies only that generally accepted accounting principles were applied on a consistent basis. It does not guarantee the accuracy or the quality of the earnings in an absolute sense.

15-7. The management of a company hires an auditing firm to prepare the financial statements. The accounting firm is supposed to conform to accepted accounting standards and act independently. However, management may be able to influence the accounting firm, which wishes to keep the business, because some flexibility in how certain items are treated does exist.

15-8. The *concept of earnings quality* has to do with the qualitative (and subjective) factors that contribute to producing the earnings figure and that help to assess the true earning power of the company. There are no absolute elements of earnings quality, but some guidelines for determining quality involve: liberal versus conservative accounting policies, the

integrity of the reporting period, the use (or misuse) of discretionary costs, the variability of earnings, and balance sheet analysis.

15-9. The determination process for earnings:

- EPS is the product of ROE (return on equity) and book value per share.
- ROE is the product of ROA (return on assets) and leverage (total assets divided by equity).
- ROA, in turn, is the product of the net income margin and turnover.

15-10. A firm has two basic choices in financing, debt and equity. Debt is a cheaper source of financing, but it is more risky because of the fixed interest payments which must be made. If leverage is favorable, it can magnify the EPS (or diminish them if unfavorable). Given the ROA, leverage determines the ROE, one of the two basic components of EPS.

15-11. Although higher ROE leads to higher EPS, two factors determine stock price, the ultimate variable of interest to investors. The increasing use of debt financing increases the risk to stockholders, raising their required rate of return. The increase in the required rate of return will, at some point, offset the higher EPS and lower the stock price.

15-12. The earnings growth rate, g, is defined as:

$$g = br$$

where r = ROE and b is the retention rate, defined as (1 - dividend payout ratio). This is an important formulation in fundamental analysis.

15-13. Earnings growth rates for individual companies usually do not persist over time. Investors cannot simply assume that a particular trend will continue. Year-to-year growth rates are often quite variable.

15-14. Investors can obtain the forecasts of security analysts from several sources such as *The Value Line Investment Survey* and other investment advisory publications, brokerage houses, and data banks accessible through a personal computer. Alternatively, model estimates can be made, using procedures such as time series models. The evidence is mixed as to which source is better. Brown and Rozeff found that analysts' (specifically, Value Line) estimates were superior. However, there is no real consensus on this issue.

15-15. Malkiel and Cragg, among others, have shown how important it is to know what the market thinks the earnings growth rate will be. Investors form expectations about EPS, and these expectations play a key role in affecting stock prices. In short, earnings expectations are a key variable in selecting stocks.

15-16. The unexpected component of EPS consists of the earnings surprise factor. One way to use this factor is by calculating a stock's SUE, the ratio of the unexpected earnings to a standardization value. Having calculated SUEs for a group of stocks, those ranking at the

top (i.e., the highest SUE stocks) are selected for purchase. Those with the lowest SUEs are candidates to be sold if owned, or possibly sold short.

15-17. SUE is closely related to fundamental security analysis. Earnings is one of the primary variables in fundamental analysis. Earnings surprises should be, and are, closely related to changes in stock prices. Unexpected information about earnings justifies a revision in investor probability beliefs about the future and, therefore, an adjustment in stock prices.

15-18. P/E ratios are often shown on a current basis (current stock price divided by the latest 12 months earnings per share). Alternatively, the P/E could be calculated using the estimated earnings for the next period (typically, a year).

15-19. Any P/E ratios collected will reflect the specific time periods.

The purpose of this exercise is twofold:

(a) To show students the differences in P/E ratios among companies at a given time--in this case, the average annual P/E ratios for a year. For example, investors were willing to pay over 22 times earnings for Apple but only 18 times for Caterpillar in March, 2006. It is easy to generate discussion about the potential return and risk involved in owning these companies, which are quite different types of companies, by comparing numbers such as these. Instructors should point out that certain types of companies--for example, financial institutions, typically have low P/E ratios.

(b) To show the differences in P/E ratios across time for all companies, but in particular high technology and growth companies. Coke's P/E ratio has varied significantly over the years for a large, blue chip company. Electric utilities can be expected to show low, but relatively stable, P/E ratios.

15-20. As Equation 15-8 shows, the three variables that affect the P/E ratio are:

(a) The dividend payout ratio (direct relation)

(b) The required rate of return (inverse relation)

(c) The expected growth rate in dividends (direct relation).

15-21. (a) Earnings and dividends are directly related; therefore, an increase in the expected growth rate of earnings would equate with an increase in g, which is directly related to the P/E (the typical assumption is that the payout ratio is constant; therefore, g is the expected growth rate in both dividends and earnings).

(b) A decline in the expected payout will lead to a decline in the P/E.

(c) An increase in the risk-free rate of return will result in a rise in k and, therefore, a decline in the P/E.

(d) An increase in the risk premium will result in a rise in k and, therefore, a decline in the P/E.

(e) A decrease in the required rate of return will increase the P/E.

15-22. Beta reflects the relative systematic risk for a stock. Other things being equal, the higher the beta, the higher the risk, and the higher the required rate of return. Investors will want to know about a stock's beta in order to estimate the volatility of the stock's returns. If a rise in the market is expected, investors would prefer, other things being equal, stocks with higher betas. Likewise, with an expected market decline, lower betas would be preferred if stocks are to be held.

15-23. Beta is not the only component of a stock's return. Return is a function of two components, the systematic component (which includes the beta) and the unique component (that part attributable to the company itself). This analysis is based on the market model.

ANSWERS TO END-OF-CHAPTER PROBLEMS

15-1. ROE = ROA x leverage
leverage = Total assets/stockholders equity = 550/330 = 1.67
ROE = 11.3 x 1.67 = 18.87%

CFA
15-2. Part A

If ROE and the retention rate are statistically independent, the probability distribution for the growth rate, PG, is given by:

Retention	x	ROE	=	Growth
40%	x	15%	=	6%
40%	x	20%	=	8%
60%	x	15%	=	9%
60%	x	20%	=	12%

PRET	x	PROE	=	PG
0.70	x	0.40	=	0.28
0.70	x	0.60	=	0.42
0.30	x	0.40	=	0.12
0.30	x	0.60	=	0.18
				1.00

Part B The expected value of the growth rate is:

E(Growth) = Σ(Growth x PG)
= (6% x 0.28) + (8% x 0.42)
+ (9% x 0.12) + (12% x 0.18)
= 8.28%

CFA
15-3.

a) The value of a share of Rio National equity using the Gordon growth model and the capital asset pricing model is $22.40. The value is calculated as follows:

Calculate the required rate of return using the capital asset pricing model.

r = R_f + beta × ($E(R_m) - R_f$)
R_f = 4.0%
$E(R_m)$ = 9.0%
beta = 1.8

r = 4.0% + 1.8 × (9.0% – 4.0%)
r = 13.0%

Calculate the share value using the Gordon growth model.

D_0 = \$0.20
g = 12.0%
r = 13.0%
$V_0 = (D_0 \times (1 + g)) / (r - g)$
$V_0 = (\$0.20 \times (1 + 0.12)) / (0.13 - 0.12)$
V_0 = \$22.40

b) The three components of Rio National's return on equity, using the DuPont model and net income, are:

Profit Margin = 10.03%
Asset Turnover = 0.56
Financial Leverage = 2.00

The components are calculated as follows:

Net Income = \$30.16 million
Sales = \$300.80 million
Total Assets = \$541.40 million
Beginning Equity = \$270.35 million
Profit Margin = Net Income / Sales = \$30.16 / \$300.80 = 10.03%
Asset Turnover = Sales / Total Assets = \$300.80 / \$541.40 = 0.56
Financial Leverage = Total Assets / Beginning Equity
= \$541.40 / \$270.35 = 2.00

c) The sustainable growth rate of Rio National is 9.97%, calculated as follows:

g = b × ROE = Earnings Retention Rate × ROE
= (1 – Payout Ratio) × ROE
= (1 – Dividends / Net Income) × (Net Income / Beginning Equity)
= (1 – (\$3.20 / \$30.16)) × (\$30.16 / \$270.35)
= 0.0997
g = 9.97%

Using DuPont model results from Part b):

Payout Ratio = \$0.20 / \$1.89 = 10.58%
ROE = 10.03% × 0.56 × 2.00 = 11.23%
g = (1 − 0.1058) × 11.23% = 10.04%
g = 10.04%

COMPUTATIONAL PROBLEMS

15-1. For 2005, as an illustration, the calculations for parts (a), (b) and (c) are:

(a) 100(721/8256) = 8.73%
(b) 100(289/8256) = 3.50%
(c) 289/51.92 = $5.57

The same values for 2001-2004 are:

Year	(a)	(b)	(c)
2001	9.6%	4.2%	$4.65
2002	9.0	4.3	5.12
2003	8.6	3.9	5.16
2004	8.3	2.6	4.47

(d), (e), (f), (g), and (h) are calculated for 2005, and are summarized for 2001-2005 below.

(d) 2315/1342 = 1.72
(e) (736/2804)(100) = 26.2%, as a percentage
(f) 1872/51.92 = $36.06
(g) 100 (Net Income after tax/Common Equity) = 100(289/1872) = 15.4%
(h) (289/4310)100 = 6.7%

Year	(d)	(e)	(f)	(g)	(h)
2001	2.05	14.9%	$26.46	17.6%	9.0%
2002	1.86	13.8	29.62	17.3	8.6
2003	2.11	18.4	32.57	15.8	8.2
2004	1.86	29.3	32.88	13.6	5.7

Again the 2005 calculations will be shown for (i) - (n), and summarized for the other years.

(i) 4310/1872 = 2.30 NOTE: 2.30 X 6.7% = 15.4%, the ROE
(j) (289/8256)100 = 3.5%, as a percentage
(k) 8256/4310 = 1.92
(l) 535 + 139 = $674 mil.
(m) (289/674)100 = 42.9%
(n) (674/8256)100 = 8.2%

Year	(i)	(j)	(k)	(l)	(m)	(n)
2001	1.94	4.2%	2.13	$483mn	48.0%	8.8%
2002	2.01	4.3	2.00	509	50.3	8.5
2003	1.93	3.9	2.13	523	48.8	7.9
2004	2.37	2.6	2.16	570	38.8	6.8

(o) Evaluate the current status of the health of GF: Examining the figures for the years 2001-2005 from parts (a) to (n), we see that ROE declined through 2004, although it recovered somewhat in 2005. The same is true of ROA. Leverage has increased. Operating efficiency declined through 2004 before turning up in 2005.

Reviewing more basic components, we see that operating income/net revenue has been deteriorating, as has net profits/revenue. The current ratio has deteriorated.

In summary, it would appear that GF underwent some deterioration between 2001 and 2005, with some (but not complete) improvement in 2005. Examining the ROE and ROA in 2005, we can see that GF had recovered some ground, but still compared unfavorably to 2001 and 2002.

15-2. (a)

Year	100(D/E)%	ROE%	TR%
2004	49.2%	14.5%	16.3
2005	40.1	18.9	29.6
2006	35.5	16.9	23.7

(b) for dividends: $(1+r) = 2.40/1.72 = 1.395349^{1/5} = 1.068899$, r% = 6.9%

It is assumed that measurement begins at the beginning of 2002; therefore, we use the year-end 2001 number.

for earnings: $(1+r) = 6.75/4.56 = 1.480263^{1/5} = 1.081603$, r% = 8.2%

(c) P/E = $47/$6.75 = 6.963

(d) (7)($7.50) = $52.50

(e) Coca-Cola is a blue-chip company but with a very good growth record. GF is a stable, blue chip company in a pedestrian line of activity with dividends growing approximately in line with the economy as a whole. Earnings growth for Coca-Cola has been much more rapid than for GF. Therefore, Coca-Cola would have commanded a larger P/E than GF in the past.

(f) .4/(.12-.07) = .4/.5 = 8

(g) r = 1-.4 = .6; g = .6(.15) = .09

Chapter 16: Technical Analysis

CHAPTER OVERVIEW

Chapter 16 is a straightforward discussion of technical analysis without going too far in trying to explain the myriad details involved in doing technical analysis. As such, it is a good balance between the tools and techniques typically discussed and used in sources that investors might see and the exact steps involved in implementing them. The focus is on a basic description of the techniques and a look behind the concepts involved.

The what and why of technical analysis is developed at the beginning of the chapter, including an overall framework for technical analysis. This discussion provides a foundation for an overall understanding of the subject.

The chapter is organized along two major themes. The first involves stock price and volume techniques. We start with the Dow Theory and then consider charts of price patterns. Again, only the highlights are included because of the voluminous nature of this material and the difficulty in knowing what is the correct interpretation to present. Included here are the best known patterns of stock prices as presented by an article in the popular press. Both moving averages and relative strength are examined.

The second organizational theme is technical indicators, such as the advance-decline line, new highs and lows, volume, sentiment indicators as illustrated by the short-interest ratio, the opinions of investment advisory services, mutual fund liquidity, and the CBOE put/call ratio. Each of these indicators is explained in enough detail to make them understandable without getting bogged down in too many how-to details.

An important part of this chapter involves the testing of technical analysis strategies. It is very important to understand how to construct proper tests of various techniques advocated in investments literature. Finally, some conclusions about technical analysis are presented in detail in order to get students thinking about the issues and the logic of technical analysis.

Chapter 16 seeks a balance between the conceptual and the descriptive. It attempts to make a fair presentation of the case for technical analysis, but makes it clear that skepticism is warranted although the techniques have not been completely refuted. Ideally, students will come away with an understanding of what must occur for technical analysis to work, and the likelihood of that occurring. Hopefully, they will think logically about what technical analysis involves, and how likely it is to really work--particularly in the case of charts of stock prices.

Clearly, this chapter can and should be related back to Chapter 12 on market efficiency.

CHAPTER OBJECTIVES

To present the basics of technical analysis so students will understand what it involves.

To outline the major techniques and tools of technical analysis so that students can properly classify them.

To present the conceptual issues involved in technical analysis so that students will think about what is involved in technical analysis, and the likelihood of success.

MAJOR CHAPTER HEADINGS [Contents]

What is Technical Analysis?

[the use of market data; price and volume information; what technicians believe; a summary of key points about technical analysis]

A Framework for Technical Analysis
[diagram outlining the framework; market vs. individual stocks; techniques vs. charting]

Stock Price And Volume Techniques

The Dow Theory
[bull and bear market; primary and secondary movements; discussion of how the theory is typically interpreted; criticisms of the theory]

Charts of Price Patterns
[support and resistance levels; bar and point-and-figure charts; some evidence on price charts by Levy]

Moving Averages
[50-day and 200-day moving averages; signals]

Relative Strength
[strength of a stock relative to an index; how relative strength is often used; chart depicting relative strength]

Using the Computer for Technical Analysis
[sources of charts, widespread availability; software vs. on-line services]

Technical Indicators

Breadth Indicators
[Advance-Decline line is compared to a market average; new highs and lows--how these are used as signals; volume--high trading volume is generally a bullish sign]

Sentiment Indicators
[short-interest ratio; the opinion of investment advisory services; mutual fund liquidity; CBOE put/call ratio]

Testing Technical Analysis Strategies

[adjustments necessary to conduct a fair test of a trading rule; discussion of filter rules; the challenge of the Efficient Market Hypothesis; some evidence to support technical analysis]

The Ebb and Flow of Technical Analysis

[the number of technical analysts decreased in recent years at major firms]

Some Conclusions About Technical Analysis

[logical reasons why it probably does not work]

POINTS TO NOTE ABOUT CHAPTER 16

Exhibits, Figures and Tables

Figure 16-1 is designed to organize the chapter, outlining the technical analysis approach to common stock selection.

Figure 16-2 illustrates the Dow Theory and can be omitted from discussion if desired.

Figure 16-3 illustrates support and resistance levels. Since these are commonly used terms in the popular press, completely understanding them is desirable.

Figure 16-4 illustrates bar charting. Individual instructors will have to decide how much emphasize to give this material. This figure is designed to show students the basics of a chart of stock prices.

Figure 16-5, from a popular press article, illustrates the important price patterns for investors when using charts. This will give students a good feel for what many technicians are typically searching for when they study charts of stock prices.

Figure 16-6 illustrates a point-and-figure chart. The same discussion presented above for Figure 16-3 applies here. This type of chart is much less important than the bar chart to most technicians, and can be commented on very quickly, if at all.

Figure 16-7 shows a bar chart for Coca Cola and illustrates moving averages as they are often shown in technical analysis. In this case both a 50-day and a 200-day moving average are shown.

Figure 16-8 illustrates the relative strength technique. This technique is widely seen (for example, in the chart of each company covered by Value Line). Relative strength can be calculated in various ways.

There are no tables in Chapter 16.

Box Inserts

Box 16-1 is a good discussion on the usefulness of technical analysis from a well-known person in the investing arena. As he notes, his firm tested numerous technical analysis tools to try to determine if any were valid, and they could not find any that were. He also makes a good point that sometimes technical analysts make correct calls, but then they often do not.

ANSWERS TO END-OF-CHAPTER QUESTIONS

16-1. The *rationale of technical analysis* can be summarized as:

(a) Prices are determined by the forces of demand and supply.

(b) Many factors affect demand and supply, including fundamental factors as well as market psychology factors.

(c) Stock prices tend to move in trends as they adjust to a new equilibrium level.

(d) Trends can be analyzed, and changes in trends detected, by studying the action of price movements and trading volume over time.

16-2. **Fundamental analysis** uses a present value model (or, alternatively, a P/E model) to produce an estimate of a stock's intrinsic value, which is then compared to the market price. It is based on fundamental economic variables such as earnings and dividends.

Technical analysis involves the use of published market data (price and volume information) to predict short-term price movements in either individual stocks or the market. Technicians attempt to forecast trends in price changes.

16-3. Technicians assume that there is a gradual adjustment of stock prices from one equilibrium to another. As this adjustment occurs, prices tend to move in trends.

16-4. Price and volume are the primary tools of the technical analyst. Volume data are used to gauge the general condition in the market and to help assess its trends. Thus, volume information is used in conjunction with price information to help confirm rising or falling trends.

16-5. The **Dow Theory** is used to predict movements in the stock market. Specifically, it is designed to detect the start of a primary movement (a broad market movement that lasts years).

The confirmation signal is important in interpreting the Dow Theory. A movement is not validated until the Transportation Average confirms the primary movement in the Industrials. The trend will continue as long as the averages confirm each other. (The determination of confirmation, however, is up to each user.)

16-6. The Dow Theory does not forecast how long the primary movement will last.

16-7. With a **moving average**, a general sell signal occurs when actual prices decline through the moving average on high volume.

16-8. The advance-decline line measures (on a cumulative basis) the net difference in the number of stocks advancing in price and the number of stocks declining in price. The net advance (or decline), therefore, reflects the breadth of the market, or whether the majority of issues are rising or declining in price.

16-9. A contrarian should react in the opposite direction of the sentiment exhibited by investment advisory services. The reason for this is attributed to the fact that these services tend to follow trends rather than forecast them. They are reporting and reacting to what has happened rather than concentrating on anticipating what is likely to happen.

16-10. The rationale for the traditional theory of contrary opinion is that some investors almost always lose. These investors include the small investor, supposedly unsophisticated and usually wrong in his or her actions. The idea is to trade opposite (contrary) these investors.

A newer theory (e.g., Dreman's) of contrary opinion is that most investors, including institutional investors, are often wrong and that it pays to do the opposite of what they are doing. One way to do this is to buy low P/E stocks, which are not popular at the time.

16-11. The odd-lot index is calculated as:

$$\text{odd-lot index} = \frac{\text{odd-lot sales}}{\text{odd-lot purchases}}$$

A decline in this index indicates more purchases (relative to sales) by small investors. Therefore, according to contrary opinion, it is time to sell and go against this group.

16-12. A rising short interest ratio is considered to be a bullish indicator because a high short interest represents a large number of shares that must be repurchased in order to close out the short sale. The larger the short sale ratio, the larger the potential demand that is indicated.

16-13. A **bar chart** is the simplest chart in technical analysis. Price is on the vertical axis and time on the horizontal axis. Each day's price movement is represented by a vertical bar whose top (bottom) shows the high (low) price for the day. The bottom of a bar chart usually shows the trading volume for each day. Time intervals can be days, weeks, months, or anything else.

A **point-and-figure chart** shows only significant price changes, with volume omitted completely. Although the horizontal axis is time, specific calendar time is unimportant. X's are typically used to show upward movements, and O's to show downward movements. The X or O is recorded only when the price moves by a specified amount.

16-14. **Relative strength** is generally used to forecast individual stocks or industries. It is calculated as the ratio of a stock's price to a market index, an industry index, or the

average price of the stock itself over some previous period. These ratios are plotted to form a graph of relative price across time. A rising ratio indicates relative strength, and it is often assumed that the trend will continue.

16-15. Assume a chart pattern is predictive in the sense that each time it gives a signal it correctly predicts movements in price. More and more investors will start to use it as they observe what is happening. This is a destructive process because price will reach its equilibrium value quickly, taking away profit opportunities from all but those acting the fastest. Also, some participants will try to anticipate the pattern or signal, driving price to an equilibrium even more quickly. Eventually, the value of this predictor will be negated.

16-16. No! It is not possible to test all the techniques of technical analysis and their variations and interpretations because they are too numerous! Therefore, absolutely definitive statements cannot be made.

16-17. In order to scientifically test a claim of success using technical analysis, an alternative needs to be constructed. For example, can this technician outperform a buy-and-hold strategy consisting of stocks from the same population used by the technician, on a risk-adjusted basis, over some period of time (preferably years) after all relevant costs are accounted for?

16-18. The traditional contrarians focused on the small investors such as the old-lotters. The new contrarians tend to go against the "crowds" in general, including "sophisticated" investors such as institutional investors.

16-19. No inherent reason exists for stock price movements to repeat themselves. However, by sheer chance alone, some probability exists of a pattern repeating itself.

16-20. It does present enough data to show some secondary reactions, and a penetration of a previous high or low. However, it would be highly desirable to use more data.

16-21. This chart contains both the industrial and transportation averages (as well as the utilities average and volume figures). The latter is needed to confirm any signal given by the industrial average.

16-22. Increased trading in stock options and financial futures has caused the short interest ratio to be less reliable. These instruments provide investors with new ways to hedge and speculate, and they have helped to distort the historical boundaries for the short interest ratio.

16-23. A *buy* (bullish) signal is generated when actual prices rise through the moving average on high volume.
A *sell* (bearish) signal is generated when actual prices decline through the moving average on high volume.

A rising advance-decline line, in conjunction with a decline in a market average, suggests that the decline in the latter should reverse itself. If the market average rises while the advance-decline line weakens or declines, a fall in the market is expected.

CFA
16-24. a

CFA
16-25. d

CFA
16-26. c

CFA
16-27. a

COMPUTATIONAL PROBLEM

16-1. $\$1{,}000 \times (1.25)^{120} = \$425{,}795{,}984{,}001{,}000$.
Obviously, this is a ridiculous claim.

Chapter 17: Bond Yields and Prices

CHAPTER OVERVIEW

Chapter 17 concentrates on the issues of bond yields and prices. In effect, virtually all of the calculations concerning bonds are contained in this chapter, thereby allowing Chapter 18 to concentrate on analysis and management issues.

The first part of Chapter 17 deals with bond yields and begins with a discussion of interest rates. After briefly considering terminology, the chapter discusses what determines interest rates. Important concepts such as the real rate of interest and the Fisher hypothesis are considered here.

The important concept of yield to maturity is examined in detail. Both conventional bonds and zero-coupon bonds are considered. The issue of the effect of reinvestment rates on realized returns is explained in detail. Yield-to-call and horizon return are also discussed.

The next part of the chapter focuses on bond prices by explaining the capitalization of income method of valuation and then applying this methodology to the valuation of bonds. Detailed examples are provided based on semiannual discounting.

Bond price changes are considered in detail. This starts with bond price changes over time (price must converge to face value at maturity) and then considers bond price changes as a result of interest rate changes (Malkiel's Theorems).

Use of the calculator where appropriate is included in the discussion. Spreadsheet problems are available at the end of the chapter.

A central part of this discussion is the measurement of bond price volatility, centering on duration. This key variable is defined and described, and all of the relationships involving duration are illustrated. Convexity is also briefly discussed.

Instructors may wish to add to the material in this chapter, or expand on various issues such as bond valuation, yield to maturity, and horizon return analysis. The essential building blocks are presented here, and additional work is possible depending upon preferences and time constraints. This is the minimum material that students should be exposed to, but it is also a very reasonable package in terms of what beginners should be expected to master.

CHAPTER OBJECTIVES

To consider the determination of market interest rates as a natural complement to the discussion of bond yields.

To analyze important calculations such as yield to maturity, yield to call, and realized compound yield.

To explain the concept of valuation (capitalization of income) and apply it specifically to bonds.

To analyze the issues involved with both prices and yields, with particular emphasis on calculations.

MAJOR CHAPTER HEADINGS [Contents]

Bond Yields

[bond yields and interest rates are the same concept]

The Basic Components of Interest Rates
[real rate of interest; Fisher hypothesis; expected inflation; risk premium]

Measuring Bond Yields
[current yield; yield to maturity; yield to call; realized compound yield; reinvestment rate risk; interest-on-interest; calculations; examples for both coupon bonds and zero-coupon bonds; horizon return]

Bond Prices

The Valuation Principle
[the calculation of intrinsic value using discounted cash flow analysis]

Bond Valuation
[calculating bond prices using semiannual discounting; required yield]

Bond Price Changes

Bond Price Changes Over Time
[price must converge to face value by maturity date]

Bond Price Changes As a Result of Interest Rate Changes
[explanations and illustrations of Malkiel's bond theorems; the implications of Malkiel's theorems to investors--coupon and maturity are key factors, given a change in rates]

Measuring Bond Price Volatility: Duration
[definition; calculation; understanding duration; estimating price changes using duration; modified duration; examples of all calculations; convexity explanation, with diagram; some conclusions on duration]

POINTS TO NOTE ABOUT CHAPTER 17

Exhibits, Figures and Tables

Figure 17-1 is designed to help explain the concept of interest-on-interest by showing the three components of a bond's total dollar return. As can be seen in the figure, the total dollar return on the illustrated bond is $7,040, and interest-on-interest constitutes the largest single part of this total, $4,040.

Figure 17-2 is a simple illustration of the fact that bond prices must converge by maturity date to the face value. Thus, other things equal, a discount bond must rise in price while a premium bond must decline in price, both moving to $1,000 by maturity date.

Figure 17-3 illustrates the convex relationship between yields and prices. Instructors may choose to explain this concept in a basic manner in a beginning course, but it probably is not necessary, or desirable, to elaborate on it in too much detail.

Figure 17-4 illustrates the cash flow pattern of a coupon-paying bond as an aid in understanding the difference between a bond's maturity and its duration.

Figure 17-5 illustrates the convex relationship between yields and prices as an aid in understanding the convexity principle.

Table 17-1 illustrates the calculation of realized compound yield based on varying reinvestment rates. This analysis is useful to emphasize in order for students to really understand interest-on-interest and related concepts such as the yield to maturity and the realized compound yield.

Table 17-2 is of interest in showing bond price calculations. It illustrates the inverse relationship between prices and yields for varying time periods.

Table 17-3 is an example of calculating the duration of a bond using semiannual periods.

ANSWERS TO END-OF-CHAPTER QUESTIONS

17-1. The going rate for similar bonds as determined by the marketplace.

17-2. Current yield does bit capture the price change component of a bond's return.

17-3. **Yield to maturity (YTM)** is defined as the indicated (promised) compounded rate of return an investor will receive from a bond purchased at the current market price and held to maturity.

Two methods of determining YTM are:*

(a) bond tables
(b) solving the equation for YTM using a calculator or software

*We ignore the approximation formula because there is little or no justification for using it in today's world of computers and calculators.

17-4. It is YTM that equilibrates in the marketplace, and bond prices change to reflect this equilibration. Investors invest on the basis of promised yields (i.e., YTMs), reflecting current conditions in the marketplace. Bond prices must adjust to these new conditions as reflected in new YTMs.

17-5. To say that YTM is a promised yield is to say that if we purchase the bond today at its current market price and hold it to maturity (and the issuer does not default), and if we reinvest the coupons at the indicated YTM rate, we can expect to earn the stated YTM. Obviously, the rate is promised--it may not materialize. If the conditions outlined do not occur, the actual yield will differ from the expected yield.

17-6. Investors buy bonds, like any other asset, on the basis of their expected future performance. Therefore, they must consider measures of the promised return. We use the realized compound yield to calculate what we actually earned, but we must make estimates of what we expect to earn when we purchase an asset.

17-7. Agree. It is the same process.

17-8. The callable bond will sell for the higher yield. Investors should receive some compensation for the risk that the bond will be called away.

17-9. *Interest on interest* refers to the fact that investment in a bond generates coupon (interest) income which in turn is reinvested to earn additional interest. Therefore, we are earning interest on interest already earned. It is part of the compounding process inherent in the nature of bond calculations.

17-10. **Bond A will be more affected** because of the higher coupon.

17-11. **Promised yield (YTM)** is exactly that--what an investor expects to earn over the life of a bond purchased at the current price and held to maturity. However, this depends upon the rates at which the coupons are assumed to be reinvested over time.

Realized compound yield indicates what has actually been earned on a bond held to maturity, given the reinvestment rates that were earned.

Typically, because of reinvestment rate risk (interest-on-interest), the realized compound yield will differ from the promised yield.

17-12. Two characteristics are its coupon and its time to maturity.

17-13. One way to eliminate reinvestment rate risk is with zero coupon bonds. Since there are no coupons to reinvest, there is no reinvestment rate risk. Investors know their realized yields at time of purchase if the bond is held to maturity (and, of course, barring default).

17-14. The **intrinsic value** of any asset is usually thought of as a present value process--the present value of the expected cash flows from that asset. These cash flows must be discounted at an appropriate discount rate; therefore, intrinsic value and present value are closely related.

17-15. The *price of a bond* is determined as the present value of its coupons and the principal repayment (ignoring zero coupon bonds). The discount rate used is the appropriate market yield for that issue. The present value process for a standard bond will involve use of both a present value term (for the principal repayment) and a present value of the annuity term (for the coupons).

This process is relatively straightforward because the payment dates and the amounts of coupon and principal repayment are known at time of issuance. Furthermore, it is relatively easy to determine the discount rate from current market rates on similar bonds.

17-16. The simple point here is that there is obviously a difference between using annual and semiannual discounting. The exact effects of the difference are somewhat complex.

- In general, if the discount rate used in the valuation is higher than the coupon rate, annual discounting will result in a higher present value than will semiannual discounting (a result of a higher present value for the principal repayment when using annual discounting).

- On the other hand, if the discount rate is less than the coupon rate, semiannual discounting produces the higher present value (a result of a higher present value for the coupons when using semiannual discounting).

Based on the above, we would predict that a 10%, 8 year bond, given a discount rate of 12%, would have a higher value using annual discounting as opposed to semiannual discounting. Specifically,

Annual discounting		Semiannual discounting	
$100 (4.9676)	= $496.76	$50 (10.1059)	= $505.30
$1000 (.4039)	= $403.90	$1000 (.3936)	= $393.60
	$900.66		$898.90

17-17. Interest rate changes do not have symmetrical effects.

17-18. The implications of Malkiel's bond price theorems to bond investors concern how investors should act with regard to trading in bonds. Specifically, the two bond variables of major importance in assessing price changes are:

- the *coupon* and
- the *maturity*.

To receive the maximum impact from an expected change in interest rates, investors should purchase low coupon, long-maturity bonds.

17-19. **Duration** accounts for the entire pattern (both size and timing) of a bond's cash flows over its life. It tells investors (in years) the economic lifetime of a bond, whereas **time to maturity** focuses only on the return of principal at the maturity date.

17-20. • Duration increases with time to maturity, but at a decreasing rate, particularly beyond 15 years time to maturity.

- The coupon is inversely related to duration.

For a zero coupon bond, duration = time to maturity.

17-21. This investor should choose bonds with the longest duration. Duration is positively related to maturity and negatively related to coupon. Since duration is additive, a portfolio's duration is a weighted average of each individual bond's duration.

17-22. Duration may not be a complete measure of bond risk. It measures volatility, which is only one aspect of the risk in bonds. It may or may not be the best measure, depending on the investor's perspective. If volatility is the most important factor to an investor, duration is probably the best measure to use.

17-23. If the coupon rate is below the current required yield, a bond is selling for a discount; if the coupon rate is above, it is selling for a premium.

17-24. The investor makes an assumption about the reinvestment rate expected to prevail over the planned investment horizon. The investor may also make an assumption about the yield to maturity expected to prevail at the end of the planned investment horizon, which in turn is used to estimate the price of the bond at that time.

17-25. For all coupon-paying bonds, duration is always less than time to maturity. Duration expands with time to maturity, but at a decreasing rate, particularly as we get beyond 15 years. For a zero coupon bond, duration is equal to time to maturity.

Both coupon and yield to maturity are inversely related to duration.

17-26. There are no coupons to reinvest. Therefore, duration has to be equal to time to maturity.

17-27. Convexity is the term used to refer to the degree to which duration changes as the yield to maturity changes. As the change in yield increases, the error that results from using a straight line to estimate a bond's price behavior as given by a curve increases.

Bond investors can use convexity calculations to improve the estimate of *total percentage price change* referred to in the duration discussion. Although still an approximation, this estimate is improved over that using only duration.

ANSWERS TO END-OF-CHAPTER PROBLEMS

17-1. 1.

Future date	Assumption A			Assumption B		
6 months				$50/(1.04)	=	48.077
1 year	$100/(1.08)	=	92.593	$50/(1.04)^2	=	46.228
1.5 years				$50/(1.04)^3	=	44.450
2 years	$100/(1.08)^2	=	85.734	$50/(1.04)^4	=	42.740
2.5 years				$50/(1.04)^5	=	41.096
3 years	$100/(1.08)^3	=	79.383	$50/(1.04)^6	=	39.516
3 years	$1000/(1.08)^3	=	793.832	1000/(1.04)^6	=	790.315
			$1051.54			$1052.42

2. Under either assumption A or B, price = $1000 (par).

Using a calculator, the discount factors can be determined by raising the rates to the appropriate power and taking the reciprocal.

17-2.

Assumption A

$$P = \frac{100}{.08}\left[1 - \frac{1}{(1.08)^3}\right] + \frac{1000}{(1.08)^3}$$

$P = 1250[.2062] + 793.83$

$P = 257.75 + 793.83 = \$1051.58$

Assumption B

$$P = \frac{50}{.04}\left[1 - \frac{1}{(1.04)^6}\right] + \frac{1000}{(1.04)^6}$$

$P = 1250[.2097] + 790.31$

$P = 262.13 + 790.31 = \$1052.44$

17-3.

$$P = \frac{25}{.02}\left[1 - \frac{1}{(1.02)^{12}}\right] + \frac{1000}{(1.02)^{12}}$$

$P = 1250[.2115068] + 788.4932$

$P = 264.38353 + 788.4932 = \$1052.88$

17-4. Given the amount of the coupon and the market interest rate, semiannual coupon payments provide a higher price for securities selling at a premium, but a lower price for those securities selling at a discount. In this problem the coupon rate is 10% and the market rate 12%; therefore, the security will be selling at a discount, and we should expect the price for semi-annual payments to be less than the price using annual payments.

Annual discounting:

$100 X 4.968 = $496.80
$1000 X .404 = $404.00
$900.80

Semiannual discounting:

$50 X 10.106 = $505.30
$1000 X .394 = $394.00
$899.30

For the sake of comparison, the alternative methodology suggested in Demonstration Problem 17-2 is applied here, and with more decimal places. One can compare the answers to see how close they are.

----------**ANNUAL**----------

$$P = \frac{100}{.12}\left[1 - \frac{1}{(1.12)^8}\right] + \frac{1000}{(1.12)^8}$$

P = 833.333[.5961168] + 403.883

P = 496.764 + 403.883 = $900.647

----------**SEMIANNUAL**----------

$$P = \frac{50}{.06}\left[1 - \frac{1}{(1.06)^{16}}\right] + \frac{1000}{(1.06)^{16}}$$

P = 833.333[.6063537] + 393.6463

P = 505.29474 + 393.6463 = $898.941

17-5. Solve for price for the 10% coupon bond in Problem 17-4:

r = 12%: There are now 40 semiannual periods.

$50 X 15.046 = $752.30 [15.046 = PV annuity @ 40 periods,6%]

$1000 X .097 = $ 97.00

$849.30

According to Malkiel's principles, for a given change in market yields, changes in bond prices are directly related to time to maturity.

17-6. $$P = \sum_{t=1}^{30} \frac{\$50}{(1.06)^t} + \frac{\$1000}{(1.06)^{30}} = \$862.34$$

or

P =$50(13.7648) + $1000(.1741)

= $688.24 + 174.10

= $862.34

17-7. $r = [FV/P]^{1/2n} - 1$ for a **zero-coupon bond**

For a zero-coupon bond sold at $400,

$= [\$1000/\$400]^{1/20} - 1$
$= 2.5^{.05} - 1$
= 1.04688 - 1
= .04688 or 4.688% semiannually or 9.376% annually

For a zero-coupon bond sold at $300

$= 3.333^{.05} - 1$
= 1.06204 - 1
= .06204 or 6.204% semiannually or 12.408% annually

17-8. **realized compound yield** =
[total future dollars/purchase price of bond]$^{1/2n}$ - 1.0

$= [\$5751/\$1000]^{1/40} - 1.0$
$= [5.751]^{.025} - 1.0$
= .0447 or 4.47% semiannually or 8.94% annually

NOTE: This problem is based on Table 17-1 and:

- total future dollars = total return in $ + purchase price
- purchase price = $1000
- total return = sum of an annuity for 40 periods, 8% reinvestment, $50 semiannual coupons or
  95.026 [$50] = $4751 where 95.026 is the sum of the annuity factor for 40 periods, 4%

17-9. Given: 12%, 10-year bond bought at par, reinvestment rate = 10%

(a) **total return** = sum of an annuity [20 periods, 5%] X $60
= 33.066 X $60 = $1983.96

(b) **interest-on-interest** = amount attributable to reinvestment = total return - coupon income

= $1983.96 - $1200 = $783.96

(c) **realized return** = [total future dollars/purchase price]$^{1/2n}$ - 1.0

= [$2983.96/$1000]$^{.05}$ - 1.0
= 2.98396$^{.05}$ - 1.0
= .05618 or 5.618% semiannually or 11.237% annually

NOTE: total future dollars = total return + purchase price = $1983.96 + $1000 = $2983.96

17-10. @ 15% required rate of return, price = $811.08
@ 17% required rate of return, price = $717.14
@ 20% required rate of return, price = $608.84

17-11. The duration is calculated as 6.16 years. Dividing by 1+YTM, or 1.1361, the modified duration is calculated as 5.42.

17-12. Using a price of $300, the YTM is 17.07%. This problem is easily solved with a calculator.

17-13. Start with 15 years. The duration is 8.84 years. Using 20 years, the duration is 9.07 years. At 25 years, the duration has decreased to 8.82 years.

17-14. To calculate the *yield to first call* (YTC):

Market Price = $970
$100 is the *annual* dollar coupon; $50 semiannual
10 is the number of years to maturity
BUT 5 is the number of years until first call, and this is used in the calculation

$1050 is the call price, as given in the problem; use this number instead of $1,000 as the future value

The YTC is 11.57% and the YTM is 10.49%. The YTC is greater than the YTM because of the call premium received when the bond is called.

17-15. using semiannual interest rates

(a) 12.3394%
(b) 8.4632%
(c) 15.3231%

17-16.
- recognize that the dollar coupon is $100
- use the correct price of $1093.75 or 109.375% of par
- there are 28 periods on a semiannual basis

Current Yield = 9.14%

YTM = 8.8209%

17-17. Doubling the maturity to 28 years changes the YTM to 9.0721%.

The *current yield* does not change.

17-18. The current market price is $899.47.

With a YTM of 11.5% instead of 12.5%, the price of the bonds would be $964.65. If the market is demanding a lower rate on the bonds, the market price would be higher. In other words, the discount rate is lower, therefore the price is higher.

17-19. The only variation here is to recognize that the current market price to be entered is $800 because it is stated that the bond is selling for 20% less than face value. The YTM is calculated as 15.21%.

CFA

17-20. A. (1) At 8% - 10-year duration. Obviously, the duration of a zero coupon bond is *always* equal to the term-to-maturity irrespective of the market rate.

(2) Present value factor at 4% for 20 periods is .456; therefore issue price is $4,560.

(3) Present value factor at 6% for 10 periods is .350; therefore market value a year later is $3,500. Therefore, the rate of return is:

$$\frac{3{,}500 - 4{,}560}{4{,}560} = \frac{-1{,}060}{4{,}560} = -23.25\%$$

B. (1) Modified Duration = Duration: (1 + Market Yield/the number of coupon payments per year)

$$\text{Modified Duration} = \frac{D}{1 + r/2} = \frac{8}{1 + .08/2} = \frac{8}{1.04} = 7.69 \text{ years}$$

(2) Percent change in bonds price = Modified Duration x

$$\frac{\text{(Change In Market Yield in Basis Points)}}{100}$$

$$7.69 \times \frac{200}{100} = 7.69 \times 2 = 15.38\%$$

CFA

17-21. A. I. The Wiser bond's duration is less than its maturity because some of the bond's cash flow payments (i.e., the coupons) occur before maturity. Since duration measures the weighted average time until cash flow payment, its duration is less than its maturity. Bond duration is defined as

$$D = \frac{\sum_{t=1}^{N} PVCF_t \times t}{\sum_{t=1}^{N} PVCF_t}$$

II. For coupon bonds, duration is a better measure of the bond's sensitivity to changes in interest rates. Using the bond's maturity is deficient as a benchmark because it measures only when the final cash flow is paid and ignores all of the interim flows. Duration is a better measure because it measures the weighted average time until cash flow and thus is a more representative measure of the bond's overall cash flow sensitivity to interest rate changes. Duration takes into account coupon (inverse relationship) and yield to maturity (inverse relationship) as well as time to maturity.

B. I. Duration will increase. As rates decline, all of the cash flows increase in value, but the longest ones increase at the greatest rate. Therefore, the redemption payment has much greater effect, causing the duration to increase.

II. Duration will increase. As rates decline, all of the cash flows increase in value, but the longest ones increase at the greatest rate. Therefore, the redemption payment has much greater effect, causing the duration to increase.

III. Duration will decrease. The elapsing of time is accompanied by the reduction of total coupon payments and the shortening of time until the redemption payment. Therefore, because the redemption payment comes sooner, the duration decreases.

COMPUTATIONAL PROBLEMS

17-1.

(1) Future date	(2) Return	(3) $1/(1.04)^{2t}$	(4) Present value	(5) P.V./ 1052.42	(6) (1)x(5)
.5	$50	.9615385	48.076923	.0456823	.022841
1.0	50	.9245562	46.227811	.0439252	.0439252
1.5	50	.8889964	44.449818	.0422358	.0633537
2.0	50	.8548042	42.74021	.0406114	.0812227
2.5	50	.8219271	41.096355	.0390494	.0976235
3.0	50	.7903145	39.515726	.0375475	.1126425
3.0	1000	.7903145	790.31453	.7509497	2.2528492
				1.0000013	2.6744578

Duration = 2 years, 8 months, and 3 days

This bond, with a term to maturity of three years, has a duration of slightly over two years and eight months. That is, the weighted average time to the full recovery of interest and principal is two years, eight months, and three days.

17-2. The duration as calculated in Problem 17-1 is 2.67 years.

(a) modified duration = 2.67/1.04 = 2.5673.

(b) approximate price change = -2.5673 X .0050 = 1.28%.
therefore, if interest rates declined to 7.5% on an annual basis, or 3.75% on a semiannual basis, the price of the bond would increase to approximately

$1,052.24 x 1.28%, or $1,065.71

Solving with a calculator for the new price of this bond, using 3.75% as the semiannual rate, produces a price of $1,066.06.

17-3. Calculate duration for a 12% coupon bond with 10 years to maturity and selling at par (i.e., the price of this bond is $1000). **Use Annual Interest for this problem.**

(1) Year	(2) Cash flow	(3) PV factor	(4) PV of (2)	(5) PV/price	(6) (1)x(5)
1	$ 120	.8929	$107.148	.107148	.107148
2	120	.7972	95.664	.095664	.191328
3	120	.7118	85.416	.085416	.256248
4	120	.6355	76.26	.076260	.305004
5	120	.5674	68.088	.068088	.34044
6	120	.5066	60.792	.060792	.364752
7	120	.4523	54.276	.054276	.379932
8	120	.4039	48.468	.048468	.387744
9	120	.3606	43.272	.043272	.389448
10	1120	.3220	360.640	.360640	3.6064
			$1000	1.000035	6.32848

Therefore, the duration is 6.33 years.

approximate % change in bond price = -D/(1+YTM) X % point change in the YTM

= -6.33/(1+.12) X (-.0075)

= -5.6518 X -.0075 = +4.239%

[**NOTE:** we are using annual interest here, so we divide by 1 + YTM, or 1.12.

Therefore, this bond would increase in price by approximately 4.24%, resulting in a price of $1,042.40.

Using a calculator, solving for the new bond price at an interest rate of 11.25% produces a price of $1,043.71.

Chapter 18 Bonds: Analysis and Strategy

CHAPTER OVERVIEW

Valuation, prices and yields are covered in Chapter 17, and analysis and strategy in Chapter 18. The purpose of this chapter is to cover issues involving the analysis of bonds from an investor's perspective, and review strategies for managing a bond portfolio.

Chapter 18 starts with a discussion of why investors buy bonds, both domestic and foreign. Included in this discussion is a discussion of the total returns on bonds over long periods of time. Instructors should emphasize how different types of investors are interested in bonds--some for the income return and some for the chance to earn capital gains as a result of interest rate changes. The discussion of foreign bonds is a good place to once again talk about currency risks.

A key part of this chapter is the discussion on important considerations in managing a bond portfolio. This includes the term structure of interest rates, and the risk structure of interest rates (yield spreads). The essential elements of this material are covered while tedious details are avoided. Students in a beginning Investments course do not need to get bogged down in the details of the term structure, and the various theories to explain term structure.

The remainder of Chapter 18 is devoted to a discussion of bond strategies and management. This chapter parallels the discussion for stocks (Chapter 11) by dividing the discussion of strategies into passive and active. This is consistent with modern investing approaches and also allows instructors to incorporate any discussion of Efficient Markets they may choose as well as touch on such issues as direct versus indirect investing.

This chapter concludes with a discussion of building a bond portfolio. The discussion is divided into how conservative investors approach this issue as opposed to aggressive investors. It concludes with a consideration of the international perspective. It is here that instructors will want to mention the use of mutual funds and closed-end funds when investing internationally.

CHAPTER OBJECTIVES

To analyze the reasons why investors buy bonds.

To recognize important considerations in managing a bond portfolio, including the term structure of interest rates and yield spreads.

To differentiate between the passive and active strategies for managing a bond portfolio.

MAJOR CHAPTER HEADINGS [Contents]

Why Buy Bonds?

[reasons why investors buy bonds; bond returns over long periods of time; large annual gains in bonds do occur]

Buying Foreign Bonds
[international considerations, primarily problems in transacting; currency risk]

Important Considerations In Managing A Bond Portfolio

Understanding the Bond Market
[changes in GDP; the importance of expected inflation; global factors]

The Term Structure of Interest Rates
[definition; yield curves; forward rates; term structure theories: expectations theory, liquidity preference theory, market preferred habitat theory, segmentation theory]

The Risk Structure of Interest Rates--Yield Spreads
[definition; factors leading to yield spreads; junk bonds; yield spreads over time; understanding and using the yield spread as an investor]

Bond Strategies

Passive Management Strategies
[definition; case for doing this; buy and hold; indexing]

Immunization--A Structured Portfolio Strategy
[definition; extended example]

Active Management Strategies
[forecasting changes in interest rates; identifying mispricings among securities; interest rate swaps]

Building A Fixed-Income Portfolio

Conservative Investors
[factors that must be considered]

Aggressive Investors
[how they might behave; using duration]

The International Perspective
[returns and risks; procedures]

POINTS TO NOTE ABOUT CHAPTER 18

Exhibits, Figures, and Tables

Exhibit 18-1 is a simple explanation of the concept of immunization.

Figure 18-1 shows yield curves for various periods, illustrating the different shapes that yield curves can take.

Figure 18-2 illustrates yield spreads for a recent period by showing differences between Baa corporates and Aaa corporates.

Table 18-1 is a detailed example of the immunization principle. It is probably worth some significant class discussion in order to help students better understand duration and reinvestment rate risk (which were covered in Chapter 17).

ANSWERS TO END OF CHAPTER QUESTIONS

18-1. Some investors are interested in bonds because they offer a steady stream of interest income over the life of the obligation and a return of principal at maturity. On the other hand, other investors are interested in bonds exactly because bond prices will change as interest rates change. Because bonds can be purchased on margin, large potential gains are possible from speculating on interest rates.

18-2. Diversification has always been a justification for U. S. investors to buy any foreign securities, stocks or bonds. In addition, foreign bonds could offer higher returns than U. S. bonds. Finally, investors might wish to try to take advantage of expected currency movements.

18-3. If the Euro weakens, the dollar strengthens. This will harm a U.S. investor.

18-4. Agree. You must sell the dollar to obtain the foreign currency to invest.

18-5. As the economy strengthens, nominal GDP should rise, and interest rates typically increase as economy activity strengthens.

18-6. Expected inflation is a component of nominal interest rates. A rise in expected inflation will probably be associated with higher interest rates, which in turn is associated with lower bond prices.

18-7. Typically, the yield curve is upward sloping. If short-term rates rise, this will generally lead to rises in long-term rates.

18-8. The key factor in analyzing bonds is the behavior of interest rates. Market yields and prices for all bonds are directly related to interest rate behavior.

18-9. Under the expectations hypothesis, investors can expect the same return regardless of the choice of investment. Any combination of securities for a specified period will have the same expected return.

18-10. The difference is the recognition that interest rate expectations are uncertain. Forward rates and estimated future rates are not the same; they differ by the amount of the liquidity premium.

18-11. Yield spreads vary inversely to the business cycle and may provide investors with clues to the direction of the economy. Yield spreads may provide investors with investing opportunities.

18-12. Two passive bond management strategies are buy and hold, and indexing.

18-13. **Immunization** is the strategy of immunizing (protecting) a portfolio against interest rate risk. It involves offsetting the two components of interest rate risk--the price risk and the reinvestment rate risk--which move in opposite directions.

Duration is the basis for immunization theory. A portfolio is immunized if its duration is made equal to a preselected investment horizon for the portfolio.

18-14. Immunization involves protecting a portfolio against interest rate risk; however, immunization requires activity to succeed. It is not a true passive strategy.

18-15. Active bond management strategies include forecasting interest rates and bond swaps. The two are related in that at least some bond swaps involve some type of forecast of interest rates (e.g., the rate anticipation swap).

18-16. A sharp decline in interest rates is, of course, the ideal environment for the bond investor seeking capital gains. Such an investor should *concentrate on low coupon, long maturity bonds, or bonds with the longest duration*. All bonds will perform well in such an environment, but investors may prefer certain types depending on the circumstances. For example, yield spreads should be considered. Governments can be purchased on 8-15% margin. The after-tax return of municipals may be superior. Zero coupons offer maximum volatility. And so forth.

18-17. Long maturities have greater price fluctuations; therefore, if a rise in market rates is expected, these bonds will be unattractive for speculative purposes. The lower the coupon, the higher the price volatility. Bonds selling at large discounts presumably have lower coupons. Again, these would not be preferable if rates are expected to rise.

18-18. Mispricings may be temporary inefficiencies in bond pricings.

18-19. **Horizon analysis** is one form of interest rate forecasting. It involves the projection of bond performance over a planned investment horizon. The investor evaluates bonds being considered for purchase over a selected holding period in order to determine which will perform the best. To do this, the investor must make assumptions about reinvestment rates and future market rates and calculate the realized compound yields for the bonds being considered.

18-20. If you think the British economy will slow down, interest rates are likely to drop because of slack loan demand, and bond prices are likely to rise.

If you are bullish on the pound, you could take an unhedged position. A bearish investor might choose to hedge the position.

CFA
18-21. a

CFA
18-22. a

CFA
18-23. (a) The three issues that Robert and Neil should address are the following:

(1) *The starting yield level relative to the U.S.* If the spread is positive, this provides a cushion against unfavorable moves in either interest rates in the foreign market or in the value of the foreign currency. If the spread is negative, the foreign market must make up the difference by outperforming in local currency terms or by experiencing an appreciation in its currency (or both).

(2) *The prospects for internal price movements relative to the U.S. bond market*. In other words, what is the likely trend in yield spreads between the foreign market and the U.S.? Unlike in the U.S., where yields in different sectors will generally move in the same direction, albeit at different rates, yields in foreign markets may move in opposite directions to the U.S., due to differences in economic, social and political factors in those foreign markets.

(3) *The prospects for currency gain or loss versus the dollar*. The factors Robert and Neil should look at to assess prospects for the Deutschemark and the Australian dollar include:

(a) trends in the balance of payments.
(b) inflation and interest rate differentials.
(c) the social and political atmosphere, particularly as it relates to foreign investment.
(d) the extent of central bank intervention in the currency markets.

(b) The two reasons for investing in a mixture of international bonds are (1) the opportunity for superior rates of return and (2) diversification. With respect to return, economic and interest rate cycles tend not to move in parallel worldwide. As a result, being able to invest in a host of different markets presents opportunities for above-average return in comparison to having access to only one individual and relatively homogeneous market. Similarly, as regards diversification, foreign bond markets are not perfectly correlated with the U.S. bond market. This means that the volatility of return for a portfolio of global bonds will be less than for a portfolio comprised only of U.S. bonds.

The ERISA account does have a 10% position in Canadian bonds, but the close interrelationship of the Canadian economy and its capital markets makes Canada highly correlated with the U.S. In that sense, the Canadian position does not afford the return and diversification opportunities that other foreign bond markets would offer.

CFA

18-24. A. Portfolio C will experience the best price performance if the 2-year spot rate increases. The weighted exposure to the 2-year key rate duration of each portfolio is shown below:

	Portfolio A	Portfolio B	Portfolio C
2-year key rate duration	0.89	1.23	0.10

Because bond prices are inversely related to the direction of the change in yields, Portfolio C would experience the *best* price performance (*least* price depreciation) because it has the lowest exposure to the 2-year key rate duration.

B. Portfolio C will experience the best price performance if 10-, 20-, and 30-year spot rates decrease.

The cumulative weighted exposure to the 10-, 20- and 30-year key rate durations of each portfolio is shown below:

	Portfolio A	Portfolio B	Portfolio C
10-year key rate duration	0.83	0.05	2.66
20-year key rate duration	0.84	0.09	0.20
30-year key rate duration	0.89	2.66	0.15
	---	---	---
Cumulative exposure	2.56	2.80	3.01

Because bond prices are inversely related to the direction of the change in yields, Portfolio C would experience the *best* price performance (*most* price appreciation) because it has the highest cumulative exposure to the 10-, 20-, and 30-year key rate durations.

ANSWERS TO END OF CHAPTER PROBLEMS

CFA

18-1. A. Note that the concepts discussed below are applied specifically to non-callable bonds. The notions of duration and convexity do pertain to callable securities, but their behavior does not necessarily follow the pattern described in this guideline answer.

Duration is a gauge of a bond's basic price volatility. Macaulay duration is the weighted term to maturity expressed in years where the weights are the present values of the cash flows occurring in those years. Modified duration is the Macaulay duration divided by (1 + semi-annual yield) for bonds with semi-annual payments. Equivalently the first derivative of the bond price-yield equation with respect to yield divided by the price (present value) of the bond produces the same modified duration. Modified duration measures bond price volatility and provides an estimate of the rate of change in bond price due to a change in yield. As such, modified duration measures a bond's sensitivity to interest rate changes and its exposure to interest rate risk.

Convexity indicates the extent to which duration is affected by the curvature of the price/yield relationship. That is, in conjunction with duration, convexity shows how much more bond price will rise with a drop in yield and how much less price will fall with an increase in bond yield. As such, convexity acts to adjust duration so that when used together they provide a more complete measure of bond price volatility.

Price-yield relationship is fundamental to bond price behavior and is based on the principle that bond prices and yields move in opposite directions. This principle is derived from the fact that the price of a bond is equal to the present value of its future cash-flows. That is, a change in yield mathematically must produce an off-setting change in price in the opposite direction. Because present value is an exponential function, the price-yield relationship is convex, meaning that bond prices rise at an increasing rate when yields fall and decline at a decreasing rate when yields rise. Because the relationship is non linear, both duration and convexity are needed to accurately represent bond price behavior.

Now, because duration is the first derivative of bond price with respect to yield, it is represented by a straight line tangent to the price-yield relationship at a given bond yield. As such, the rate of change in bond price estimated by duration remains the same for all changes in bond yields. Duration alone underestimates price appreciation (when rates fall) and overestimates price depreciation (when rates rise). While this is not much of a problem for small changes in yield, the differences can become substantial for large differences.

Because convexity is the second derivative (of price with respect to yield), it results in a curved price-yield relationship which much more accurately reflects bond price

behavior. Essentially, convexity is used with duration to correct errors in estimated price behavior, especially with large swings in yields. That is:

Price Change Estimated by *Duration*
\+ Adjustment in Price Change Due to *Convexity*
= More Accurate Measure of Price Change

As can be derived from the discussion above, the best way to monitor bond price volatility, whether individually or in a portfolio, is to use *BOTH* duration and convexity. Duration is fine for small moves in yield, but as the change in yield increases (to more than 100 basis points or so), the combination of both duration and convexity provides the superior measure of estimated bond price behavior.

B. A barbell portfolio combines two bonds such that the portfolio has the desired (bullet) modified duration. The term barbell comes from the usual practice of combining bonds at opposite ends of the term structure. The motivation for a barbell position is to manage the convexity of the investment.

The barbell position is a combination of the two bonds, such that the weighted modified duration is eight years:

$$3.97\ w_1 + 9.73\ (1 - w_1) = 8.0$$

$$w_1 = .30 \text{ (bond 1)}$$

$$w_2 = .70 \text{ (bond 2)}$$

Bond	Weights		Mod. Duration		Wt't. Mod. Duration
1	.30	*	3.97 yrs.	=	1.19 yrs.
2	.70	*	9.73 yrs.	=	6.81 yrs.
	1.00				8.00 yrs.

At the same time, this barbell portfolio will also have its own weighted average convexity:

Bond	Weights	Convexity	Wt'd. Avg. Convexity
1	.30	19.58	5.87
2	.70	167.56	117.29
	1.00		123.16

Thus, the two positions stack up as follows:

	Mod. Duration	Convexity
15-year T-Bond Currently Held	8.0 years	94.36
Proposed Barbell Portfolio	8.0 years	123.16

Clearly, while the two positions result in the same duration, the convexity of the barbell is considerably higher than the bond currently held. The net result is that the price behavior of these two positions will not be the same over different yield environments. More specifically, the two positions will undergo about the same price volatility if rates drop by only 50 basis points, since the durations are the same and convexity doesn't have much of an impact with small swings in yields. In sharp contrast, if rates drop by 250 basis points, the barbell will experience much better price appreciation, as the larger convexity will lead to more price volatility. All of this, of course, assumes an equal shift in the term structure --i.e., that both 5-year and 30-year issues experience the same change in yield. If they don't, the price behavior could differ -- not because of variations in convexity, but because of variations in yield behavior.

CFA

18-2. The three reasons for these discrepancies that could be cited from the information provided are:

(1) Modified duration, when used to estimate the expected price behavior of a bond, is only accurate for small changes in yield. The relatively large 100 basis point change assumed in the question accentuates this fact. The inaccuracy of modified duration as an estimator of percentage price change is referred to as convexity. Therefore, convexity is a measure of the degree to which modified duration (a linear estimate) fails to capture the true dynamics of the curvilinear price/yield function.

(2) The percentage volatility indicated by the modified duration number applies to the full price of the bond including accrued interest, and not the quoted (flat) price. Here, only market quoted prices have been used (excludes accrued interest).

(3) The effect of a call price is shown by examining Bond Z. Since Bond Z only rose in price by 2.4% (to 101), it is obvious that the price rise has been constrained by the greater likelihood of it being called at par (100) in one year on June 1, 1990.

Although no specific information is provided in the question, two other possible sources of discrepancy are:

(4) A change in tax rate could impact market prices, so that their change would vary from the amount predicted by the modified duration number.

(5) Differences in market liquidity could impact the changes in market price of the three bonds. Supply and demand considerations could affect one type of bond more significantly than another.

PART VI: DERIVATIVE SECURITIES

Chapter 19: Options

CHAPTER OVERVIEW

Chapter 19 is a thorough discussion of the basics about options--puts and calls--including market index options. It is designed to cover all the terminology and trading mechanics as well as considerable analytics involving the valuation and use of options. It can be used with software for solving the Black-Scholes call option model, although use of the software is optional because complete examples are presented to illustrate the model. Such concepts as put-call parity and hedge ratios also are covered. Overall, this chapter is a comprehensive treatment of options from the standpoint of the typical undergraduate student. It is also a very lengthy chapter.

The first few pages of the chapter provide the necessary background information, including terminology and an analysis of exactly how options work, with an extended example. The mechanics of trading also are covered, including a detailed description of the role of the clearing corporation, margin, and brokerage commissions.

The payoffs and profits from basic option positions are analyzed in detail, using graphs, in order for students to clearly understand how options can be used and how they change the distribution of potential outcomes in ways that could not readily be accomplished (if at all) without the use of options. Each of the four basic cases is analyzed, buying a call and buying a put, and selling (writing) a call and selling a put. Somewhat more sophisticated options strategies are examined in a briefer format in Appendix 19-A by considering straddles, strips, straps, and spreads. While the basics are covered here, an instructor may choose to augment this discussion. At the beginning level, however, it is sufficient as presented.

Considerable attention is devoted to option pricing. The discussion begins with a general framework of in-the-money and out-of-the money conditions, and the resulting intrinsic value of an option. The speculative premium is then developed. Examples are used in all cases, and these examples are based on option prices as might be seen daily.

The next part of the discussion on option pricing develops the boundaries on option prices in graph format, which provides a framework for understanding actual option prices. This discussion leads into the Black-Scholes model, which is developed in a detailed but understandable format. All of the variables are explained, and a comprehensive example illustrates the calculations. Following this, the idea of hedge ratios is developed, and the put-call parity relationship presented.

Having developed all of the above, the chapter proceeds to explain what puts and calls mean to investors in terms of truncating the distribution of potential returns and the concept of

purchasing insurance. This is followed by a discussion of portfolio insurance, with a detailed example that clearly illustrates this often-talked about concept. Finally, the evolutionary use of options is discussed, as we consider how institutions are using options.

Chapter 19 concludes with a thorough discussion of stock index options. Basics are covered, and examples given. Strategies with stock index options are developed, showing how investors might use these instruments in managing their portfolios.

CHAPTER OBJECTIVES

To present the background--terminology and mechanics—necessary to thoroughly understand puts and calls.

To explain uses of, and strategies with, options.

To explain the pricing of options.

To provide a basic discussion of stock index options.

MAJOR CHAPTER HEADINGS [Contents]

Why Have Derivative Securities?

Why Options Markets?

Introduction To Options

[definitions; why options markets?]

Understanding Options

Options Terminology
[strike price, expiration date, option premium; LEAPS]

How Options Work
[detailed examples of buying and selling calls and puts]

The Mechanics of Trading
[the options exchanges; the clearing corporation]

Payoffs And Profits From Basic Option Positions

Calls
[buying a call; selling a call; diagrams]

Puts
[buying a put; writing a put; diagrams]

Some Basic Options Strategies

Covered Calls
[explanation and example; diagram]

Protective Puts
[explanation and example; diagram]

Portfolio Insurance
[explanation; discussion; example; costs]

Option Valuation

A General Framework
[in the money and out of the money definitions]

Intrinsic Values and Time Values
[intrinsic value definition; time value]

Boundaries on Option Prices
[graphical illustration of how boundaries are established]

The Black-Scholes Model
[model variables and equations; analysis of the inputs; complete example]

Put Option Valuation
[using put/call parity to derive the price of a put]

Summarizing the Factors Affecting Options Prices
[effects of various variables on put and call prices]

Hedge Ratios
[definition; example]

Using the Black-Scholes Model
[brief analysis of the evidence]

An Investor's Perspective on Puts and Calls

What Puts and Calls Mean to Investors
[truncating the distribution of returns]

The Evolutionary Use of Options
[institutional trends; use in strategic portfolio management]

Stock-Index Options

The Basics of Stock-Index Options
[what is available; differences from stock options; example]

Strategies with Stock-Index Options
[example of buying a call; example of buying a put]

The Popularity of Stock-Index Options

POINTS TO NOTE ABOUT CHAPTER 19

Exhibits, Figures, and Tables

Figures 19-1 through 19-5 illustrate the basic options strategies (buying and writing puts and calls) and can be used to emphasize important points about the distribution of returns. Both the payoff profiles and the profit and losses are shown for each case.

Figure 19-6 shows the payoff profiles for a covered call position, while Figure 19-7 shows the profit and loss possibilities for a covered call position.

Figure 19-8 illustrates the payoff profile and profit/loss possibilities for a protected put position.

Figure 19-9 illustrates the boundaries on option prices.

Table 19-1 analyzes how the relevant variables affect both put and call prices.

Box Inserts

Box 19-1 is an interesting discussion of an individual investor learning to use options.

ANSWERS TO END-OF-CHAPTER QUESTIONS

19-1. The potential advantages of puts and calls include:

(a) the smaller investment required relative to transacting in the common

(b) leverage--potential magnification of gains

(c) maximum loss is known in advance

(d) an expanded opportunity set, increasing the risk-return combinations available.

(e) possible lower transactions cost for the portfolio as a whole

(f) the ability to hedge or speculate on broad market movements and/or interest rates using index options

19-2. Puts and calls are short-term options, with maturities (on organized exchanges) measured in months. Warrants generally have maturities of several years, and a few are perpetual.

A second distinction is that puts and calls are created by investors (individuals or institutions), while warrants are created by corporations.

Finally, every warrant is unique, with the corporation (issuer) setting its parameters on a case-by-case basis.

19-3. An option buyer can choose to do nothing (or, put differently, fail to act). There is no obligation to take action.

19-4. (a) **Strike or exercise price**--the per-share price at which the common stock may be purchased (or sold to a writer)

(b) **Naked option**--a call option written without the stock being owned by the writer, or a put option written by a writer who is not short the stock

(c) **Premium**--the price paid by the option buyer to the writer or seller of the option--the market price of the option

(d) **Out-of-the-Money Option**--a call whose exercise price exceeds the current stock price or a put whose exercise price is less than the current stock price.

19-5. Premiums and prices are the same thing.

19-6. Investors, both individuals and institutions, write puts and calls in an attempt to profit from their beliefs about the underlying stock's likely price performance. Writers earn the premiums paid by the buyers.

19-7. The options clearing corporation (OCC) plays an important role in the options market. The OCC guarantees the performance of the contracts, preventing potential problems with writers who must honor their obligations. The OCC facilitates the taking of an opposite (closing) position at any time by buyers or sellers.

19-8. The writer can cancel by purchasing the identical option. Thus, a sale is followed by a purchase.

19-9. Option prices almost always exceed intrinsic values. This excess, sometimes called the premium over parity, exists because buyers are willing to pay some price for potential future stock price movements.

19-10. Option prices almost always exceed intrinsic values, with the difference reflecting the option's potential appreciation typically referred to as the time premium. Time obviously has a positive value for call options because the longer the time to expiration for a call option, the more chance it has to appreciate.

19-11. **The Black-Scholes model** uses five variables to value a call option:

(a) the price of the underlying stock
(b) the exercise price of the option
(c) the time remaining to the expiration of the option
(d) the riskless rate of return
(e) the volatility of the underlying stock price.

The first two variables determine whether an option is in-the-money or not. A difference between (a) and (b) that results in an in-the-money option has a direct (positive) effect on the option's value.

The last three factors, (c) through (e), have a direct (positive) effect on an option's value.

19-12. Reasons for purchasing a call are:

(a) to establish a position with minimum initial investment

(b) to protect a short sale

(c) to maximize leverage for speculative purposes

(d) to engage in hedging strategies.

19-13. Investors writing calls often are seeking the income from the premium. Such a strategy can supplement the dividend income on stocks held.

The obligation of a call writer is to deliver the stock for the strike price if called upon to do so.

19-14. A **straddle** is a combination of a put and a call on the same stock with the same exercise date and exercise price.

A straddle buyer believes that the underlying stock price is highly volatile, and may go either up or down. Since each part of the straddle can be exercised separately, a buyer can profit from a large enough move either way.

19-15. A **spread** is defined as the purchase and sale of an equivalent option varying in only one respect (exercise price or expiration date). The purpose of a spread is to reduce risk in an option position.

19-16. Two types of spreads are (see Appendix 19-A):

(a) A money spread involves the purchase of a call option at one exercise price and the sale of the same maturity option, but a different exercise price.

(b) A time spread involves the purchase and sale of options identical except for expiration dates.

19-17. The call or put writer's position is considerably different from the buyer's position because of the obligation involved on the part of a writer. A call writer must be prepared to deliver the stock, regardless of the level to which the stock price has risen. A put writer must be prepared to take delivery of a stock and pay a specified price for it, regardless of the level to which the stock price has declined. Buyers know their potential losses while writers do not.

19-18. A **stock index** option is a call or put contract on a stock market index. Stock index options enable investors to trade on general stock market movements in the same way that they can trade on individual stocks.

Stock index options have included the S&P 100 Index, the S&P 500 Index, the New York Stock Exchange Index, the Major Market Index, the Value Line Index, the National OTC Index, and various industry sub-indices such as the Computer Technology Index and the Gold/Silver Index. Index options were also available for an Institutional Index and a NYSE Beta Index. This list changes from time to time; therefore, it is best to consult the current issue of *The Wall Street Journal*.

19-19. The major differences between a stock index option and a stock option are that buyers of index options receive cash from the seller upon exercise of the contract. Stock options, in contrast, require the actual delivery of the stock upon exercise.

19-20. A put can be used to protect a profit that an investor has. Assume a stock purchased at $100 rises to $130. To protect against a decline, an investor may be able to purchase a put with an exercise price of $130 which would offset the lost profits should the stock price decline.

A call could be used to protect a short sale position. To protect against an unexpected rise in price, an investor could purchase a call. If the stock price rises, the call can be exercised and the stock acquired and delivered to cover the short sale.

19-21. Writing covered calls is basically a conservative strategy. The writer forgoes possible price appreciation while knowing what the likely gains are, whether the stock is called or not.

For a naked call writer, the potential gain is limited while the potential loss is large.

19-22. Return volatility is greater because the options sell at relatively small prices. Thus, the returns on options as a percentage of the invested funds are larger than for the corresponding common stock.

19-23. With industry sub-index stock index options, investors can speculate on certain segments of the market. Thus, if an investor is optimistic about the technology stocks, a call on the Computer Technology Index can be purchased; if pessimistic about the prospects of such a group, a put can be purchased. And so forth.

19-24. (a) If you fear a market decline over a six month period, you could purchase a put on one of the market indices, thereby establishing a short position.

(b) Basically, this hedge would be quite effective. However, the exact degree of effectiveness will depend upon how closely correlated the 50 stock portfolio is with the particular market index involved. For example, if most of the stocks in the portfolio were on Nasdaq, a put option on the NYSE Composite Index would not be as effective as if the 50 stocks were large NYSE stocks.

(c) Other things being equal, as the number of stocks in the portfolio increases, the protection should be more effective because the portfolio resembles more and more the market as a whole.

19-25. If you expect interest rates to rise, you could purchase an interest rate option put. If interest rates are expected to rise, bond (i.e., fixed income securities) prices will decline; therefore, you need a put.

19-26. To say an option is worth more alive than dead refers to the fact that it never pays to exercise an American call option on a non-dividend-paying stock early.

Consider such an option holder who is ready to close out the position. The holder has two choices: exercise the call or sell it. It can be shown that the proceeds from the sale of the option exceed the proceeds from exercising. Thus, the option should be continued by selling it rather than "killing" it through exercise.

CFA
19-27. a

CFA
19-28. a

CFA
19-29. a

CFA
19-30. a

CFA
19-31. A. i. The value of the call option is expected to decrease if the volatility of the underlying stock price decreases. The less volatile the underlying stock price, the less the chance of extreme price movements and the lower the probability of having the option expire in-the-money. This makes the participation feature on the upside less valuable.

ii. The value of the call option is expected to increase if the time to expiration of the option increases. The longer the time to expiration, the greater the chance that the option will expire in-the-money resulting in an increase in the time premium component of the option's value.

B. i. When European options are out-of-the money, investors are essentially saying they are willing to pay a premium for the right but not the obligation to purchase or sell the value of an underlying asset. The out-of-the money option has no intrinsic value, but because options require little capital (just the premium paid) to obtain a relatively large potential payoff, investors are willing to pay that premium even if the option may expire worthless. The Black-Scholes model does not reflect investors' demand for any premium above that of the time value of the option. Hence, if investors are willing to pay premiums for out-of-the money options above the time value, the Black-Scholes model does not value that excess premium.

ii. With American options, investors have the right, but not the obligation, to exercise the option prior to expiration, even if they exercise for non-economic reasons. This increased flexibility associated with American options has some value but is not considered in the Black-Scholes model, because the model only values options to their expiration date (European options).

ANSWERS TO END-OF-CHAPTER PROBLEMS

19-1. (a) The Teledyne calls that are in the money, given a closing stock price of $162, are the calls with exercise prices of 140, 150, and 160.

(b) The Teledyne puts in the money are the puts with exercise prices of 170 and 180.

(c) Although the stock closed at $162, investors are willing to pay 1/4 for the 180 call because they feel there is some probability that the price of the stock will rise to the 180 area. They are willing to pay only 1 for the 150 put because they feel there is less chance of the stock declining to the 150 area.

19-2. (a) Using the Teledyne data, the intrinsic value of the April 140 call is

$$162 - 140 = 22$$

The intrinsic value of the October 170 call is $0 (zero) since the stock price is less than the exercise price.

(b) The intrinsic value of the April 140 put is $0 (zero) since the strike price is less than the stock price.

The intrinsic value of the October 170 put is

$$170 - 162 = 8$$

(c) The stock price is on the higher end of the range of exercise prices available for Teledyne options. Therefore, the intrinsic values for the calls are greater.

19-3. (a) The cost of 10 October 150 call contracts in total dollars is: a price of 25 = $2500 per contract; therefore, 10 contracts would involve a total dollar amount of $25,000. From the text, the brokerage cost for 10 option contracts is $65. Therefore, the total cost of this transaction would be $25,065.

(b) The cost of 20 October 160 put contracts in total dollars is: a price of 9 = $900 per contract; therefore, 20 contracts would involve a total dollar amount of $18,000. From the text, the brokerage cost for 20 contracts is $115. Therefore, the total cost of this transaction would be $18,115.

(c) If Teledyne closed at $164 the following day, the in-the-money call options would increase in value, and the out-of-the-money calls probably would also. As the stock price rises, the prices of the put contracts should decline.

(d) If the price of this option rises $1, from 25 to 26, the gross profit per contract would be $100. Therefore, for 10 contracts the one-day profit would be $1000. Subtracting out two-way brokerage cost of 65 x 2 = $130, an investor would net $870.

(e) If the October 160 put goes to 7 1/2, each contract would show a loss of 9 - 7 1/2, or 1 1/2 ($150). Therefore, the one-day loss on 20 contracts would be $150 x 20 = $3000. Adding in two-way brokerage costs of $115 x 2 = $230, the total loss would be $3230 if these contracts had been bought at 9 and sold one day later at 7 1/2.

(f) These contracts, like any option contracts, can expire worthless, resulting in a total loss of investment plus brokerage costs. You can lose the full purchase price plus at least one-way commissions.

19-4. (a) More, because of its longer time to maturity.

(b) $3--the intrinsic value is zero.

(c) Using the put-call parity relationship, the price of a put is:

price of put = $E/(e^{rt}) - S + C$

= $\$50/(e^{.08(.25)}) - \$45 + \$3$

= $\$50/1.0202013 - \$45 + \$3$

= $7.01

NOTE: $e^{.08(.25)}$ = .02 raised to the e^x.

It is not working according to this calculation.

COMPUTATIONAL PROBLEMS

19-1. Using the put-call parity relationship, the price of a put is:

price of put = $E/(e^{rt}) - S + C$

= $\$45/(e^{.08(.25)}) - \$47.375 + \$8.94$

= $\$45/1.0202013 - \$47.375 + \$8.94$

= $5.67

NOTE: $e^{.08(.25)}$ = .02 raised to the e^x.

NOTE: THE REMAINING PROBLEMS WERE SOLVED WITH software. Numerous alternative software packages for solving options problems are available.

19-2. Price of call = $7.30
Price of put = $1.53

19-3. (a) $7.84
(b) $10.65

The change in volatility caused the greater change in the value of the call. In general, call prices are going to be more sensitive to a change in volatility than in a change in the risk-free rate.

19-4. The hedge ratio as determined by the program is -0.66. Therefore, for every call option written, 0.66 shares of common would be required to hedge the position. For a standard 100-share option contract, 66 shares of common would be required.

19-5. (a) $20.66
(b) $14.44
(c) $6.63

19-6. If the stock is currently $2 out of the money, it is selling for $38. Using this price and the information given, the price of the call is calculated to be $6.31.

19-7. The put would sell at a higher price because it would be in the money since the stock price is less than the exercise price. Solving for the price produces a value of $7.33.

Chapter 20: Futures

CHAPTER OVERVIEW

Chapter 20 is designed to cover the basics of futures markets in general but with primary emphasis on financial futures. While the basics are applicable to any commodity, and money can be thought of as another commodity, it is felt that students will receive the most benefit from concentrating on financial futures after a general introduction to the subject. This is typically a difficult subject for beginners.

The first part of the chapter develops the idea of a forward market and a futures market, outlines current U. S. futures markets, and describes the structure of futures markets. This provides the student with the necessary background information.

The chapter next focuses on the mechanics of trading, including all of the basics. Margin, which is completely different from that involving stock, is developed in detail, including an example.

The chapter discusses the use of futures contracts by explaining the role of hedgers and speculators. This includes a description of basis. The subsequent discussion is organized by examining how to both hedge and speculate in both interest rate futures and stock index futures. The necessary background information is provided, along with examples of how to use the contracts, with particular emphasis on short hedges. The limitations of hedging are considered. Speculating with both interest-rate futures and stock-index futures is discussed.

Single stock futures are also covered.

The chapter concludes with a discussion of program trading, which is often cited in the popular press.

CHAPTER OBJECTIVES

To explain the basics of futures markets in general.

To explain financial futures in particular--what is available, how they are used, what they can accomplish.

To illustrate various hedging and speculating strategies using both interest rate options and stock index options.

MAJOR CHAPTER HEADINGS [Contents]

Understanding Futures Markets

Why Futures Markets?
[reasons for forward markets and futures markets]

Current U. S. Futures Markets
[futures markets in the United States]

Foreign Futures Markets
[brief description of futures markets in other countries]

Futures Contracts
[basic characteristics]

The Structure Of Futures Markets

Futures Exchanges
[members of the exchanges]

The Clearinghouse
[the role of the clearinghouse]

The Mechanics of Trading

Basic Procedures
[short position vs. long position; offset; price fluctuations; commissions]

Margin
[good faith deposit; margin call; how accounts are marked to the market, including example]

Using Futures Contracts

[traditional uses]

Hedgers
[trying to offset the risk in a cash position]

How to Hedge With Futures
[Basic idea; short hedge; long hedge]

Speculators
[trying to profit by their actions]

Financial Futures

[reasons for; differences between these and commodity futures]

Interest Rate Futures

[what contracts are available; reading quotes; hedging and speculating with interest rate futures, with examples]

Stock-Index Futures

[how they work; hedging with stock-index futures; how short hedges work; example; long hedges; limitations of hedging with stock index futures; index arbitrage and program trading; speculating with stock index futures--benefits; strategies--spreaders (intramarket and intermarket]

Single Stock Futures

[how they differ from stocks and options; the future of SSFs]

POINTS TO NOTE ABOUT CHAPTER 20

Exhibits, Figures, and Tables

Exhibit 20-1, showing the types of futures contracts available, is for general reader interest.

Exhibit 20-2 on characteristics of interest rate futures contracts can be examined by students on their own.

Exhibit 20-3 on hypothetical quotes on bond futures contracts also provides basic information.

Exhibit 20-4 illustrates a short hedge for interest rate futures. The major emphasis should be on the short hedge since most investors are long the cash position and must hedge by selling futures.

Figure 20-1 shows return distributions for hedged and unhedged positions on a conceptual basis. The idea, of course, is to show why investors might choose to hedge their positions.

Figure 20-2 shows that the value of a well-diversified stock portfolio tracks very closely the price of the S&P 500 index futures.

Figure 20-3 (a) compares the value of a relatively undiversified portfolio with the price of the S&P 500 futures contract. This portfolio is only 66 percent diversified, and the futures contract does not move all that closely with the portfolio.

Figure 20-3 (b) shows that a hedged position in this situation is only 27 percent lower than an unhedged position. Thus, stock-index futures generally do not provide a good hedge for relatively undiversified portfolios.

Table 20-1, showing how investor accounts involving futures are marked to the market, is worth emphasizing because it helps to explain the real risk of futures contracts--the equity can be wiped out, or diminished severely, very quickly.

Table 20-2 illustrates both short and long hedges using stock-index futures. Although designed to be simple examples, they convey the essence of the hedge involved, and students can readily understand them.

ANSWERS TO END-OF-CHAPTER QUESTIONS

20-1. A **futures contract** is a commitment to buy or sell at a specified future settlement date a designated amount of some item. A firm agreement by two parties, the seller of the futures contract agrees to make delivery, and the buyer agrees to take delivery, at a currently determined market price.

20-2. A forward contract is an agreement between the two parties that calls for delivery of a commodity at a specified future time at a price agreed upon today.

20-3. All futures contracts are *marked to the market* daily; that is, all profits and losses on a contract are credited and debited to each investor's account every trading day.

Almost all (95%+) futures contracts are settled by offset rather than delivery; that is, holders liquidate a position by arranging an offsetting transaction.

20-4. The *clearinghouse* ensures the fulfillment of each futures contract. Buyers and sellers settle with the clearinghouse, not with each other. The clearinghouse is on the other side of all transactions, and stands ready to fulfill a contract if either buyer or seller defaults. Thus, the clearinghouse helps to facilitate an orderly market in futures.

20-5. The initial margin deposited with a broker is the equity of the transactor. Each contract also requires a maintenance margin below which the investor's equity cannot drop. If the equity declines below the maintenance margin, a **margin call** occurs. It should be remembered that all contracts are marked to the market daily; that is, all profits and losses are debited and credited daily to an investor's account.

20-6. Differences between trading in stocks and trading in futures contracts include:

(a) The whole concept of margin is different because no credit is being extended with futures contracts.

(b) Margin is the norm in futures but not in stock trading.

(c) Most futures contracts have a daily price limit while stocks do not.

(d) Unlike stocks, there are no price movement restrictions with short sales.

(e) Futures positions have definite termination dates.

(f) Brokerage commissions for futures are paid on the basis of a completed contract, unlike stocks.

(g) There are no specialists on futures exchanges.

(h) Futures contracts are not securities.

20-7. In a zero sum game, one person's loss is another's gain. Thus, what a buyer (seller) gains, the seller (buyer) loses.

20-8. Financial futures differ from other futures contracts in a few respects.

With stock index futures, the seller settles in cash at maturity--there is no delivery. Also, unlike traditional futures contracts, stock index futures typically have no daily price limits.

20-9. **Hedgers** buy or sell futures contracts in order to offset the risk in some other position. They want to reduce the risk of adverse price fluctuations. Hedgers forego some potential profits to eliminate part of the risk.

Speculators buy or sell futures contracts in an attempt to earn a return. They are willing to assume the risk of price fluctuations, hoping to profit from them.

20-10. **Basis** can be, and is, defined in different ways. In this edition basis is defined as the difference between the cash price of an item and the futures price of the contract used, and the basis is positive when this difference is positive.

20-11. In hedging, the buyer benefits from a weakening basis (cash price weakens relative to futures). The seller benefits from a strengthening basis.

20-12. Price quotations on Treasury bonds are percentages of par, are quoted in 32nds, and the face value is $100,000. Therefore, a price of:

80-5 is 80 5/32 of $100,000 or $80,156.25

90-24 is 90 24/32 of $100,000 or $90,750.00

69-2 is 69 2/32 of $100,000 or $69,062.50.

20-13. A manager with a bond position may plan to sell the bonds later but meanwhile fears a rise in interest rates. To protect the portfolio, a **short hedge** can be used. If interest rates rise (and, therefore, bond prices drop), the manager will gain on the short hedge while losing on the cash position (i.e., the portfolio).

20-14. Risk cannot be entirely eliminated in a hedge because of basis risk. The basis fluctuates in an unpredictable manner, and changes in the basis will affect the hedge position during its life.

20-15. Investors could have preferences among the different stock index futures as a result of the composition of their particular portfolios. The New York Stock Exchange Index, covering only NYSE stocks, is not the same as the Value Line Index, which covers NYSE, AMEX, and OTC stocks.

20-16. The S&P 500 futures contract is the most popular stock-index futures contract. It is traded on the Chicago Mercantile Exchange.

20-17. Stock index futures allow investors to hedge **systematic (market) risk**. This is desirable for investors attempting to earn the unique part of a stock's return while avoiding market risk. The futures contract helps to protect the portfolio against market fluctuations.

20-18. A pension fund could use a *long* hedge with stock index futures if a market rally was expected but the fund was not ready with individual stock selections. Buying futures contracts would provide gains if the market does rise, and would help to offset the cost of buying stocks at the higher prices existing after the rise.

20-19.
- An investor would likely *buy a call on a stock index* if he or she expected a rise in the market and wanted to try to take advantage of this expectation.

- An investor would likely *buy puts on interest rate futures* if he or she expected interest rates to rise (which would cause a decline in bond prices).

20-20. **Program trading** involves the use of computer-generated orders to buy and sell securities based on arbitrage opportunities. The arbitrage occurs between common stocks, on the one hand, and index futures and options, on the other.

Large institutional investors seek to exploit differences between the two sides. Specifically, when stock index futures prices rise substantially above the current value of the stock index itself (e.g., the S&P 500), they sell the futures and buy the underlying stocks, typically in "baskets" of several million dollars.

Because the futures price and the stock index value must be equal when the futures contract expires, these investors are seeking to "capture the premium" between the two, thereby earning an arbitrage profit. That is, they seek high risk-free returns by arbitraging the difference between the cash value of the underlying securities and the prices of the futures contracts on these securities. In effect, they have a hedged position and should profit regardless.

CFA

20-21. Call options give the owner the right, but not the obligation, to purchase SFr's for a pre-specified amount of domestic currency. Purchasing an at-the-money call option would guarantee the current exchange rate over the life of the option. If the SFr declines in value, the call will not be exercised since francs can be purchased more cheaply in the open market and redeeming the bond issue will be less costly.

Contrasting characteristics:

- Currency options are traded world-wide and enjoy a liquid market.
- Exchange-traded currency option contracts have standard amounts, maturities, etc.
- Over-the-counter options could be tailored to meet Michelle's needs.
- The initial cash outflow would be the premium.
- The use of options preserves the ability to profit.
- No counterparty credit risk.
- Must roll to match 5-year obligation.

Currency forward contracts commit the seller to deliver the specified amount of currency to the buyer on a specified future date at a fixed price. A short position in a forward contract requires delivery.

Contrasting characteristics:

- The market for forward contracts is over-the-counter and sometimes may not be as liquid as option or futures market.
- Forward contracts may be custom-designed for specific applications.
- Cash does not change hands until a forward contract is settled.
- Counterparty credit risk.
- Can best match 5-year obligation.

Currency futures are like forward contracts except the gain or loss is settled daily under the supervision of an organized exchange. A short position in the futures requires either offset or delivery at expiration.

Contrasting characteristics:

- Futures are traded in standardized contracts and are highly liquid.
- Cash is required for daily settlement.
- A margin account is required.
- Management and administration costs are higher than with a forward or option contract.
- No counterparty credit risk.
- Must roll to match 5-year obligation.

CFA
20-22. d

CFA
20-23. b

CFA
20-24. c

CFA
20-25. b

ANSWERS TO END-OF-CHAPTER PROBLEMS

20-1. (a) The initial margin is $3500. Each point in price is equivalent to 20 ticks worth $25 each, or $500.

Equity on day of purchase = $3500--the initial position

Equity 1 day after purchase = $3650 [67.8 - 67.5 = .3 or 6 ticks worth $150]

Equity 2 days after purchase = $3800 [68.1 - 67.8 = .3 or 6 ticks worth $150]

Equity 3 days after purchase = $3750 [68 - 68.1 = -.1 or 2 ticks worth -$50]

Equity 4 days after purchase = $4000 [68.5 - 68 = .5 or 10 ticks worth $250]

(b) The excess equity for these four days is +150, +300, +250, and +500.

(c) The final gain is one point, or $500.

(d) An investor who was short over this same period would show the same numbers in reverse; that is, equity shortages and a final loss of $500.

20-2. The aggregate change in market value is the difference between the current price (or closing price) and the initial price multiplied by $500. Therefore

[70.5 - 67.5] X $500 = $1500

CFA

20-3. **A.** Information about foreign firms is often difficult to obtain on a timely basis and, once obtained, can be difficult to interpret and analyze due to language and presentation differences.

Financial statements are not comparable from country to country. Different countries use different accounting principles. Even when similar accounting methods are used, cultural, institutional, political and tax differences can make cross-country comparisons hazardous and misleading.

Stock valuation techniques useful in the U.S. may be less useful in other countries. Stock markets in different countries value different attributes.

Smith must consider currency risk in selecting non-U.S. stocks for his portfolio.

Increased costs: custody, management fees, and transactions expenses are usually higher outside the U.S.

The candidate must realize that a futures contract is a commitment to transact in the future. The price of the contract on any given day is a function of the current price of the underlying commodity (index price) plus the time value of money less, in this case, any dividends received.

B. $F_0 = S_0(1 + r_j - d)^m$

Where: F_0 = Futures Contract Price
S_0 = Index Price = 15,000
r_j = Risk Free Rate = .05
d = Dividend Yield = .02
m = Length of Contract (years) = .5

Therefore:

$F_0 = 15{,}000(1 + .05 - .02)^{0.5}$
$F_0 = 15{,}223$

COMPUTATIONAL PROBLEMS

20-1. (a) Sell 10 contracts at 82-20 each
82-20 = $82,625 and 10 contracts = $826,250

Buy 10 contracts at 76-12 each
76-12 = $76,375 and 10 contracts = $763,750

This is a short position and the price declined. The total profit is $826,750 - $763,750 = $63,000.

(b) Sell 10 contracts at 80-14 each
80-14 = $80,437.50 and 10 contracts = $804,375

Buy 10 contracts at 77 each
77 = $77,000 and 10 contracts = $770,000

This is a short position, and the price declined. The total profit is $804,375 - $770,000 = $34,375.

(c) Buy 15 contracts at 62-10
62-10 = $62,312.50 and 15 contracts = $934,687.50
Sell 15 contracts at 64-24
64-24 = $64,750 and 15 contracts = $971,250

This is a long position, and the price rose. The total profit is $975,250 - $934,687.50 = $40,562.50.

(d) Sell one contract at 70-14
70-14 = $70,437.50
Buy one contract at 78-08
78-08 = $78,250

This is a short position; however, the price rose. The total *loss* is $78,250 - $70,437.50 = $7812.50.

20-2. (a) The manager is long in the cash market, so to protect this position the manager would establish a short position. At $100,000 per contract, the manager should sell 10 futures contracts with a maturity three months hence (we are ignoring weighted hedges).

(b) The manager sells 10 contracts at a current price of 68, for a total transaction value of $680,000. The manager repurchases 10 of these contracts three months later at a price of 59-12, for a total transaction value of $593,750 ($59,375 x 10). Therefore, this was a successful hedge with a total dollar gain of $86,250.

The futures position gains $86,250.

(c) If the bonds are priced at 67-8 three months later, the cash market position is:

beginning	-- $76,062.50	X 10 = $760,625
ending	-- $67,250	X 10 = $672,500
		loss $ 88,125

The portfolio (cash) position declines $88,125.

(d) The net effect of this hedge is a *loss* of $88,125 - $86,250 = $1875

ANSWERS TO APPENDIX 20-A

20A-1. (a) greater than
(b) greater than
(c) less than
(b) less than

PART EIGHT: INVESTMENT MANAGEMENT

Chapter 21: Portfolio Management

CHAPTER OVERVIEW

Chapter 21 is designed to cover some portfolio management topics primarily having to do with actual investment practice. The emphasis in Chapter 21 is on the more practical, day-to-day aspects of portfolio management whereas Chapters 8 and 9 cover the theoretical aspects of portfolio management.

Chapter 21 is designed to integrate very closely with the CFA Institute's approach to portfolio management, which emphasizes that it is a process to be followed by all firms and managers. While the details will vary from manager to manager, the process will be the same.

Chapter 21 begins by explaining portfolio management as a process, integrating a set of activities in a logical and orderly manner. The process is systematic, continuous, dynamic, and flexible. It encompasses all portfolio investments. Having structured portfolio management as a process, any portfolio manager can execute the necessary decisions for an investor.

Figure 21-1 outlines the process as described by Maginn and Tuttle in *Managing Investment Portfolios*, a book associated with the CFA program. These steps are described in more detail in the chapter.

Individual investors are contrasted with institutional investors. Instructors may wish to add their own detail in this area. Covered here are such concepts as the investor's life cycle.

The remainder of the chapter focuses on the steps in the investment process. The first step, the determination of portfolio policies, receives the most emphasis because this is the part of the process involving objectives, constraints, and preferences, and this material receives the bulk of the attention in the CFA program.

The other steps in the process are discussed, and details are added where appropriate. For example, in the discussion of forming expectations, the author's work on probabilities associated with common stock returns is included. This material allows students to see the risk involved with common stocks, and can be a good focal point for class discussion.

Other important topics are discussed in this chapter. These include the important topic of asset allocation, including the types of asset allocation. Other topics are also touched upon, such as portfolio optimization and the costs of trading.

CHAPTER OBJECTIVES

To discuss why portfolio management should be thought of, and implemented as, a process.

To describe the steps involved in the portfolio management process.

To assess related issues of importance, such as asset allocation.

MAJOR CHAPTER HEADINGS [Contents]

Portfolio Management as a Process

[description of the process and what is involved; outline of the steps; figure showing the process]

Individual Investors Versus Institutional Investors
[a summary of the differences between the two; characteristics of investment policies for each]

Formulate an Appropriate Investment Policy

[overall view]

Objectives
[return and risk; discussion of life cycle for individual investors; establishing a portfolio risk level; inflation considerations]

Constraints and Preferences
[time; liquidity; taxes; regulatory; unique needs; example of stating all of these factors for two different investors]

Determine and Quantify Capital Market Expectations

Forming Expectations
[Forming Expectations--macro and micro]

Rate of Return Assumptions
[importance of historical data; arithmetic and geometric means; probabilities associated with common stock returns]

Developing and Implementing Investing Strategies

Asset Allocation
[importance; making the decision; example; types of asset allocation]

Portfolio Optimization
[the Markowitz model]

Monitor Market Conditions and Investor Circumstances

Monitoring Market Conditions

Changes in Investor's Circumstances

Rebalancing the Portfolio

[importance; problems]

Performance Measurement

[introduction to Chapter 22, which covers the evaluation of portfolio performance]

POINTS TO NOTE ABOUT CHAPTER 21

Exhibits, Figures, and Tables

Figure 21-1 is a diagram of the portfolio management process.

Figure 21-2 illustrates risk/return positions at various life cycle stages.

Table 21-1 contains the probabilities associated with common stock returns as calculated and reported in *The Journal of Portfolio Management*. This is a very detailed table of probabilities and can be used to show the risk of common stocks.

Table 21-2, taken from AAII Journal, illustrates some asset allocation possibilities depending upon stage in the life cycle and risk posture assumed.

Box Inserts

Box 21-1 is a good discussion of the rebalancing issue from a practical standpoint, as presented in S&P's Outlook. Note that the tax liability issue is discussed in this article.

ANSWERS TO END-OF-CHAPTER QUESTIONS

21-1. Portfolio management is best thought of as a process, meaning that it can applied in any situation to any manager. As a process, it is continuous, systematic, dynamic and flexible, and it applies to all investments.

21-2. NO! The process should be used by all managers, but the details can vary. Therefore, firms can be organized differently.

21-3. A major difference between the two occurs with regard to time horizon because institutional investors are often thought of on a perpetual basis, but this concept has no meaning when applied to individual investors. As explained below, for individual investors it is often useful to think of a life cycle approach, as people go from the beginning of their careers to retirement. This approach is less useful for institutional investors because they typically maintain a relatively constant profile across time.

Kaiser has summarized the differences between individual investors and institutional investors as follows:[1]

1. Individuals define risk as "losing money" while institutionals use a quantitative approach, typically defining risk in terms of standard deviation (as in the case of the Ibbotson data presented in Chapter 6).

2. Individuals can be characterized by their personalities, while for institutions we consider the investment characteristics of those with a beneficial interest in the portfolios managed by the institutions.

3. Goals are a key part of what individual investing is all about, along with their assets, while for institutions we can be more precise as to their total package of assets and liabilities.

4. Individuals have great freedom in what they can do with regard to investing, while institutions are subject to numerous legal and regulatory constraints.

5. Taxes often are a very important consideration for individual investors, whereas many institutions, such as pension funds, are free of such considerations.

21-4. The investment policy is the first step in the portfolio management process. It consists of objectives, constraints, and preferences, and sets the stage for the entire process. The investment policy describes what the investor is trying to achieve in terms of return and risk, and the investor's constraints and preferences.

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[1] See Ronald W. Kaiser, "Individual Investors," in *Managing Investment Portfolios*, 2nd. ed., John L. Maginn, CFA and Donald L. Tuttle, CFA, eds. (Charlottesville, Va.: Association for Investment Management and Research, 1990), p. 3-2.

21-5. The investment policy statement spells out the investor's objectives, constraints and preferences, thereby making operational a statement for investment managers to follow. For example, if, under constraints, it is stated that the investor is in the highest tax bracket and wishes to hold some bonds, the manager may be guided very quickly to municipals.

21-6. The asset allocation decision, having been made, has the greatest impact on the portfolio. For example, if it is decided to allocate 90 percent of the portfolio to stocks, a strong upward stock market, or a strong downward market, will clearly have a very large impact on the performance of the portfolio.

21-7. 1. **Strategic asset allocation** This type of allocation is usually done once every few years, using simulation procedures to determine the likely range of outcomes associated with each mix. The investor considers the range of outcomes for each mix, and chooses the preferred one, thereby establishing a long-run, or strategic asset mix.

2. **Tactical asset allocation** This type of allocation is performed routinely, as part of the ongoing process of asset management. Changes in asset mixes are driven by changes in predictions concerning asset returns. As predictions of the expected returns on stocks, bonds and other assets change, the percentages of these assets held in the portfolio changes. In effect, tactical asset allocation is a market timing approach to portfolio management intended to increase exposure to a particular market when its performance is expected to be good, and decrease exposure when performance is expected to be poor.

21-8. Given the increased complexity in managing institutional portfolios, it is critical to establish a well-defined and effective policy. Such a policy must clearly delineate the objectives being sought, the institutional investor's risk tolerance, and the investment constraints and preferences under which it must operate.

The primary reason for establishing a long-term investment policy for institutional investors is twofold:

(1) it prevents arbitrary revisions of a soundly-designed investment policy;

(2) it helps the portfolio manager to plan and execute on a long-term basis and resist short-term pressures that could derail the plan.

21-9. There is no definitive answer to this question. On the one hand, more recent years should generally be more relevant to the current situation for obvious reasons. For example, we have not had a Depression since the 1930s, and government interest rates were held to artificial lows for many years. On the other hand, the entire historical record from 1926 should be, on average, representative of a broad sweep of market history and may indicate what investors, on average, can expect from stocks when various conditions are taken into account--wars, inflation, deflation, stability, and so forth.

CFA

21-10. A. FRAMEWORK

OBJECTIVES	CONSTRAINTS
Return	Time Horizon
Risk	Liquidity Needs
	Tax Considerations
	Legal/Regulatory Issues
	Unique Needs and Circumstances

B. APPLICATION DIFFERENCES

	Pension Fund	Widow's Portfolio
Return	Total Return Objective	Income-Oriented with Some Inflation Protection
Risk	Above-Average Capacity; Company Bears Risk	Somewhat Below-Average Capacity Indicated; Widow bears Risk; Safety Important
Time Horizon	Long Term; Infinite	Medium Term; Finite Life
Liquidity	Low; Cash Flow Accrues	Probably Medium to High; No Reinvestment Likely
Tax	U.S. Tax-Exempt	Federal (and Probably State) Income Taxes Paid on Most Investment Receipts
Legal/ Regulatory	Governed by ERISA (Federal)	"Prudent Man" Rule Applies (State)
Unique Needs and Circumstances	Cash Flow Reinvested; Opportunity for Compounding	Widow's Needs Are Immediate and Govern Now; Children's Needs Should Be Considered in Planning for future

CFA
21-11.

A. A useful framework that identifies and organizes the required inputs to an investment policy statement is the following:

Objectives	Constraints
Return requirement	Liquidity needs
Risk tolerance	Time horizon Tax considerations Legal and regulatory considerations Unique needs, circumstances and preferences

B. The returns of a well-diversified portfolio (within an asset class) are highly correlated with the returns of the asset class itself. Over time, diversified portfolios of securities within an asset class tend to produce similar returns. In contrast, returns between different asset classes are often much less correlated, and over time, different asset classes are very likely to produce quite different returns. This expected difference in returns arising from differences in asset class exposures (i.e., from differences in asset allocation) is, thus, the key performance variable.

C. Three reasons why successful implementation of asset allocation decisions is more difficult in practice than in theory are:

(1) Transaction costs - investing or rebalancing a portfolio to reflect a chosen asset allocation is not cost-free; expected benefits are reduced by the costs of implementation.

(2) Changes in Economic and Market Factors - changing economic backgrounds, changing market price levels and changing relationships within and across asset classes all act to reduce the optimality of a given allocation decision and to create requirements for eventual rebalancing. Changes in economic and market factors change the expected risk/reward relationships of the allocation on a continuing basis.

(3) Changes in Investor Factors - the passage of time often gives rise to changes in investors needs, circumstances or preferences which, in turn, give rise to the need to reallocate, with the attendant costs of doing so.

In summary, even the "perfect" asset allocation is altered by the very act of implementation, due to transaction costs and/or changes in the original economic/market conditions and, as time passes, changes in the investor's situation. These impediments to successful implementation are inherent in the process, mandating ongoing monitoring of the relevant input factors. In practice, the fact of change in one or more of these factors is a "given;" constant attention of the degree and the importance of the effects is required.

CFA
21-12.

A. The investment process itself is common to all managers everywhere. Systematic exploitation of this underlying reality is as readily accomplished at a one-manager shop in which a hand-held calculator is used as it is by an industry giant employing the latest in real-time, on-line, interactive computer systems. The dynamic is there, and it is useful and fundamental.

The four key steps in the portfolio management process are:

1. Identify and specify the investor's objectives, preferences and constraints in order to develop explicit investment policies.

2. Develop and implement strategies through the choice of optimal combinations of financial and real assets in the marketplace.

3. Monitor market conditions, relative asset values and the investor's circumstances.

4. Make portfolio adjustments as appropriate to reflect significant changes in any or all of the relevant variables.

Portfolio management is a dynamic and continuous process with the four steps repeated again and again.

B.
<u>Objectives</u>

Risk:	While a need exists to protect both the corpus and the income stream against inflation, the Board of Trustees is "conservative" and spending needs are continuous while gift income is quite variable. These circumstances argue for adoption of a non-aggressive, medium-risk policy posture.
Return:	Current income production of adequate proportions is clearly of major importance here, mitigated to some extent by the historical availability of gift supplements to endowment returns. A "spending rule" should be formulated by the Board that takes inflation into account, and policy should state a preference for income over gain without, however, adopting an extreme income orientation.

Constraints

Time Horizon:	The actual horizon is clearly a very long one (perpetual, in concept) but given the nature of the objectives it would be useful if the policy statement spoke of, say, successive 5-year planning horizons with some fairly definite 1-year sub-goals.
Liquidity Needs	Since gifts are important but are quite a variable as well, a 12-18 month liquidity reserve would be appropriate here to provide for spending continuity and possibly emergency needs. The existence of such a reserve might allow the Board to be a bit more aggressive in its asset allocation overall.
Tax Considerations:	Aside from meeting whatever Federal and State reporting requirements may exist, taxes are a very minor matter here and should have no effect on investment policy.
Legal & Regulatory Requirements:	Except for required conformity with the Prudent Man Rule relating to investments, and to any human-rights type regulations that may impact policy, these considerations are minor in this case. The policy statement may wish to give some specific attention to proxy-voting and like matters.
Unique Needs & Circumstances:	The need to satisfy a conservative Board and the wide variations in gift income must be addressed in whatever policy statement is produced. These are easily accommodated, however, and should not disrupt normal investment action.

CFA 21-13.

A. Policy statement. An investment policy statement for the Foote family is as follows: "The Foote account should be invested to achieve maximum after-tax, inflation-adjusted, total return subject to their risk profile. Their substantial ability to tolerate risk is increased by the long time horizon and the absence of any need for liquidity. The tax implications favor focusing on long-term appreciation."

Using the objectives constraints template, relevant policy considerations would include the following:

• Risk tolerance: high	Return objectives: high - maximum
• Time horizon: long	Taxes: important
• Liquidity needs: small	Legal: observance of appropriate law

Justification. The Footes have said they do not expect to use the income or principal of the fund before their retirement, which is at least 30 years in the future. With such a long time horizon, they have a maximum ability to accept uncertainty of returns and should seek the highest return given this high risk tolerance. The return focus should be "total" with an after-tax inflation-adjusted emphasis. The Footes do not need liquidity, and the couple does not have any truly unique limitations that would impose constraints on investment policy.

The interests of the charitable remainder do not conflict with those of the Footes and should not constrain the policy developed above. With significant passage of time or major changes in client circumstances, a policy adjustment might be necessary, but not at this point.

B. The expected versus required returns of the three funds as determined by the security market line are as follows:

	Expected	Required
Fund A	16.5%	17.6%
Fund B	13.0%	12.8%
Fund C	8.0%	8.0%

Determining an appropriate allocation for the Foote family requires considering both the security market line and the policy findings in Part A. The policy statement in Part A found the couple could tolerate high risk and therefore could accept the higher betas of Funds A and B. However, the required returns of the security market line must be determined to make a judgment about the propriety of each fund.

As the table above shows, Fund A is an inefficient portfolio because the expected returns are less than the required returns. Fund B would be a better choice considering only the security market line (SML). If taxes are considered and capital gains remain unrealized, Fund A's after-tax rate of return would be 16.1 percent and Fund B's after-tax rate of return would be 11.8 percent. Taxes widen the return spread between A and B to 4.3 percent and can be used to justify the inclusion of Fund A. Because Fund B has 3 percent of its total 13 percent return from dividends, which are taxed at 40 percent, the after-tax expected return in Fund B drops from 13 percent to 11.8 percent.

A portfolio that uses more than one of the available funds should still have a growth orientation. The use of Fund C can be justified only by diversification or risk reduction and should be minimal given the high risk/high return policy objectives.

C. The $350,000 inheritance is expected to achieve a 12 percent rate of return, or $42,000, from its investment in the small-capitalization portfolio. The improved return from leverage would be the difference between the expected return, 12 percent, and the cost of borrowing, 8 percent, or 4 percent multiplied by the incremental

funds, $150,000, or $6,000. The leverage would improve the total expected return from the portfolio and would, of course, impart additional risk to the portfolio.

The borrowing is appropriate based upon the policy statement in Part A. The fund has no liquidity needs and can accept the volatility implicit in a 1.4 beta because of the long time horizon.

CFA
21-14.

A. A policy statement for the Hope Ministries would read: "The Foundation's assets should be invested in keeping with the special requirements of its Charter and fiduciary laws to produce $90,000 of current income. Because of the perpetual nature of the Foundation, consideration should be given to protecting the value of the fund and the value of the future income stream from the effects of inflation. Moderate risk may be tolerated to achieve these objectives. Only minimal liquidity is required and taxes are of no concern."

Using the objectives and constraints template, the following **justification** would be appropriate:

Return objectives:	$90,000 in current income and appreciation of income and asset value sufficient to offset expected inflation.
Risk tolerance:	Moderate because the time horizon is long and inflation poses a potential threat over time.
Taxes:	Tax exempt.
Legal constraints:	Include the terms of the Charter, which require all income to be distributed and all appreciation, realized or not, to be retained (making a total return approach inappropriate), and the normal requirements of fiduciary law.
Liquidity:	Not a major factor.
Unique factors:	The Charter requirements mentioned above are relatively unique.

B. Fund B and C

A minimum of $90,000 in income must be achieved under any acceptable allocation. Because the Foundation can tolerate moderate risk, Omega could allocate $1,500,000 between Fund B and Fund C. For example, by investing $900,000 of the assets in Fund C, the Foundation receives $72,000 (8% x $900,000) of current income toward the required $90,000 annual income. Investing the remaining $600,000 in Fund B,

which is also an efficient portfolio, produces income of $18,000, (3% x $600,000). This allocation produces the required $90,000 of income and would appreciate at a rate of $60,000 annually (10% x $600,000). Therefore, if Omega expects inflation to exceed 2%, this allocation ($900,000 to Fund C and $600,000 to Fund B) would provide inflation protection up to 4% ($60,000/$1,500,000).

Undesirable Allocations

Allocating the endowment funds between U.S. Treasury bills and Fund C would lower the return and also lower the risk. This approach is not allowed by the question and is not recommended because the Foundation can tolerate a higher level of risk than provided by such an allocation.

Investing the entire amount in U.S. Treasury bills, Fund A or Fund B would not achieve the Foundation's objective of earning $90,000 in annual income.

- Treasury bills would provide only $60,000 (4% x $1,500,000) in annual income.
- Fund A would provide only $15,000 (1% x $1,500,000) in annual income.
- Fund B would provide only $45,000 (3% x $1,500,000) in annual income.

Fund A is an inefficient portfolio because the required return is 17.6% ([RA = 4% + 1.7 (12% - 4%)]) but its expected return is 16.5 percent. Therefore, Omega should avoid allocating funds to this inefficient portfolio.

Investing the entire portfolio in Fund C would provide no inflation protection because all of the income must be distributed for operations.

Chapter 22: Evaluation of Investment Performance

CHAPTER OVERVIEW

This chapter, which is concerned with measuring portfolio performance, is a logical concluding chapter for an investments text. The bottom line of investing for investors is deciding how well their portfolio performed and if they need to make changes.

Chapter 22 covers the composite measures of portfolio performance as well as some of the newer concepts such as performance attribution. Although the composite measures have some problems, these measures are often seen and used in both textbooks and in the popular press, and they are easy to understand.

The chapter begins with a discussion of what is involved in evaluating portfolio performance, including the need to adjust for differential risk and differential time periods, the need for a benchmark, and constraints on portfolio managers. It also considers the difference between the portfolio's performance and the manager's performance.

The dollar-weighted and time-weighted returns measures are described, and the issue of risk is considered. Both beta and R^2 are covered.

Performance benchmarks and performance universes are discussed.

The three well-known risk-adjusted (composite) measures of portfolio performance by Sharpe, Treynor and Jensen are discussed. Each of these is developed and illustrated separately. Mutual fund data are used to show how the measures are computed and evaluated. Additional discussion involves a comparison of the measures to each other, such as how the Sharpe and Treynor measures compare. A newer measure, M2, is also discussed.

Along with the discussion of the measures themselves is related discussion of such issues as how to measure diversification. Also, capital market issues related to Jensen's measure are considered.

Style analysis and performance attribution are examined in adequate detail. Money managers and performance presentations are also considered.

CHAPTER OBJECTIVES

To outline the issues involved in measuring portfolio performance, including the problems that remain.

To develop and illustrate the three composite measures of portfolio performance.

To discuss issues such as benchmarks and style analysis.

MAJOR CHAPTER HEADINGS [Contents]

A Framework for Evaluating And Assessing Portfolio Performance

Performance Measurement Issues

Three Questions to Answer in Measuring Portfolio Performance
[return calculations; risk considerations; performance benchmarks and performance universes; performance universes; performance benchmarks]

Return Calculations

Risk Considerations

Performance Benchmarks and Performance Universes

Performance Universes

Performance Benchmarks

Risk-Adjusted Measures of Performance

The Sharpe Performance Measure
[equation; diagram; example with mutual fund data]

The Treynor Performance Measure
[equation; diagram; example with mutual fund data; comparing the Sharpe and Treynor Measures; measuring diversification]

Jensen's Differential Return Measure
[development of equation; diagram; how to use; significance; a comparison of the three composite measures]

M2
[Modigliani and Modigliani's return adjusted for volatility]

Style Analysis And Performance Attribution

Style Analysis
[what is it; two types]

Performance Attribution
[definition; issues; bogey]

Money Managers And Performance Presentations

[performance presentation standards; GIPS®]

An Overview On Performance Evaluation

POINTS TO NOTE ABOUT CHAPTER 22

Exhibits, Figures, and Tables and Figures

The figures in this chapter are standard figures showing the three measures of composite performance and characteristic lines. They are keyed to discussion in the text in terms of the mutual fund data used, but otherwise there is nothing unique about them. Instructors can easily use comparable figures of their own to illustrate the major points about the composite measures of performance.

Figure 22-1 shows Sharpe's measure of performance for five mutual fund portfolios, with three funds plotting above the CML and two below.

Figure 22-2 shows Treynor's measure of performance for three mutual fund portfolios, with three of these funds plotting above the SML and two below.

Figure 22-3 illustrates Jensen's measure of portfolio performance for three hypothetical funds.

Table 22-1 contains the mutual fund data discussed in the chapter. As such, it is for informational purposes in illustrating the calculations of the composite measures, the measure of diversification, and so forth.

Table 22-2 shows the risk-adjusted measures for the five equity mutual funds used in the analysis of the risk-adjusted measures.

Box Inserts

There are no box inserts for this chapter.

ANSWERS TO END-OF-CHAPTER QUESTIONS

22-1. The framework for evaluating portfolio performance primarily involves an analysis of both the returns and the risk of the portfolio being evaluated and a comparison to a proper benchmark. Other issues include the diversification of the portfolio and an evaluation of the manager as opposed to the portfolio itself.

22-2. It is important to determine if a portfolio manager is following the stated objectives for the portfolio. It is also necessary to analyze any constraints imposed on a portfolio manager. If a portfolio outperforms its expected benchmark, such results may be attributable to the manager. If the portfolio manager ceases to manage this portfolio, potential investors will want to be aware of this fact.

22-3. The three composite measures use either standard deviation (from the CML) or beta (from the SML) as a risk measure. It is easy to see how Jensen's measure is directly related to the CAPM. There is a derivable relationship between Jensen's measure and Treynor's measure, thereby connecting Treynor's measure to the CAPM. Finally, Sharpe's measure can be related to capital market theory.

22-4. The Sharpe measure takes into account how well diversified the portfolio was during the measurement period. Any difference in rankings between the two measures should reflect the lack of diversification in the portfolio. With perfect diversification, the two measures produce identical rankings.

22-5. Regressing a portfolio's returns against the market's returns for some period of time results in a **characteristic line** for the portfolio. Such a line shows the linear relationship between the fund's returns and the market's returns; that is, it shows how well the former is explained by the latter.

22-6. Portfolio diversification can be measured by the **coefficient of determination (R^2)**, which is produced when a characteristic line is fitted. If the fund is totally diversified, the R^2 will approach 1.0, indicating that the fund's returns are completely explained by the market's returns. On average, mutual funds have high degrees of diversification (i.e., an R^2 of .85 or .90, or higher).

22-7. An index fund covering a broad array of stocks should show complete diversification.

22-8. Investors who have all (or substantially all) of their assets in a portfolio of securities should rely more on the Sharpe measure because total risk is important.

For investors whose portfolio constitutes only one part of their total assets, systematic risk is the relevant risk and the Treynor measure would be appropriate.

22-9. Start with the CAPM equation, using a portfolio subscript p. If investor's expectations are, on average, fulfilled, the equation can be approximated ex post as:

$$R_{pt} = RF_t + \beta_p[R_{mt}-RF_t] + E_{pt} \quad \textbf{(22-5)}$$

Rearranging,

$$R_{pt} - RF_t = \beta_p[R_{mt}-RF_t] + E_{pt} \quad \textbf{(22-6)}$$

Finally, an intercept term, alpha, can be added to 22-6 to identify superior or inferior portfolio performance.

22-10. The Jensen measure is computationally efficient because the beta for the portfolio is estimated simultaneously with the alpha, or performance measure.

22-11. The alpha must be statistically significant to be meaningful. If it is not significantly different from zero, it doesn't mean much, whether positive or negative.

22-12. Roll has argued that no unambiguous test of the CAPM has yet been conducted. Since the composite performance measures are based on the CAPM (or capital market theory), they are also called into question.

22-13. The use of different market indices can result in different betas for a portfolio. This, in turn, could lead to different rankings for a portfolio; that is, if a "wrong" market index was used, a portfolio could rank lower than it otherwise would.

22-14. In theory, the proper market index to use would be the "true" market portfolio--the portfolio of all risky assets, both financial and real, in their proper proportions. Such a portfolio is completely diversified.

22-15. The steeper the angle, the higher the slope of the line, and the better the performance. A portfolio with a line steeper than that of the market has outperformed the market.

22-16. No. Sharpe and Jensen use different measures of risk, and different procedures; therefore, different rankings of performance can be obtained.

CFA
22-17. b

CFA
22-18. b

ANSWERS TO END-OF-CHAPTER PROBLEMS

22-1. (a) Fund 1. It has the highest R^2.

(b) Standard deviations are needed to answer this question.

(c) Fund 4 has the lowest market risk, and fund 5 is the highest.

(d) Funds 2 and 5 are the only funds with alphas that are positive and statistically different from zero.

22-2. (a) The vertical axis is $E(R_p)$ - RF

The horizontal axis is $E(R_M)$ - RF

(b) A, the fund with the steeper slope

(c) B, the fund with the higher intercept

(d) The fund with the higher positive alpha because both are statistically significant.

22-3. Using the data as given in the problem, the results are as follows:

	Market Return	RF	Portfolio 1	Portfolio 2
Mean	8.0	7.6	10.3	9.9
SD	13.3	-	15.8	17.12
Beta	1.0	-	1.15	1.24
R^2	1.0	-	0.93	0.93
RVAR	0.03	-	0.17	0.13
RVOL	0.40	-	2.35	1.85
Alpha	0.00	-	2.24	1.80

Based on these results, the answers are as follows:

(a) portfolio 1 ranks higher

(b) portfolio 1 ranks higher

(c) portfolio 1 has the higher alpha

(d) since the R^2 is the same for each, nonsystematic risk is a tie

(e) portfolio 2 has the larger beta

(f) portfolio 2 has the larger standard deviation

(g) portfolio 1 has the larger mean return

(h) portfolio 1 has a larger mean return but a smaller SD and beta compared to portfolio 2. The result is a larger RVAR and RVOL.

22-4. (a) portfolio 3 has the widest range of returns and the largest beta

(b) portfolio 3 for the same reason

(c) portfolio 1's returns are closest to the market, and therefore best explained by the market

(d) there is no way to be certain without doing the calculations

(e) the results using the data as given are as follows:

	Market Return	RF	Portfolio 1	Portfolio 2	Portfolio 3
Mean	12.33	7.17	16.33	17.15	15.17
SD	12.36	-	12.63	13.55	18.5
Beta	1.0	-	1.00	1.06	1.35
R2	1.0	-	0.96	0.94	0.81
RVAR	0.42	-	0.73	0.76	0.43
RVOL	5.17	-	9.17	9.73	5.93
Alpha	0.00	-	4.00	4.84	1.03

Based on this analysis, the portfolios rank as follows:

on RVAR: 2, 1, 3
on RVOL: 2, 1, 3

(f) on R^2, the portfolios rank 1, 2, 3

(g) portfolio 2 had the largest alpha

(h) portfolio 2 is the clear winner using composite measures

22-5. (a) portfolio 1 has returns identical to the market and a beta of 1.0

(b) portfolio 2 has returns exactly twice those of the market, and a beta of 2.0

(c) the R^2 is going to be 1.0 in each case because the market returns will explain each portfolio's returns perfectly

(d) the market has an alpha of zero, so portfolio 1 does also

(e) it would have to be identical since the returns are the same

CFA
22-6. a

CFA
22-7. d

CFA
22-8. a

CFA
22-9. c

CFA
22-10. **A.** The Treynor measure (T) relates the rate of return earned above the risk-free rate to the portfolio beta during the period under consideration. Therefore, the Treynor measure shows the risk premium (excess return) earned per unit of systematic risk:

$$Ti = \frac{R_i - R_f}{\beta_i},$$

where

R_i = average rate of return for portfolio i during the specified period,

R_f = average rate of return on a risk-free investment during the specified period, and

β_i = beta of portfolio i during the specified period.

Treynor Measure	Performance Relative to the Market (S&P 500)
$T = \frac{10\%-6\%}{0.60} = 6.7\%$	Outperformed
Market (S&P 500)	
$T_M = \frac{12\%-6\%}{1.00} = 6.0\%$	

T examines portfolio performance in relation to the security market line (SML). Because the portfolio would plot above the SML, it outperformed the S&P 500 Index. Because T was greater than T_M, 6.7 percent versus 6.0 percent, respectively, the portfolio clearly outperformed the market index.

The Sharpe measure (S) relates the rate of return earned above the risk free rate to the total risk of a portfolio by including the standard deviation of returns. Therefore, the Sharpe measure indicates the risk premium (excess return) per unit of total risk:

$$Si = \frac{R_i - R_f}{\sigma_i},$$

R_i = average rate of return for portfolio i during the specified period,

R_f = average rate of return on a risk-free investment during the specified period, and

σ_i = standard deviation of the rate of return for portfolio i during the period.

Sharpe Measure	Performance Relative to the Market (S&P 500)
$S = \frac{10\%-6\%}{18\%} = 0.222$	Underperformed

Market (S&P 500)

$$S_M = \frac{12\%-6\%}{13\%} = 0.462$$

The Sharpe measure uses total risk to compare portfolios with the capital market line (CML). The portfolio would plot below the CML, indicating that it under-performed the market. Because S was less than SM, 0.222 versus 0.462, respectively, the portfolio under-performed the market.

B. The Treynor measure assumes that the appropriate risk measure for a portfolio is its systematic risk, or beta. Hence, the Treynor measure implicitly assumes that the portfolio being measured is fully diversified. The Sharpe measure is similar to the Treynor measure except that the excess return on a portfolio is divided by the standard deviation of the portfolio.

For perfectly diversified portfolios (that is, those without any unsystematic or specific risk), the Treynor and Sharpe measures would give consistent results relative to the

market index because the total variance of the portfolio would be the same as its systematic variance (beta). A poorly diversified portfolio could show better performance relative to the market if the Treynor measure is used but lower performance relative to the market if the Sharpe measure is used. Any difference between the two measures relative to the markets would come directly from a difference in diversification.

In particular, Portfolio X outperformed the market if measured by the Treynor measure but did not perform as well as the market using the Sharpe measure. The reason is that Portfolio X has a large amount of unsystematic risk. Such risk is not a factor in determining the value of the Treynor measure for the portfolio, because the Treynor measure considers only systematic risk. The Sharpe measure, however, considers total risk (that is, both systematic and unsystematic risk). Portfolio X, which has a low amount of systematic risk, could have a high amount of total risk, because of its lack of diversification. Hence, Portfolio X would have a high Treynor measure (because of low systematic risk) and a low Sharpe measure (because of high total risk).

COMPUTATIONAL PROBLEMS

22-1. (a) The RVAR are:

Fund	Rank	
1	(14-6)/21 = .38	fourth
2	(16-6)/21 = .48	second
3	(26-6)/30 = .67	first
4	(17-6)/25 = .44	third
5	(10-6)/18 = .22	fifth
Market	(12-6)/20 = .30	

(b) The RVOL are:

Fund	Rank	
1	(14-6)/1.15 = 6.96	fifth
2	(16-6)/1.10 = 9.09	third
3	(26-6)/1.30 = 15.38	first
4	(17-6)/ .90 = 12.22	second
5	(10-6)/ .45 = 8.89	fourth
Market	(12-6)/1.00 = 6.00	

(c) Yes, there are differences. Note that the numerator values for the RVAR are exactly the same as for the RVOL. The differences arise from the differences in risk as measured by the SD and the beta. The difference in rankings is caused by the degree of diversification.

(d) For the RVAR, only Fund 5 failed to outperform the market. For the RVOL, all of the funds outperformed the market.

22-2. (a) The RVAR are:

Fund			Rank
A	(17.0-8.6)/20.0 =	.42	(5)
B	(19.0-8.6)/17.8 =	.584	(1) high
C	(12.3-8.6)/25.0 =	.15	(7)
D	(20.0-8.6)/24.5 =	.47	(4)
E	(15.0-8.6)/17.4 =	.37	(6)
F	(19.0-8.6)/18.0 =	.578	(2)
G	(8.6-8.6)/19.0 =	0.0	(8) low
H	(20.0-8.6)/21.5 =	.53	(3)
Market	(11.0-8.6)/20.5 =	.117	

(For some of the funds, the RVAR are shown to an additional number of decimal places in order to eliminate ties).

(b) The RVOL are:

Fund			Rank
A	(17.0-8.6)/ .88 =	9.545	(5)
B	(19.0-8.6)/ .65 =	16.000	(1) high
C	(12.3-8.6)/ .83 =	4.478	(7)*
D	(20.0-8.6)/1.00 =	11.400	(4)
E	(15.0-8.6)/ .79 =	8.101	(6)
F	(19.0-8.6)/ .83 =	12.530	(2)
G	(8.6-8.6)/ .91 =	0.0	(8) low
H	(20.0-8.6)/ .93 =	12.258	(3)
Market	(11.0-8.6)/1.00 =	2.40	

(* = ranking by RVOL different from that of RVAR)

(c) The highest R^2 (the greatest diversification) is for Fund G, the lowest is for Fund C. Except for Funds B and C, it appears that the funds are highly diversified.

(d) Funds F and H have positive alphas (and positive t values greater than 2.365), and therefore have above average performance.

(e)

	betas			alphas		
	excess	original	excess - orig.	excess	original	excess - orig.
A	.87	.88	-.01	6.57	7.53	- .96
B	.61	.65	-.04	8.81	11.70	-2.89
C	.86	.83	+.03	1.58	7.53	-1.54
D	1.03	1.00	+.03	8.98	3.12	- .02
E	.81	.79	+.02	4.34	6.15	-1.81
F	.83	.83	0.0	8.69	10.11	-1.42
G	.92	.91	+.01	-2.22	-1.37	- .85
H	.95	.93	+.02	8.88	9.52	- .64

Using the [excess-original] beta differences, two betas are less, one unchanged, and five are larger. No generalization about larger or smaller betas is possible because it depends on the relative covariance of RF with the market return and the covariance of RF with the portfolio return. Therefore, the betas using excess returns may be greater or smaller than the betas with the original returns.

With the alpha differences [excess-original], all are negative, but the magnitudes vary widely. This is somewhat illusory, because no beta is greater than unity. If we had used a constant for RF (the average RF for the period) then the betas above would have not been equal to the excess betas, and:

$$\text{excess alpha} = [RF(\beta - 1) + \text{original alpha}]$$

So, for portfolios with betas less than unity, the excess alpha is smaller; and for portfolios with betas greater than unity, the excess alpha is larger.

