

UNIT 19

Types of Investment Risks

LEARNING OBJECTIVES

When you have completed this unit, you will be able to accomplish the following.

- » LO 19.a **Identify** the different systematic risks.
- » LO 19.b **Identify** the different unsystematic risks.
- » LO 19.c **Identify** opportunity cost.
- » LO 19.d **Recall** the sequence of priority of claims in the event of a corporate liquidation.

Your exam will include approximately six questions from the topics covered in Unit 19.

INTRODUCTION

The concepts discussed in this unit are types of risk that both businesses and investors bear. Though not a comprehensive list, they are among the most common. Although we routinely use the term *risk*, we often have difficulty defining it precisely. In finance, *risk* is defined as the uncertainty that an investment will earn its expected rate of return. There are two basic categories of risk—systematic and unsystematic. We will address both of them and their subcategories one at a time.

LESSON 19.1: INVESTMENTS ARE NOT WITHOUT RISK

LO 19.a Identify the different systematic risks.

Systematic risk is the risk in the return of an investment that is associated with the macroeconomic factors that affect all risky assets. Stated another way, systematic risk is the risk that changes in the overall economy will have an adverse effect on individual securities regardless of the company's circumstances. It is generally caused by factors that affect all businesses, such as war, global security threats, or inflation. Primary examples would include market risk, interest

rate risk, and purchasing power risk, each of which will be dealt with separately. You might also see this referred to as nondiversifiable risk because, as we'll learn, systematic risk cannot be avoided through diversification.

Market Risk

The first example of systematic risk that generally comes to mind is market risk. When the market tanks, virtually all securities lose value. This is a classic example of a nondiversifiable risk because, regardless of the number of different stocks in your portfolio, when you encounter a stock market such as we had in the first half of 2022 (reported by the Wall Street Journal as the worst performance for the S&P 500 since 1970), chances are most of those assets will have declined in price. In the next unit, we will discuss *correlation*. One way to protect against market risk is to have some negatively correlated securities in your portfolio. Those tend to go up when the others go down.



TAKE NOTE

Market risk is measured by a security's beta (coming up in Lesson 20.4).



EXAMPLE

Should a war break out between two major oil-producing countries, the stock market could decline dramatically. The stocks of individual companies would likely decline as well, regardless of whether the war directly affected their businesses.



TAKE NOTE

Market risk cannot be diversified away. In Unit 21, we will discuss several strategies that might be used to protect portfolios against this risk.

Interest Rate Risk

Interest rates fluctuate in the market all the time. If market conditions or the Federal Reserve push interest rates higher, the market price of fixed-income securities (bonds and preferred stock) will be affected. When interest rates rise, the market price of bonds falls; that is why this is a systematic risk. This risk is sometimes referred to as the market risk for bonds. Rising interest rates can be bearish for some common stock prices as well, particularly those of highly leveraged companies such as public utilities. Having a diversified portfolio of bonds won't help, because an increase in interest rates will cause all bonds to decline in price. In Unit 21, we'll discuss three strategies that may be used to reduce interest rate risk.



TAKE NOTE

Interest rate risk is intrinsic to all types of fixed-income investments, such as debt securities and preferred stock, whether from an emerging market issuer or a triple-A issuer. It is the risk that a security's value will fluctuate as a result of a change in market interest rates. This is known as the inverse relationship between interest rates and the market price of a fixed-income security. That is, when interest rates move in one direction, the price of those securities moves in the opposite direction. Specifically, when interest rates increase, the market price of fixed-income securities declines. And, when interest rates decline, the market price of fixed-income securities increases.



EXAMPLE

If the Federal Reserve increases interest rates dramatically, the market price of all bonds, regardless of credit quality, will decline.

Reinvestment Risk

A variation of interest rate risk is reinvestment risk. There is reinvestment risk as to interest and reinvestment risk as to principal.

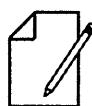
An investor receiving a periodic cash flow from an investment, such as interest on a debt security, may be unable to reinvest the income at the same rate as the security itself is paying. For example, if an investor purchased a bond with a 10% coupon and several years later comparable securities were only paying 7%, the investor would not be able to compound the investment at the original rate. Zero-coupon bonds avoid this risk because there is nothing to reinvest.

This risk also occurs at maturity. If the fixed-income investor was enjoying a 10% return on the above bond, when it matured, the investor would only be able to reinvest the principal in a 7% security. That is one of the advantages of purchasing bonds with a longer term to maturity—you're assured the fixed return for that length.

Inflation Risk (Purchasing Power Risk)

This is another systematic risk. Inflation reduces the buying power of a dollar (or whatever currency is used where you live). A modest amount of inflation is inherent in a healthy, growing economy, but uncontrolled inflation causes uncertainty among individual investors as well as corporate managers attempting to evaluate potential returns from projects. Treasury Inflation Protection Securities (TIPS) are one investment vehicle designed to protect against inflation risk.

Fixed-income securities, such as bonds and preferred stock, are the most vulnerable to this risk; common stock is historically the least susceptible. In Unit 5 of this course, we learned that tangible assets, such as real estate and precious metals like gold, are also good inflation hedges.



EXAMPLE

As we stated, purchasing power risk is a systematic risk, meaning that diversifying your portfolio is of little or no help. Let's assume that an individual nearing retirement took \$1 million and, seeking income with safety, invested \$100,000 into each of 10 different corporate bonds, all maturing in 20 years. For sure, this diversification does give protection against financial risk (if one of the bonds defaults due to bankruptcy of the issuer, the other nine should still pay off). However, if the cost of living rises, 20 years from now, when each of those bonds pays back the \$100,000 principal, the investor will have \$1 million, but how much will that \$1 million purchase compared to what it would have 20 years earlier?

Exchange Rate or Currency Risk

Purchasers of foreign securities, whether through direct ownership or ADRs, face the uncertainty that the value of either the foreign currency or the domestic currency will fluctuate. For example, let's say that the British pound (£) is up about 5% against the U.S. dollar in the past 12 months. As a result, someone who invested one year ago in the stock of a company domiciled in Great Britain will find that even if the stock has remained level or slightly lower on its local market, in terms of dollars, the value has increased. On the other hand, if your funds are in domestic cash or cash equivalents, you have little if any exposure to currency or exchange rate risk.



TEST TOPIC ALERT

On an individual level, the exam may even ask you about exchange rates and vacationers. For example, you take a trip to Country A and purchase a dinner on your credit card for 200 units of the local currency. Then, on the final night of your stay, you go to the same restaurant, order the same meal, and, once again, the bill is for 200 units. When you get home, you check your credit card statement and see that you were billed \$100 for the first meal and \$110 for the second. What happened? The value of the foreign currency rose against the U.S. dollar from \$.50 ($\$100/200$) to \$.55 ($\$110/200$). Even though no prices changed in the foreign country, you encountered currency risk.

LO 19.b Identify the different unsystematic risks.

Unlike systematic risk, which is nondiversifiable, unsystematic risks can be reduced through diversification. They are risks that are unique to the specific industry or business enterprise and would include things such as labor union strikes, lawsuits, and product failure. These are sometimes called nonsystematic risks. We will cover the most testable examples below.



TAKE NOTE

Several of these risks were covered in LO 5.g. You might want to review them.

Business Risk

This is an operating risk, generally caused by poor management decisions (e.g., Edsel, New Coke, or, more recently, RIMM failing to pay attention to the success of the iPhone—remember when everybody had to have a BlackBerry?). At best, earnings are lowered; at worst, the company goes out of business and common stockholders probably lose their entire investment.

Financial Risk

Often confused with business risk (it is similar), financial risk relates primarily to those companies that use debt financing (leverage). An inability to meet those debt obligations could lead to bankruptcy and, once again, total loss for the stockholders. For that reason, this is sometimes called **credit risk** or **default risk**.

TEST TOPIC ALERT

Unsystematic risk can be minimized through portfolio diversification. For example, a client long 1,000 shares of XYZ selling those shares and investing the proceeds into an S&P index fund eliminates (or greatly reduces) business risk (but not market risk). In similar fashion, owning a diversified portfolio of bonds, such as is offered in a bond fund, offers protection against financial risk.

TEST TOPIC ALERT

Business risk is highest for investors whose portfolios contain stock in only one issuer or in lower rated bonds.

Regulatory Risk

A sudden change in the regulatory climate can have a dramatic effect on the performance or risk of a business and entire business sectors. Overreaching bureaucrats and court judgments that change the rules a business must comply with can devastate individual companies and industries almost overnight. A very common example of this is rulings by the EPA (Environmental Protection Agency), which can sometime play havoc with the oil and gas industry.

Legislative Risk

It is common to lump together regulatory and legislative risk, but there is a difference. Whereas regulatory risk comes from a change in regulations, legislative risk results from a change in the law. And, because there is frequently a political agenda behind legislation, this risk is sometimes referred to as political risk, although most consider political risk to be of its own making. A governmental agency, state or federal, may pass certain regulations, but only a legislature can pass a law. Changes to the tax code are the most obvious legislative risks.

Political Risk

It might seem like we are splitting hairs here, but each of these, although potentially interrelated, does have a different basis in the source of the risk. In the case of political risk, most attribute this to potential instability in the political underpinnings of the country (think of a coup). This is particularly true in emerging economies, but, as history has shown, political insurrections can occur even in highly developed societies. Please note that many (but not the folks who author the exam questions) consider this to be a systematic risk.

Sovereign Risk

Sovereign risk ratings capture the risk of a country defaulting on its commercial debt obligations. Headlines were made several years ago when the credit rating of the United States was reduced from AAA (at the time of this printing, the United States was back up to AAA). That is an example of the perceived increased sovereign risk that existed at the time. More recent examples with Greece point out that even countries can have difficulty paying their obligations.

Country Risk

Country risk monitors the political and economic stability of countries. Country risk is the total risk of investing in the obligations of that country and includes political, financial, and sovereign risk.

EXAMPLE



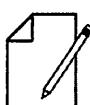
Investments that could be affected by regulatory changes include so-called green industries (and those that tend to pollute), oil and gas exploration, airlines, and pharmaceutical manufacturers. The most common regulatory risk comes from governmental agency attempts to control or influence product prices or the competitive structure of a particular industry through the passage and enforcement of regulations.

EXAMPLE



An example of legislative risk is how the domestic boat-building business in the United States was nearly wiped out in the early 1990s after the government instituted a luxury tax for yacht purchases.

EXAMPLE

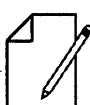


An example of political risk was the actions of the Chavez government in Venezuela several years ago, where nationalization took place in many industries from cement to supermarkets. Those investors in what were previously privately owned (not government) businesses saw much, if not all, of their investment lost.

Liquidity Risk

Liquidity measures the speed or ease of converting an investment into cash without causing a price disruption. **Liquidity risk** is the risk that when an investor wishes to dispose of an investment, no one will be willing to buy it, or that a very large purchase or sale would not be possible at the current price. Although there is technically a difference, for exam purposes, you may also refer to this as **marketability risk**.

EXAMPLE



The Treasury bill market is a highly liquid market because investors can sell a Treasury bill within seconds at the quoted prices. Real estate investments, however, can take months or years to sell if you want to get close to your asking price. The longer it takes to convert an investment into cash without having a fire sale, the greater the liquidity risk.

TAKE NOTE



Listed stocks and mutual funds have virtually no liquidity risk. Thinly traded stocks, many municipal bonds, and most tangible assets have a greater degree of inability to liquidate rapidly at your price.

LO 19.c Identify opportunity cost.

Opportunity Cost

Opportunity cost is the foregone return, or the return given up, on an alternative investment. In economic terms, opportunity cost is defined as the highest valued alternative that must be sacrificed as a result of choosing among alternatives. More simply, one can invest in short-term Treasury bills incurring virtually no risk. That is the risk-free alternative that can be earned by basically doing nothing. Any return that deviates from the risk-free return represents your opportunity gained or lost.



EXAMPLE

Assume the 91-day Treasury bill is currently yielding 6%. An investor decides to purchase a stock with an expected return of 11%. If that stock actually returns 2%, the opportunity cost is 4% ($6\% - 2\%$) because that is the rate that the investor gave up, risk free, to assume the risk of investing in the alternative choice.



TEST TOPIC ALERT

You should know that the primary systematic risks are the following, represented by the mnemonic **PRIME**:

- Purchasing power (inflation)
- Reinvestment
- Interest rate
- Market
- Exchange rate (currency)

Also, there are six primary unsystematic risks:

- Business
- Financial (credit/default)
- Legislative
- Liquidity (marketability)
- Political
- Regulatory



PRACTICE QUESTION

All of the following risks are considered diversifiable **except**

- A. default risk.
- B. liquidity risk.
- C. purchasing power risk.
- D. sovereign risk.

Answer: C. Purchasing power risk, also known as inflation risk, is a systematic risk and, as such, is one that cannot generally be lessened through diversification.



KNOWLEDGE CHECK 19.1

1. Of the many different types of risk faced by investors in securities, the systematic risk that first comes to mind for most is
 - A. inflation risk.
 - B. interest rate risk.
 - C. market risk.
 - D. purchasing power risk.
2. If a sovereign government enacted legislation that prohibited the sale of a certain product, companies who manufacture that product would likely see the price of their stock drop. This is an example of
 - A. business risk.
 - B. credit risk.
 - C. legislative risk.
 - D. sovereign risk.
3. When an investor is faced with several choices, each with different levels of risk, the decision as to which to purchase opens the investor to
 - A. behavioral modification.
 - B. call risk.
 - C. decision risk.
 - D. opportunity cost.

LESSON 19.2: LIQUIDATION PRIORITY

LO 19.d Recall the sequence of priority of claims in the event of a corporate liquidation.

Liquidation Priority

As discussed previously in Unit 7, a corporation's capital structure is the way it raises its capital. Think of it like the building blocks of the company. All corporations build the base, as it were, with common stock. They may or may not issue preferred stock. If they wish to employ leverage, they will borrow money by issuing debt securities. Those securities may be issued with collateral, such as a mortgage bond, or merely on the general credit of the issuer (a debenture). In terms of looking at risks, it is critical to understand where the investor's position is in the event of a bankruptcy.

When examining the capital structure of a corporation, it is important to know the liquidation priority:

- Secured creditors (e.g., mortgage bonds, equipment trust certificates, collateral trust bonds). These may be called senior debt or even senior notes on the exam.
- Unsecured creditors (e.g., general creditors, including debenture holders)
- Subordinated debt holders
- Preferred stockholders
- Common stockholders

Regardless of how low on the totem pole a debt security is, such as a subordinated debenture, it still has priority in terms of payment of interest and principal ahead of any equity security. Look for a question asking, in essence, "In the event of a corporate liquidation, who comes first: A senior prior lien preferred stock or a junior unsecured subordinated debenture?" Now, you may not see all of those adjectives, but no matter what, a debt security always has priority over an equity security.



TEST TOPIC ALERT

If an exam question includes taxes and wages, those would have the highest priority of the unsecured creditors but would be behind those who are secured.



KNOWLEDGE CHECK 19.2

1. Which of the following securities is considered the most senior?
 - A. Common stock
 - B. Senior lien prior preferred stock
 - C. Subordinated debenture
 - D. Treasury stock
2. Due to unfavorable business conditions, a corporation whose common and preferred stock are traded on the New York Stock Exchange is forced to seek protection from its creditors. Who of the following is most likely to receive back the largest portion of their investment in the company's securities?
 - A. Holders of bonds collateralized by a mortgage on the company's real property
 - B. Holders of the largest block of stock in the company
 - C. Senior management of the company
 - D. The bankruptcy lawyers



KNOWLEDGE CHECK ANSWERS

Knowledge Check 19.1

1. **C** Although all of these are examples of systematic risk, it is market risk that stands out in the minds of most investors.
LO 19.a
2. **C** There are actually times on the exam where the question tells you the answer. That is the case here. Legislation that has an adverse effect on an investment is, obviously, legislative risk. Oftentimes, students don't believe a question like that could possibly be on the exam and they select something else (and miss the question). What's wrong with sovereign risk? That is the risk that the government will falter on its obligations and has nothing to do with the discussion here.
LO 19.b
3. **D** Opportunity cost—in reality, opportunity risk—arises when an investor forgoes one investment in favor of the other. If the investment with the higher risk is selected but does not outperform the one with lower risk, the investor has lost the opportunity to receive a greater return with less risk. In many cases, opportunity cost compares the “risky” investment to the risk-free investment (the 91-day or 13-week U.S. Treasury bill). Having just finished a previous question where a key word in the question was the answer, you might have thought that decision risk was a “gimmie.” However, that is simply a made-up term.
LO 19.c

Knowledge Check 19.2

1. **C** Regardless of how many adjectives are in front of the preferred stock, equities are always junior to debt. This is true even when the debt is a subordinated debenture. This debt is subordinate (comes behind) all other debt of the issuer, but, as a debt, it comes ahead of any equity security. Treasury stock is not issued by the U.S. Treasury (you cannot buy stock in America, regardless of what the ads for savings bonds say).
LO 19.d
2. **A** Seeking protection from creditors is a nice way to say “filing for bankruptcy.” Sure, the lawyers will get their money, but they aren’t investors in the company, so they don’t count in this question. Holders of secured debt, such as a mortgage bond, are in the senior position and generally will receive a return of a substantial portion (if not all) of their investment.
LO 19.d

UNIT 20

Analytical Methods

LEARNING OBJECTIVES

When you have completed this unit, you will be able to accomplish the following.

- › LO 20.a **Describe** the different time value concepts, including use of the rule of 72 to determine the return on an investment.
- › LO 20.b **Evaluate** the effect of a bond's duration on its market price.
- › LO 20.c **Describe** how discounted cash flow is used to estimate the value of an investment.
- › LO 20.d **Select** the proper measure of central tendency when presented with a set of variables.
- › LO 20.e **Identify** alpha and beta.
- › LO 20.f **Recall** how standard deviation relates to volatility.
- › LO 20.g **Recognize** the relationship between correlation and diversification.
- › LO 20.h **Calculate** liquidity and valuation ratios of common stock.

Your exam will include approximately seven questions from the topics covered in Unit 20.

INTRODUCTION

Analytical methods primarily involve mathematical concepts in an attempt to assist in making better investment decisions. Because the testing center only permits the use of a simple four-function calculator, any computations you will be asked to perform will be relatively straightforward. In general, it will be more important to understand the concept than do the computation.

LESSON 20.1: TIME VALUE OF MONEY

LO 20.a Describe the different time value concepts including use of the rule of 72 to determine the return on an investment.

There is no question that investing is a numbers business. In Unit 7, we discussed financial statements as a tool for evaluating a company, and those are almost entirely number oriented. In this unit, we'll go further by looking at both the overall market and examine some of the tools that quantitative analysts (known as "quants" in the industry) use to assist them in making investment decisions. The first place to start is understanding that "time is money."

Time Value of Money

We've all heard the famous saying, "time is money." The concept certainly applies to investments. For example, if a person promises to pay a certain sum 10 years from now, what is it worth to have the money today so that the investor will have use of it over the next 10 years instead of having to wait? If the investor could earn 10% on the money, compounded annually, having about \$38.55 today would be equivalent in value to receiving \$100 in 10 years. That is known as the *present value* of a future sum. The second view of time value relates to computing the amount necessary to be invested today, using an assumed rate of return, so that it will have a defined amount in the future. Using the above case, if the investor were to invest \$38.55 today and earn 10% compounded annually, he would have \$100 in 10 years. We call that the *future value* computation.



TAKE NOTE

Although this can be proven in less than 10 seconds using a financial calculator, you may have to do a compound return computation on the exam but won't have the benefit of such a fancy tool. Using the basic four-function calculator issued at the testing center, you would take the initial \$38.55 and multiply that by 110% and continue to do that for a total of 10 times. We'll just get you started to show you what it looks like:

$38.55 \times 110\% = 42.405 \times 110\% = 46.6455 \times 110\% = 51.31$ and so forth, seven more times, will get to you approximately 100.00. This is the same concept we will show you with the TIPS bond in Unit 22.

Future Value

Future value is the formal term that indicates what an amount invested today at a given rate will be worth at some period in the future. The future value of a dollar invested today depends on the:

- rate of return it earns (r); and
- number of years over which it is invested (n).

The equation to calculate the FV of an investment is expressed as:

$$FV = PV \times (1 + r)^n$$



EXAMPLE

In these two examples, we will demonstrate how these values are calculated. However, you will **not** be required to know the formula or how to do these computations.

Assuming we invest \$11,348.54 today and expect to earn 12% compounded annually for five years, what will it be worth then? Its future value is calculated using the above formula as follows:

$$FV = \$11,348.54 \text{ (the PV)} \times 1.125 = \$20,000$$

The future value expressed here reflects a **compound rate of return** on the original \$11,348.54 invested. The compound return assumes that the interest earned (12% in this case) in a given period (five years) is reinvested at the identical rate for the number of years in which it is invested.



TAKE NOTE

To find PV, you must already know the FV.

To find FV, you must already know the PV.

Present Value

Present value is the formal term for value today of the future cash flows of an investment discounted at a specified interest rate to determine the present worth of those future cash flows.

Intuitively, investors recognize that a dollar in hand is worth more than a dollar in the future. The difference between the value today and sometime in the future is a function of the time elapsed and the rate of interest earned.

The formula used to calculate present value is as follows:

$$PV = FV \div (1 + r)^n$$

In the formula above, **PV** stands for the present value, **FV** stands for the future value, **r** is the interest rate, and **n** is the number of time periods the money is compounded.

This formula says that the present value (PV) of an investment equals the investment's future value (FV) discounted at (divided by) an interest rate over a time period specified by **n**. The factor $(1 + r)^n$ is known as the **discount factor**.



EXAMPLE

What is the present value of \$20,000 that will be received 5 years (**n**) from today? If the investor requires a 12% return (**r**) for the \$20,000, the value of that \$20,000 today (PV) to be received in 5 years is calculated as follows:

$$PV = \frac{FV}{(1 + r)^n} = \frac{\$20,000}{(1 + .12)^5} = \frac{\$20,000}{1.7623416} = (\$11,348.54)$$

The \$20,000 to be received in 5 years discounted by the required 12% interest rate is worth \$11,348.54 today. As stated with future value, you will **not** have to know this formula or perform this calculation. You will be expected to understand the concept of the time value of money.

TEST TOPIC ALERT

When computing present value (or future value), we are using an estimated rate of return. What happens if the actual return is different from the estimated? If our actual return is less, we don't make out as well. That means that the present value (the required initial deposit) is going to be higher than we computed. On the other hand, if the actual return was higher than the present value (we did better than we thought), the present value (the amount we would have had to deposit) is less.

The same logic holds true for future value. If the actual return is higher than projected, the future value will be higher (we made more on our money than we thought we would). Logically, if the actual return is lower, our future value winds up lower.

PRACTICE QUESTION

Present value is a computation that is frequently used to determine the amount of a deposit needed now to meet a future need, such as college education. If an investor uses an expected return of 8% but the actual return over the period is 10%, the future value will be

- A. lower than anticipated.
- B. higher than anticipated.
- C. the same as anticipated.
- D. too varying to tell.

Answer: B. Present value is the amount deposited to meet a future goal based on an expected rate of return. If the return is higher than expected, the ending result will be greater (a good thing).

Rule of 72

The rule of 72 is a shortcut method for determining the number of years it takes for an investment to double in value, assuming compounded earnings. To find the number of years for an investment to double, simply divide the number 72 by the interest rate the investment pays. For example, an investment of \$2,000 earning 6% will double in 12 years ($72 \div 6 = 12$).

Here is another example of the rule of 72. A savings account with \$1,000 in it bearing 4% compounded per year in interest would double (i.e., the account would be worth \$2,000) in 18 years: $72 \div 4 = 18$.

**EXAMPLE**

Suppose an investment of \$1,000 was worth \$4,000 in 16 years. Under the rule of 72, what is the compounded earnings rate?

You figure this by realizing that the account has quadrupled—that means it has doubled twice. So, if it took 16 years to double twice, it takes 8 years to double one time. Dividing 72 by 8 tells us that our account must be earning 9%.

The rule of 72 also works in reverse; that is, if you know the number of years you have, you can compute the required earnings rate to double by once again using 72 as the numerator and this time the number of years as the denominator. For example, if you have nine years before your child is going to enter college, what will you have to earn in order for a deposit made today to double? Simply divide 72 by 9, and the result is that an 8% earnings rate will have your money double.



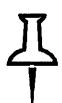
EXAMPLE

An advisory client's oldest child is 8 years old. With an expected college entry at age 18, a need of \$200,000, and a projected earning rate of 7.2%, what is the present value needed to accomplish the client's goal?

Using the rule of 72, we divide 72 by the 10 years before the money is needed (child's age is 8 and college starts at 18) and see that money will double if the earnings rate is 7.2%. That matches the projected rate, so any deposit today (the present value) will double by the time the funds are needed. A deposit of \$100,000 today will be worth \$200,000 in 10 years. Is this a guarantee? Of course not; but using the rule of 72 is a quick and easy way to approximate the funds needed for a future event.

Net Present Value (NPV)

Net present value (NPV) is the difference between an investment's present value and its contemporaneous cost (current market value, or CMV). A positive NPV of \$10 means that an investment selling for \$100 must have a discounted present value (PV) of \$110 for an NPV of \$10. Note that the difference between the CMV (\$100) and the PV of the investment's future returns (\$110) equals the NPV (\$10). If the PV is \$90, there is a negative NPV of \$10 because the price is above the present value.



TAKE NOTE

NPV is expressed in dollar amounts and not as a rate of return.

An investment adviser could use the NPV concept to evaluate a client's investment in any investment vehicle with a projected income stream. The adviser would project the cash flows from the investment and then discount them to their present value at the investor's required rate of return. If the NPV is positive, the investment is a worthwhile addition to the investor's portfolio.



EXAMPLE

This concept is very important on the exam (at least two or three questions worth), so let's try to make it as simple as possible. Don't worry about how we got the following numbers—that won't be tested. What will be tested is understanding what they mean.

Several years ago, the XYZ Corporation issued a bond with a nominal yield (interest rate) of 5% per year. The bond matures in exactly 20 years. As of the date of this example, comparable bonds are being issued with nominal rates of 4%. In this type of computation, the *required* rate of return = the current market rate (which is 4%). Using a financial calculator (which, as stated before, you won't have at the test center), the present value (PV) of this bond (using these assumptions) is \$1,136.78. I hope you are not surprised that this bond's expected value is above the \$1,000. After all, we learned in Unit 2 that when interest rates decline, the price of outstanding bonds increases.

Now, here is where we get to the critical test question: If this bond is currently available from your broker-dealer for \$1,100, what is its NPV? The answer is \$36.78, because NPV is computed by subtracting the market price from the PV (\$1,136.78 - \$1,100). In this case, we have a positive NPV, and that means we're able to buy the bond for less than what it is theoretically worth. If, on the other hand, the bond was available for \$1,150, it would have a NPV of -\$13.22 or a negative NPV and so would not be one you would likely purchase.

Internal Rate of Return (IRR)

The **internal rate of return (IRR)** is the discount rate (r) that makes the future value of an investment equal to its present value. The IRR can be thought of as the r in the present and future value calculations. The IRR is difficult to calculate directly; it must be determined by a trial-and-error process called **iteration**. IRR takes into consideration the time value of money. IRR is not practical for common stock due to uneven cash flow and no maturity date or price.

TAKE NOTE



The IRR calculation can be used to determine whether an investment meets the investor's required rate of return. If an investor requires an investment return of 10% and the IRR for a proposed investment is 12%, the investor will view that investment as attractive because it returns a higher rate than the investor's required rate.

TEST TOPIC ALERT



NPV and IRR are far and away the most difficult mathematical concepts you'll encounter on this exam. These are most important points to remember:

- Internal rate of return (IRR) is the method of computing long-term returns that takes into consideration *time value of money*.
- The yield to maturity of a bond reflects its IRR.
- The investment is a good one if it has a positive NPV; stay away if the NPV is negative.
- NPV is generally considered more important than IRR.
- When an investment's IRR is equal to the discount rate (sometimes called the *required rate of return*), the NPV = zero. In an efficient market (Unit 21), bonds should be priced so that their NPV is zero.
- The quickest way to identify IRR versus NPV is that IRR is always expressed as a percentage, while NPV never is. It is usually shown as a dollar amount. So, one is a "rate" (%), while the other is a "value" (\$).

EXAMPLE



Let's go back to that NPV example to show you how IRR fits in. We established that the required rate of return was one that equaled the market rate of 4%. If the XYZ bond in our question was available from the broker-dealer at a price of \$1,136.78, then its PV and the market would be the same, giving us an NPV of zero. At that price, the bond's yield to maturity and the internal rate of return are equal to the market rate of 4%.

We are going to elaborate further on this in the next lesson, when we show how this is a discounted cash flow (DCF) computation (and you might want to come back here after that).

KNOWLEDGE CHECK 20.1



1. One of your clients recently came into an inheritance. Initially, some of the money was used to pay off credit card debt. Now, with the remainder, this client wants your help in determining how much should be invested today so that funds for college education will be available in 14 years. The most appropriate calculation to assist this client is
 - A. future value.
 - B. internal rate of return.
 - C. net present value.
 - D. present value.

2. A 46-year-old investor has \$100,000 to invest today and would like it to be worth \$400,000 when they retire at age 70. Using the rule of 72, what annual rate of return must the account generate for this goal to be achieved?
 - A. 3%
 - B. 4%
 - C. 6%
 - D. 8%

LESSON 20.2: DURATION AND DISCOUNTED CASH FLOW

LO 20.b Evaluate the effect of a bond's duration on its market price.

In the financial industry, the term *duration* is used to measure the sensitivity of a debt security when faced with changes in interest rates. The longer the duration, the greater the market price movement, and vice versa.

It is a complicated computation, but, to try to simplify things, it is basically a measurement of the time it takes for the cash flow (interest payments) to repay the invested principal. That being the case, in general the higher the coupon rate, the shorter the duration, while the lower the coupon, the longer the duration.

Just remember that there are two components to the computation: the interest rate and the maturity date. If the maturity dates are about the same (the difference between a 20-year maturity and a 22-year one is almost insignificant), then the bond paying the highest coupon rate will always have the shortest duration, and that with the lowest coupon, the longest duration. However, if the coupon rates are approximately the same, then the bond that will mature first will have the shortest duration, and the one that will mature last will have the longest duration.

The way to compute the duration (calculation not tested) is to take the present value of a bond's future cash flows (interest and repayment of principal) weighted by length of time to receipt and divided by the bond's current market value. We're talking about that same "present value" covered in the previous lesson. There, we learned that when a bond's coupon rate was higher than the current market rate, the bond's present value was greater than the face amount, and it should sell at a premium. Here, the effect of that higher present value results in a shorter duration and less market volatility.



TAKE NOTE

One way to keep things straight is to think about the zero-coupon bond. With no periodic interest payments (that's why it's called *zero coupon*), the duration of a zero-coupon bond will always equal its length to maturity. In other words, if we're trying to compute how long it will take for the income payments to return your principal without any interest payments, you can't expect to get your money back until the maturity date. If that is the case with a zero-coupon bond, then as we find bonds paying interest, the more they're paying every six months, the quicker the payback.

TEST TOPIC ALERT

The general characteristics of duration follow.

- The lower the coupon rate, the longer a bond's duration; the higher the coupon rate, the shorter the duration.
- The longer a bond's maturity, the longer the bond's duration.
- For coupon bonds, duration is always less than the bond's maturity.
- Duration for a zero-coupon bond is always equal to its maturity.
- On a percentage basis, the longer a bond's duration, the more its value will change for a 1% change in interest rates; the shorter the duration, the less it will change.

TEST TOPIC ALERT

If you were managing a portfolio of bonds and expected interest rates to decline (bond prices would rise), you would *lengthen* the average duration of the portfolio. On the other hand, if you were of the opinion that interest rates were going to rise (bond prices would decline), you would want to *shorten* the average duration.

You might be asked for the **average duration** of a group of bonds or a bond portfolio. The correct computation is too complicated for the four-function calculator you are given, but you'll get the correct answer if you just find the average of the durations given. For example, the average duration of a portfolio whose individual bonds have durations of 3, 5, 7, and 17 years is 8 years ($3 + 5 + 7 + 17 = 32$ divided by $4 = 8$).

TAKE NOTE

The duration of a bond with coupon payments is always shorter than the maturity of the bond. By the same token, the duration of a zero-coupon bond is equal to its maturity.

TAKE NOTE

A five-year zero-coupon bond has a duration of five because it takes five years to make the money back; the buyer gets a single payment (par) at maturity five years after purchase.

PRACTICE QUESTION

Being concerned about price volatility, a bond investor wishes to compute the duration of a bond being considered for her portfolio. Which of the following is **not** a necessary component of that calculation?

- A. Coupon rate
- B. Current market price
- C. Rating of the bond
- D. Time until maturity

Answer: C. Although it is true that lower-rated bonds tend to have greater price volatility than high-rated ones, the rating has nothing to do with the calculation of the bond's duration, so our exception here is choice C. Duration is simply the weighted average of the cash flows an investor will receive over time discounted to the bond's present value. Those cash flows come from the coupon and the return of the par value at maturity.

If you took geometry in school, you learned that curves could be convex (bulging to the outside) or concave (curving to the inside). It's been over 65 years, but I still remember the key to the difference by the statement, "You can hide in a cave." Now, what does that have to do with our discussion?

Convexity is the measurement of the curve that results when plotting a bond's price movements in response to changes in interest rates. It is a more accurate representation than duration of what will happen to a bond's price as interest rates change, especially when the changes are great. Should you have a question about convexity on your exam, here's what you have to know:

- Duration is a linear (straight-line) measurement, while convexity follows a curve.
- Comparing two bonds, the one with the higher convexity will show a greater price increase when yields fall and a smaller decrease when yields rise (that is a good thing).
- If we find two bonds with the same duration, the one with the higher convexity offers greater interest rate risk protection.



TEST TOPIC ALERT

If you should be asked, "Which of the following is the most useful in determining the price volatility of a bond to a significant change in interest rates?", the correct choice is **convexity**.

LO 20.c Describe how discounted cash flow is used to estimate the value of an investment.

One way of assessing the value of a fixed-income security is by looking at the future expected free cash flow (the interest payments plus the eventual return of the principal) and discounting it to arrive at a present value. In its simplest iteration, this is nothing more than taking all the money you are scheduled to receive over a given future period and adjusting that for the time value of money. The concept is used as well in some equity projections, such as the dividend discount and dividend growth models described previously. Therefore, in order to compute the future value of the cash flow from a bond, you would have to know the:

- principal amount;
- coupon rate; and
- number of interest payments.



TAKE NOTE

The higher the discounted cash flow (DCF), the more valuable the investment.



EXAMPLE

There will be no computations regarding discounted cash flow, but there is a common example that may help you understand the concept better. We all wish we could be a winner of those huge Powerball or Mega Millions jackpots. Winners have the choice of receiving a series of payments over a number of years (about 29 currently) or taking the money in cash. If they take the cash, they'll receive around 72% of the announced total prize. Why is there a difference? The cash represents the **present value** of those future payments, and that is why you get less by taking it now instead of over time.

In fact, years ago, when interest rates were higher than they are at the time of this printing, the lump-sum payment was only about 60% of the “prize.” That is because the higher the market interest rates, the higher the **discount rate**. This is the same concept used in valuing a bond using DCF. When you buy a bond, you are expecting semiannual interest payments (cash flow) until the maturity date. When you compare those interest rates to the current market rates (the discount rate in the equation), you get an idea of the fair value of the bond. To better help you understand, take a look at this question.

PRACTICE QUESTION



A client interested in fixed income is viewing different bonds with the same rating and a coupon of 6%. Using the discounted cash flow method, which bond should have the highest market value?

- A. 5-year maturity when the discount rate is 4%
- B. 5-year maturity when the discount rate is 8%
- C. 10-year maturity when the discount rate is 4%
- D. 10-year maturity when the discount rate is 8%

Answer: C. Remember, the discount rate is just another way of stating the current interest rate in the marketplace. If the discount rate is *higher* than the coupon rate, the present value, the expected market price will be *below* par. Conversely, if the discount rate is *lower* than the coupon rate, the present value will be *above* the par value. Now, there is nothing new for you here—when the current interest rate in the marketplace (that is what the discount rate represents) is less than the coupon, the bond price is higher (as interest rates go down, bond prices go up). And, if the current market interest rate is higher than the coupon rate, the bond’s price will be lower (when interest rates increase, bond prices fall). That would narrow the choices to the two 4% bonds. That is, a bond with a 6% coupon should sell at a premium when current interest rates are at 4%; when interest rates are at 8%, the 6% bond should be selling at a discount. Then, as we’ve just learned with duration, when interest rates change, the longer the time to maturity, the greater the effect on the market price of a bond.

PRACTICE QUESTION



An analyst would use the discounted cash flow method in an attempt to find the

- A. fair value of a security.
- B. the current market price of a security.
- C. the current rate of return of a security.
- D. the cash flow from operations.

Answer: A. DCF uses the present value of future cash flows, based on a specified discount (interest) rate, to evaluate the price that a security should be selling for in the market. If the current market price of the security is less than this value, it has a positive net present value (NPV) and should be a good investment. The opposite is true if there is a negative NPV (the market price is higher than that computed under the DCF method).



EXAMPLE

Here is something that may help. The current rate of interest (the discount rate) on new AA rated bonds with a 20-year maturity is 4%. If you have an older AA bond with 20 years until it matures and a coupon of 6%, how does all of this apply?

If the yield to maturity (YTM) on your bond is 4.4%, it has a positive NPV (its yield is above the market rate of 4%, so this bond is selling at a price below its present value).

If the YTM on your bond is 3.6%, it has a negative NPV (its yield is below the market rate of 4%, so this bond is selling at a price above its present value).

If the YTM on your bond is 4%, it has a zero NPV (its yield is equal to the market rate of 4%, so this bond is selling at its present value).

One more point should be made on this topic. You might see the following statement as the definition of a bond's yield to maturity: The yield to maturity is the discount rate that equates the present value of the bond's future cash flows until maturity to its price.

Unlike the other debt securities we've discussed, trying to project your client's cash flow on a portfolio of mortgage-backed securities has its challenges. Although they do have default risk (other than GNMA's) as do other debt securities, the specific risk due to the possible (some would say *likely*) prepayments complicates the computation.



TEST TOPIC ALERT

When doing cash flow analysis on a mortgage-backed pass-through security, you would want to know the average maturities.

You might want to go back and review the discussion of present value in Lesson 20.1.



KNOWLEDGE CHECK 20.2

1. Given that each of the following bonds is of the same quality and has the same maturity as the others, which has the longest duration?
 - A. ABC 5s
 - B. DEF 6s
 - C. GHI 7s
 - D. JKL zero

2. With current market interest rates at 5%, when will a bond have a positive NPV?
 - A. When its yield to maturity is more than 5%
 - B. When its yield to maturity is exactly 5%
 - C. When its yield to maturity is less than 5%
 - D. When the discount rate is higher than 5%

LESSON 20.3: MEASURES OF CENTRAL TENDENCY

LO 20.d Select the proper measure of central tendency when presented with a set of variables.

There are a number of other numerical tools used that do not involve time value. Following are those most likely to appear on your exam.

Measures of Central Tendency

We are going to continue this section on quantitative measurements with a discussion dealing with the method of determining how one might approach figuring the logical outcome of a securities investment. Central tendency is usually defined as the center or middle of a distribution. There are many measures of central tendency. Let's take a look at some of them.

Mean or Arithmetic Mean

When we use the word *average*, this is what we are really speaking about. Of all the different measures, this is the one most commonly used to measure central tendency. You've been computing this for years—all you do is take the sum of the variables and divide by the number of occurrences. For example, if a stock returned 5%, then 8%, then 9%, and then 2%, the mean would be 6% ($5 + 8 + 9 + 2 = 24 \div 4 = 6$). Even though it is the most used (probably because it is so simple to do), the mean may not be an appropriate measure of central tendency for skewed distributions. The term *mean* by itself will always refer to the arithmetic mean.

Geometric Mean

This one takes some math skills and is, therefore, rarely used (and probably won't be a correct choice on the exam and certainly not something you'll have to compute). The geometric mean of any given set of numbers (n) is obtained by multiplying all of them together, and then taking the n th root of them. For example, over the past five years, a stock has annual returns of 10%, 5%, 15%, 8%, and 12%. Its geometric mean is 9.36%. This is computed by multiplying $10 \times 5 \times 15 \times 8 \times 12$, which equals 72,000 and finding the 5th root.

This is not to be confused with the more commonly used arithmetic mean, which, in this case, is $10 + 5 + 15 + 8 + 12 = 50 \div 5 = 10\%$.

TEST TOPIC ALERT



When comparing the arithmetic mean to the geometric mean, the arithmetic mean will always be higher, unless all of the numbers being used are the same (e.g., figuring the mean of 6, 6, and 6), in which case they will be equal. The reason is because the geometric mean uses imputed **compounding**.

Median

The median is a midpoint of a distribution—that is, there are as many variables below as there are above. To find the median of a number of returns, list them in order and then find the number in the middle. For example, the median of 11, 7, 4, 13, and 8 is 8 (4, 7, 8, 11, and 13). If the number of variables is even, then take the average of the middle two. If we use the numbers given above for the mean (2, 5, 8, and 9), the average of the middle two is 6.5 ($5 + 8 = 13 \div 2 = 6.5$). Note that the median is not the same number as the mean. The median is often more appropriate than the mean in skewed distributions or in situations with variables that fall far outside the normal range (outliers).

Definition: skewed distributions. In a normal distribution, the mean and median are the same; nothing is skewed. This rarely happens. Most commonly, distributions of returns are skewed either to the left (the mean is lower than the median) or to the right (the mean is higher than the median).

Mode

The mode is determined much differently than the prior two. Mode measures the most common value in a distribution of numbers. For example, the mode of 2, 2, 2, 6, 7, 7, and 9 is 2. The mode is likely to be quite unlike the mean or median. For example, using the numbers just shown, the mean is 5 ($35 \div 7$) and the median is 6.

Range and Mid-Range

Range is the difference between the highest and lowest returns in the sample being viewed. When there are many values at either extreme of the range, the results tend to be skewed in that direction. The simplest way to do this is to reorder the data set from smallest to largest and then subtract the first element from the last element. Some look at the mid-range value, which, as the name implies, is the number that is exactly in the middle of the range. That is calculated by adding the highest number to the lowest number and dividing by 2.

For example, if we look at the numbers we used to determine the median above, we reorder the numbers: 4, 7, 8, 11, and 13. This makes the range 9 ($13 - 4$) and the mid-range is 8.5, close to but not the same as the median. How did we solve for the mid-range? Add the lowest number and the highest number in the series and divide by two ($4 + 13 = 17 \div 2 = 8.5$). Using our mode example, the range is 7 ($9 - 2$) and the mid-range is 5.5 ($2 + 9 = 11 \div 2 = 5.5$).



EXAMPLE

Over the past seven years, a security has produced annual returns of 10%, 4%, -5%, 10%, 12%, -2%, and 6%. In this example, the mean return (the average) is 5% (adding these seven returns totals 35% and dividing by seven results in an average of 5%). The median return, the one with as many returns above as below, is 6%. The mode, the return with the most occurrences, is 10%, and the range, the difference between the lowest and highest returns, is 17% (-5% to 12%).



PRACTICE QUESTION

An investor is looking at the past performance of a security over the past three years. In year one, it returned 10%; in year two, it returned 15%; and in year three, it returned -4%. This computes to an average rate of return of 7%. This would be properly referred to as the

- A. arithmetic mean.
- B. internal rate of return.
- C. median return.
- D. range.

Answer: A. When a true average return is shown, that is the arithmetic mean. The median return (the number in the middle of the group of three) is 10%, and the range is 19% (-4 to 15).

TEST TOPIC ALERT

You may have a question that shows four portfolios listing the mean, the median, and the mode for each one. The question will ask: Which one had some investments that significantly outperformed the average of the other investments? The answer will be the one with the highest mean. To show how that works, let's say that you have seven securities in the portfolio with the following returns: A: 5%; B: 5%; C: 8%; D: 10%; E: 12%; F: 40%; and G: 60%. The mode (the number that appears the most frequently) is 5%. The median (the number with the same number of returns above and below it) is 10%, and the mean (the average of the seven returns) is 20% ($140 \div 7$). The two outliers (F at 40% and G at 60%) caused the mean (average) to be significantly higher than the mode or the median because those two performed significantly better than the other five holdings.

KNOWLEDGE CHECK 20.3

1. An investor reviewing annual returns of a mutual fund for the past five years notes that they have ranged from a high of 24% to a low of negative 2%. That would mean a mid-range of
 - A. 11%.
 - B. 12%.
 - C. 13%.
 - D. without knowing the other three returns, the mid-range cannot be calculated.
2. When viewing past returns of a security, an outlier would cause the greatest distortion to
 - A. the mean.
 - B. the median.
 - C. the mode.
 - D. all of these equally.

LESSON 20.4: MEASUREMENTS OF RETURN AND VOLATILITY**LO 20.e Identify alpha and beta.****Beta Coefficient**

Beta and *beta coefficient* mean the same thing. In the securities industry, *coefficient* is ordinarily dropped for purposes of convenience. Beta is used to measure the variability between a particular stock's (or portfolio's) movement and that of the market in general. A stock with a beta of 1.00 will tend to have a market risk similar to that of the market as a whole. Most frequently, beta is measured against the Standard & Poor's 500 composite index. A stock with a beta of 1.50 will be considerably more volatile than the market; a stock with a beta of 0.70 will be much less volatile than the market. Although most assets have a positive beta, it is possible to find some with a negative beta. Assets with a negative beta can be an important component when diversifying a portfolio. For example, if beta is -1.2, a 10% up move in the market's return will cause the stock return to decline by 12%. On the other hand, if the general market were to suffer a decline, a stock with a negative beta would generally show positive returns. Know that conservative clients need securities with low positive betas, whereas aggressive clients will find betas in excess of 1.00 to be quite suitable. In the previous unit, we mentioned that beta is a measurement of **systematic risk**—specifically, market risk.



TAKE NOTE

If the S&P 500 rises or falls by 10%, a stock with a beta of 1 rises or falls by about 10%, a stock with a beta of 1.5 rises or falls by about 15%, and a stock with a beta of .75 rises or falls by about 7.5%.



PRACTICE QUESTION

Adding investments with a negative beta to a well-diversified portfolio that currently has a beta of +1.0 will

- cause the expected performance of the portfolio to improve in declining markets.
- cause the expected performance of the portfolio to decline in declining markets.
- cause the portfolio to experience more volatility in times of a rising market.
- cause the portfolio to experience more volatility in times of a declining market.

Answer: A. A negative beta means that the investment will move in an opposite direction from the overall market. Therefore, if the market is declining, then the asset should increase in value, thereby increasing the expected performance of the portfolio.

Alpha

For portfolio managers, good news is when they can say that they have generated *positive alpha*. Basically, that means that their investment performance is better than what would have been anticipated, given the risk in terms of volatility that was taken. The expected return is usually determined using the capital asset pricing model (CAPM), which will be covered in Unit 21. That generally means the manager has been adept at security selection and timing.

You may be asked to compute how much alpha was generated for a particular stock or portfolio based on the amount of risk taken. Alpha can be positive, negative, or zero. If the alpha is negative, then the portfolio is underperforming the market; if higher, the portfolio is outperforming the market (and the manager is doing a good job). Although the general calculation refers to the *market*, a deeper view compares the performance to the specific benchmark that is most similar to the portfolio. For example, a large-cap fund manager would use the S&P 500, not the Russell 2000 (small-cap index), return as the market return in the alpha calculation.

The most common formula for computing alpha goes like this:

$$(Actual \text{ portfolio return} - \text{risk-free rate}) - (\text{portfolio beta} \times [\text{market return} - \text{risk-free rate}])$$

In essence, what is being done is comparing performance after eliminating the risk-free rate.

This is one item it's easier to understand if we show you the numbers.

Definition: risk-free rate. The risk-free rate used on the exam will always be the 91-day (or 13-week) U.S. Treasury bill. Because their price movements are not generally related to the stock market, those T-bills are said to have a beta of zero.

**EXAMPLE**

Portfolio return 10%

Risk-free rate 2%

Market return rate 8%

Beta 1.2

The computation of alpha would be:

$(10\% - 2\%) = 8\%$. Then $(1.2 \times [8 - 2])$, which is $1.2 \times 6 = 7.2$. Plug that into the formula, which gives us $8 - 7.2$ or an alpha of 0.8 (positive alpha).

**PRACTICE QUESTION**

Portfolio return 10%

Risk-free rate 2%

Market return rate 8%

Beta 0.8

$(10\% - 2\%) - (.8 \times 6) = 8 - 4.8 = \text{positive alpha of } 3.2$

Let's review for a moment. Both portfolios earned the same 10%, but the second one did it with a much lower beta—we would not have expected that portfolio to do as well as the one with the higher beta (remember, more risk, more reward). The fact that it did means the portfolio manager(s) did a great job.

**TEST TOPIC ALERT**

It is possible on the exam that you will have an alpha computation where the RF (risk-free return) is not given. In that case, the computation is the same but without the RF being subtracted from both the actual return and the market return. For example, in our first case, the computation would be $10\% - (1.2 \times 8\%)$ or $10\% - 9.6\%$ for an alpha of .4.

LO 20.f Recall how standard deviation relates to volatility.**Standard Deviation**

Standard deviation is a measure of the volatility of an investment's projected returns, computed by using historical performance data. Standard deviation is a statistical term that measures the amount of variability or dispersion around an average. The larger this dispersion or variability is, the higher the standard deviation. The higher the standard deviation, the larger the security's returns are expected to deviate from its average return, and, hence, the greater the risk.

**EXAMPLE**

This simple example should give you a basic understanding of the concept behind using standard deviation as a tool to predict price volatility. Let's compare the returns generated by the common stock of two unrelated companies over the past three years.

| | 2012 | 2013 | 2014 |
|-----------|------|------|------|
| Company A | 8% | 12% | 10% |
| Company B | -4% | 25% | 9% |

For an investor who held shares in Company A for those three years, the mean return on investment was 10%. This is calculated, just like any other average, by adding together the three annual returns ($8 + 12 + 10 = 30$) and dividing that by 3.

For an investor who held shares in Company B for those three years, the mean return on investment was exactly the same: 10% ($25 + 9 - 4 = 30 \div 3$). However, which one of the shares had a greater dispersion (or variance) from the mean? Clearly, Company B's. You will not have to compute it, but you should be able to see from this that Company B would have a much higher standard deviation (its returns have deviated far greater from the average) than Company A. If you were asked on your exam to choose which of these two would be more suitable for the conservative investor (the one who likes to sleep well at night), you'd better pick Company A, the one with the lower standard deviation.

Standard deviation is expressed in terms of percentage. It is generally accepted that a security will vary within one standard deviation about 68% of the time, within two standard deviations about 95% of the time, and within three standard deviations about 99% of the time. A standard deviation of 7.5 means that the return of a stock for a given period may vary by 7.5% above or below its predicted return about two-thirds of the time, within 15% about 95% of the time, and within 22.5% about 99% of the time.



EXAMPLE

A security has an expected return of 12% and a standard deviation of 5%. Investing in a security with an expected 12% return, an investor can expect returns to range within 7% to 17% about 68% of the time and within 2% to 22% about 95% of the time.



TAKE NOTE

An investor can use standard deviation to compare the volatility between investments. Simply put, the higher the standard deviation, the greater the volatility (and the reverse).



EXAMPLE

If an investor had a choice between an investment that historically returned 12% with a standard deviation of 6% and another investment that also returned 12% but had a standard deviation of 10%, the investor would probably choose the first one. In effect, he would expect to receive an equal return in the future return with less risk.

Beta vs. Standard Deviation

Beta is a volatility measure of a security compared with the overall market, measuring only systematic (market) risk. Standard deviation is a volatility measure of a security compared with its expected performance and includes both systematic and unsystematic risk. Another way to put that is that standard deviation measures the total risk of a security or portfolio. After studying the next unit, you might want to reread this, because you will have a better understanding of these two types of risk.



KNOWLEDGE CHECK 20.4

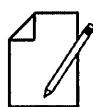
1. Solve for alpha given the following information:
Portfolio return 9%
Risk-free rate 2%
Market return rate 8%
Beta 1.2
 - A. -0.6
 - B. -0.2
 - C. +0.2
 - D. +1.8
2. Using modern portfolio theory, one of your customers calculates the expected return of a stock at 15%. When explaining this to you, the customer asks you how much variation should be expected from this investment the majority of the time. You respond that 95% of the time, the returns should be within the range of a low of negative 7% and a high of 37%. This information was determined based on this stock having a standard deviation of
 - A. 7%.
 - B. 11%.
 - C. 15%.
 - D. 22%.

LESSON 20.5: THE EFFECTS OF CORRELATION ON A PORTFOLIO'S RETURN

LO 20.g Recognize the relationship between correlation and diversification.

Correlation

Correlation means that securities move in the same direction. A **strong or perfect correlation** means two securities prices move in a perfect positive linear relationship with each other.



EXAMPLE

Two securities are correlated if one security's price rises by 5% and the other security's price then rises by 5%, or if one declines by 4% and the other also declines by 4%.

The correlation coefficient is a number that ranges from -1 to $+1$. Securities that are perfectly correlated have a correlation coefficient of $+1$. Securities whose price movements are unrelated to each other have a correlation coefficient of 0 . If prices move in perfectly opposite directions, they are negatively correlated or have a correlation coefficient of -1 . Generally speaking, correlation coefficients of $.80$ and up are considered to be a very high correlation.

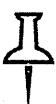
As previously mentioned in Lesson 17.3, one of the risks in investing in index funds is tracking error. When the correlation is no longer close to 1 , the fund's performance is unlikely to match the benchmark (it could be better or worse; it just is unlikely to match).

Diversification

Throughout this course, we have praised the benefits of diversification. Whether the discussion was about pooled investment vehicles such as mutual funds and REITs or alternative investments, spreading the risk among a number of different holdings, especially with different market characteristics, is a proven way of reducing unsystematic risk.

There are several ways to diversify a portfolio. One of them, typically used in mutual funds, is to own a number of different securities. For example, a growth fund will be highly concentrated in common stock in companies in industries that have the potential for greater than average future growth. In this case, most of the securities in the portfolio will be highly correlated (they'll tend to move in the same direction).

Another way is to diversify by owning different types of assets. We have mentioned the topic of asset allocation previously and will delve further into it in the next unit. By investing in assets with a low or negative correlation, the investor benefits further from diversification because when there is a down market for equities, those assets with a negative correlation will have a tendency to provide positive returns.



TAKE NOTE

Index funds attempt to achieve perfect correlation (+1) with the index they are mirroring (e.g., the Standard & Poor's 500). The goal of an index fund manager is to come as close as possible to matching the performance of the underlying index. It is not a goal to exceed the performance, but only to match it. An index fund may not perfectly track its index. For example, a fund may only invest in a sampling of the securities in the market index, in which case the fund's performance may be less likely to match the index. This is known as tracking error.



TEST TOPIC ALERT

One of the best ways to increase the diversification of a portfolio is to include investments with a negative correlation. The logic is that those negatively correlated assets will go up when the rest of the portfolio is going down. One of the best examples of a negatively correlated asset is an investment in gold stocks. Bonds frequently have a negative correlation as well, which is one of the reasons for creating a balanced allocation.



PRACTICE QUESTION

Take a look at this example: One of your clients has a portfolio that has a correlation of .91 with the overall market. A stock with which correlation coefficient would most likely offer the greatest diversification to this client?

- A. .91
- B. .51
- C. .01
- D. -.51

Answer: D. Remember, the best way to diversify is to include securities with a negative correlation, and the only one here that meets that requirement is choice D.



KNOWLEDGE CHECK 20.5

1. Which of the following statements is most accurate?
 - A. The higher the correlation, the more diversified the portfolio.
 - B. The lower the correlation, the more diversified the portfolio.
 - C. When the correlation coefficient is zero, the portfolio is at its maximum diversification.
 - D. Correlation is primarily used for individual investments rather than portfolios.
2. An investor holds a portfolio in stocks that generally react in similar fashion to economic events. When seeking to add securities to the portfolio that will follow the same path, it would be logical to select which of the following stocks?
 - A. ABC, correlation -0.82
 - B. DEF, correlation -0.25
 - C. GHI, correlation +0.25
 - D. JKL, correlation +0.82

LESSON 20.6: FINANCIAL STATEMENT CALCULATIONS

LO 20.h Calculate liquidity and valuation ratios of common stock.

Using the Balance Sheet

One of the key tools in fundamental analysis is the corporation's financial statements. We have viewed the balance sheet and income statement in Unit 7 and now are going to focus on the most testable calculations derived from those documents. We will begin with the three ratios that evaluate liquidity as determined by examining the company's balance sheet.

Working Capital

Working capital is the amount of capital or cash a company has available. Working capital is a measure of a firm's liquidity, which is its ability to quickly turn assets into cash to meet its short-term obligations.

The formula for working capital is:

$$\text{current assets} - \text{current liabilities} = \text{working capital}$$

Factors that **increase** working capital include increases in cash from:

- ▣ the sale of securities (long-term debt or equity);
- ▣ profits from the business operations; and
- ▣ the sale of noncurrent assets, such as equipment no longer in use.

Factors that **decrease** working capital include increasing current liabilities such as:

- ▣ declaring cash dividends;
- ▣ paying off long-term debt at maturity or, if called, earlier; and
- ▣ net operating losses.

Current Ratio

Knowing the amount of working capital is useful, but it becomes an even better indicator when paired together with the current ratio. This computation uses the same two items, current assets and current liabilities, but expresses them as a ratio of one to the other. Simply divide the current assets by the current liabilities, and the higher the ratio, the more liquid the company is.

Quick Asset Ratio (Acid Test Ratio)

Sometimes it is important for the analyst to use an even stricter test of a company's ability to meet its short-term obligations (as such, "pass the acid test"). The quick asset ratio uses the company's quick assets instead of all of the current assets. Quick assets are current assets minus the inventory. Then divide these quick assets by the current liabilities to arrive at the quick ratio.



TAKE NOTE

Liquidity measures a company's ability to pay the expenses associated with running the business.



EXAMPLE

As with most arithmetic, there are two ways to get to the correct answer. The standard formula for the quick asset ratio is the following: Current assets minus inventory divided by current liabilities. The same result is achieved by adding together all of the current assets **except** the inventory and then dividing by the current liabilities.

Here are two additional computations relying on the balance sheet:

Debt-to-Equity Ratio

The best way to measure the amount of financial leverage being employed by the company is by calculating the debt-to-equity ratio. It is really a misnomer—it should be called the debt-to-total capitalization ratio because that is what it is. For example, using the numbers in the capitalization table below, we see that the total capital employed in the business is \$90 million. Of that, \$50 million is long-term debt. So, we want to know how much of the \$90 million total is represented by debt capital. The answer is simple: \$50 million of the \$90 million, or 55.55%. That is the debt-to-equity ratio.

Capitalization Table

| | |
|--|--------------|
| Long-term debt | \$50 million |
| 4% preferred stock (1 million shares @ \$20 par value) | \$20 million |
| Common stock (1 million shares @ \$1 par value) | \$1 million |
| Capital surplus (common stock issue price @ \$4 per share) | \$4 million |
| Retained earnings | \$15 million |
| Total equity capital | \$40 million |
| Total capitalization (long-term debt + equity) | \$90 million |

Book Value Per Share

A fundamental analyst is described as one who focuses on the company's books. Therefore, one of the key numbers computed is the book value per share.

In the case of a corporation, this is basically the liquidation value of the enterprise. That is, let's assume we sold all of our assets, paid back everyone we owe, and then split what was left among the stockholders. But remember, before we can hand over anything to the common shareholders, we must take care of any outstanding preferred stock. So, from the funds that are left after we pay off all of the liabilities, we give the preferred shareholders back their par (or stated) value and the rest belongs to the common stockholders.

But there is one more thing. In the case of liquidation, some of the assets on our books might not really be worth what we're carrying them at. In particular, those that are known as intangible assets (goodwill, patents, trademarks, copyrights, etc.). That is why the analyst uses only the tangible assets, computed by subtracting those intangibles from the total assets.

Expressed as a formula, book value per share is:

$$\frac{\text{Tangible assets} - \text{liabilities} - \text{par value of preferred}}{\text{shares of common stock outstanding}} = \text{book value per share}$$



TEST TOPIC ALERT

Book value reflects the theoretical *liquidating* value of the company, not its *intrinsic* value. Fixed assets are shown at actual cost (the original purchase price) minus the accumulated depreciation; their actual value may be higher or lower.

Using the Income Statement

There are a number of important ratios that can be computed using information from the income statement. We'll take a look at several of them.

Earnings Per Share (EPS)

Among the most widely used statistics, EPS measures the value of a company's earnings for each common share:

$$\text{EPS} = \frac{\text{earnings available to common}}{\text{number of shares outstanding}}$$

Earnings available to common are the remaining earnings after the preferred dividend has been paid. Earnings per share relates to common stock only. Preferred stockholders have no claims to earnings beyond the stipulated preferred stock dividends.

Simplified Income Statement

| | |
|--|--------------|
| Net Revenues (Sales) | \$10,000,000 |
| - Cost of Goods Sold (including \$500,000 of depreciation) | 5,500,000 |
| = Gross Profit or Margin | 4,500,000 |
| - Other Operating Expenses (rent, utilities) | 500,000 |
| = Operating Profit (EBIT) | 4,000,000 |
| - Interest Expense | 750,000 |
| = Income after Interest Expense (Pre-tax income) | 3,250,000 |
| - Income Tax | 1,000,000 |
| = Net Income | 2,250,000 |
| = Preferred Dividend (1 million shares at \$0.80) | 800,000 |
| Earnings Available for Common | 1,450,000 |
| Earnings per Share (1 million common shares outstanding) | 1.45 |
| Dividends per Share (\$1.00) | 1,000,000 |
| Credited to Retained Earnings | 450,000 |

Earnings Per Share After Dilution

EPS after dilution assumes that all convertible securities, such as warrants and convertible bonds and preferred stock, have been converted into the common. Because of tax adjustments, the calculations for figuring EPS after dilution can be complicated and will not be tested.

Current Yield (Dividend Yield)

A common stock's **current yield** expresses the annual dividend payout as a percentage of the current stock price:

$$\text{Current yield} = \frac{\text{annual dividends per common share}}{\text{market value per common share}}$$



EXAMPLE

LMN Corporation pays a quarterly dividend on its common stock of \$.50 per share. If the current market price of LMN common stock is \$80 per share, what is the current yield? The first step is to recognize that quarterly dividends of \$.50 total \$2.00 annually. Then, we plug the numbers into the formula:

$$\$2.00 = 0.025 \text{ or } 2.5\% \text{ current yield}$$

One way to remember this is that we are computing the return on \$80.00, your investment. So, take the return (\$2) and put it "on" your investment (\$80).

Dividend Payout Ratio

The **dividend payout ratio** measures the proportion of earnings paid to stockholders as dividends:

$$\text{Dividend payout ratio} = \frac{\text{annual dividends per common share}}{\text{earnings per share (EPS)}}$$

In general, older, well-established companies pay out larger percentages of earnings as dividends. Utilities as a group have an especially high payout ratio. Growth companies normally have the lowest ratios because they reinvest their earnings in the businesses. Companies on the way up hope to reward stockholders with gains in the stock value rather than with high dividend income.



EXAMPLE

Using the simple income statement above, we see that the company paid dividends of \$1.00 per share out of the earnings of \$1.45 per share. That is a ratio of approximately 68.97%. Simply, the computation is “dividends paid over (divided by) earnings made.” It can be shown as total dividends and total net income (in our income statement, that would be \$1.0 million ÷ \$1.45 million) or as dividends per share and earnings per share (\$1.00 ÷ \$1.45). It is the same 68.97% either way.

Market Price Related Ratios

Price-to-Earnings (P/E) Ratio

The widely used **price-to-earnings (P/E) ratio** provides investors with a rough idea of the relationship between the prices of different common stocks compared with the earnings that accrue to one share of stock:

$$\text{P/E ratio} = \frac{\text{current market price of common share}}{\text{earnings per share (EPS)}}$$



EXAMPLE

In our income statement, we see that the earnings per share are \$1.45. If the stock's current market price is \$29, what is the P/E ratio? Simply take the price (29) and place it “on” the earnings (1.45), and that computes to 20. So, we say the P/E ratio is 20 to 1, or 20:1. In general, the exam will be looking for the *trailing* P/E ratio, which means the earnings used are the actual results for the past 12 months. Some analysts use the *forward* P/E ratio; that is, using the projected earnings for the coming 12 months.

Growth companies usually have higher P/E ratios than do cyclical companies. Investors are willing to pay more per dollar of current earnings if a company's future earnings are expected to be dramatically higher than earnings for stocks that rise and fall with business cycles. Companies subject to cyclical fluctuations generally sell at lower P/E ratios; declining industries sell at still lower P/E ratios. Investors should beware of extremely high or extremely low P/E ratios. Speculative stocks often sell at one extreme or the other.

If a stock's market price and P/E ratio are known, the earnings per share can be calculated as follows:

$$\text{EPS} = \frac{\text{current market price of common stock}}{\text{P/E ratio}}$$

**EXAMPLE**

If the price of the stock is \$29 and that is 20 times the earnings, the earnings must be $\$29/20$ or \$1.45 per share.

**TAKE NOTE**

A company's stock trades for \$30 per share and has earnings of \$1.50 per share. It has a P/E (multiple) of 20 ($\$30 \div \$1.50 = 20$). If the average P/E of the company's industry is 11, this stock is high-priced. If the average P/E is 35, this company is low-priced.

**TEST TOPIC ALERT**

Some fundamental analysts feel that the company's sales to earnings ratio is more valuable than the P/E ratio because different accounting methods can impact earnings much more than sales.

Price-to-Book Ratio

The **price-to-book ratio** reflects the market price of the common stock relative to its **book value** per share. It is the current market price divided by the book value per share. As stated previously, the balance sheet is used to calculate book value. The book value is the theoretical value of a company (stated in dollars per share) in the event of liquidation and bears no relationship to the stock's current trading price. When calculating book value, fixed assets are shown at their cost less accumulated depreciation. That is, a drill press that had an original cost of \$100,000 but has been depreciated by \$40,000 would be counted as \$60,000 when calculating the company's book value.

This ratio is particularly useful when evaluating companies with inconsistent or negative earnings.

**TAKE NOTE**

A quick rundown of the most testable points about ratios follows.

- Book value is the company's theoretical liquidation value expressed on a per share basis.
- Growth companies have higher P/E ratios than do cyclical or defensive companies.
- Earnings per share relates only to common stock; it assumes preferred dividends were paid.

**PRACTICE QUESTION**

RMBN common stock is currently selling for \$60, which gives the stock a P/E ratio of 20:1. Based on that information, the earnings per share are

- A. \$2.00.
- B. \$3.00.
- C. \$5.00.
- D. \$20.00.

Answer: B. This is simply telling us that the price of \$60 is 20 times the earnings. That would make the earnings $60/20$ or \$3.00.



KNOWLEDGE CHECK 20.6

1. A fundamental analyst comparing a corporation's current assets to its current liabilities is viewing the company's
 - A. net worth.
 - B. net income.
 - C. working capital.
 - D. leverage ratio.
2. The balance sheet of DEF Corporation shows that included in its \$15 million in current assets is \$4 million in cash and \$2 million in accounts receivable. If DEF's current liabilities are \$4 million, the quick asset ratio is
 - A. 1.0:1.
 - B. 1.5:1.
 - C. 2.5:1.
 - D. 3.0:1.

KNOWLEDGE CHECK ANSWERS

Knowledge Check 20.1

1. **D** The giveaway clue in the question is the word *now*. Now is in the present, and when we know what we'd like to have in the future (14 years from now), the present value calculation shows us the required lump-sum deposit. NPV is used to determine if a security is priced correctly, and IRR is commonly used to report past performance.

LO 20.a

2. **C** The first step is determining how many years we have before retirement. Subtracting the current 46 from the target age of 70 equals 24 years. The rule of 72 tells us the percentage return needed for a deposit made today to double. The goal of \$400,000 is four times the initial sum of \$100,000. That means the deposit must double twice. Therefore, the first doubling must take place in 12 years. Dividing 72 by 12 years results in a required return of 6%. If we have \$200,000 in 12 years and continue to earn 6%, that will double in the next 12 years, giving us \$400,000 in 24 years.

LO 20.a

Knowledge Check 20.2

1. **D** Any bond paying interest will have a duration shorter than its maturity. On the other hand, because the zero coupon bond makes no payment until maturity, it has the longest duration. Regarding the other choices, when the maturities are the same (or very close), the higher the coupon rate, the shorter the duration. That would have the 7s with the shortest duration, followed by the 6s and then the 5s.

LO 20.b

2. **A** First of all, the discount rate is the current market interest rate, so it cannot be higher than itself. One would expect that with current market rates at 5%, properly priced bonds, those with a zero NPV, would yield that same 5%. If the bond is yielding more than the discount rate, the investor is receiving added value and that means the NPV is positive.

LO 20.c

Knowledge Check 20.3

1. **A** The mid-range of any set of numbers is the midpoint between the highest and lowest value. In our question, to find the mid-range, we add the lowest value (-2) to the highest value (+24). That is a sum of +22. Dividing that in half gives us the mid-range of 11.
2. **A** An outlier (a value that is extremely high or low when compared to the other values) would impact the average (the mean) more than any of the others. The mode wouldn't be affected, and the median would likely have little change.
LO 20.d

Knowledge Check 20.4

1. **B** The solution is the actual portfolio return (9%) minus the risk-free rate (2%), which is 7%. Then, we multiply the beta (1.2) times the (market return of 8% minus the 2% RF rate). Putting together all of the numbers we have: $(9\% - 2\%) - (1.2 \times 6) = 7 - 7.2 =$ alpha of -.2 (negative). This portfolio underperformed; for the additional risk taken, it should have returned at least 9.2%.
LO 20.e
2. **B** A security will range within two standard deviations of its expected return 95% of the time. Given an expected return of 15%, a high end of the range of 37% means a deviation of 22% to the upside. A return at the low end of the range of -7% is a deviation of 22% to the downside. With a 95% expectation of two standard deviations being + or - 22%, the standard deviation of this stock is half of that, or 11%.
LO 20.f

Knowledge Check 20.5

1. **B** One of the best ways to diversify a portfolio is to add investments with a negative correlation to the rest of the assets. A zero correlation means there is no predictable relationship between these assets and the rest of the portfolio. As should be clear from this explanation, correlation is used for portfolio diversification—one does not diversify an individual asset.
LO 20.g
2. **D** Following the same path means a high correlation. This investor is **not** looking to diversify the portfolio (for that, the best choices would be the negative correlation stock).
LO 20.g

Knowledge Check 20.6

1. **C** The formula for working capital is current assets minus current liabilities. Net worth is all of the assets minus all of the liabilities. Net income is the revenues minus all of the expenses and taxes. The leverage ratio is the percentage of long-term debt to the total capital (equity plus long-term debt).
LO 20.h
2. **B** We aren't told what the inventory is, but we are given the other current assets. So, we can add together the \$4 million in cash to the \$2 million in receivables, resulting in \$6 million divided by the \$4 million in current liabilities for a 1.5 to 1 answer. It wasn't necessary for the question to tell us the inventory—we didn't have to subtract it because we never included it in the first place.
LO 20.h

UNIT 21

Portfolio Management Styles, Strategies, and Techniques

LEARNING OBJECTIVES

When you have completed this unit, you will be able to accomplish the following.

- › LO 21.a **Discriminate** between the major asset classes used in an asset allocation program.
- › LO 21.b **Identify** the risk reduction benefits of diversification.
- › LO 21.c **Describe** the difference between active and passive management styles.
- › LO 21.d **Evaluate** the methods used to determine the value of equity securities.
- › LO 21.e **Contrast** the different portfolio management strategies, styles, and techniques.
- › LO 21.f **Compare** the three techniques for minimizing interest rate risk.
- › LO 21.g **Identify** the components of the capital market theory.
- › LO 21.h **Calculate** the expected return using the security market line.
- › LO 21.i **Identify** the three forms of the efficient market hypothesis.
- › LO 21.j **Illustrate** how dollar cost averaging results in lowering an investor's average cost per share.
- › LO 21.k **Describe** the use of put and call options to hedge positions.

Your exam will include approximately nine questions from the topics covered in Unit 21.

INTRODUCTION

Portfolio managers use a range of investment styles and strategies. Although each style attempts to generate superior investment returns and reduce investment risks, no single style is suited to every investor. Often, an investment adviser's role is to guide clients toward a mutual fund or private money manager that is consistent with the client's objectives and temperament. The unit will conclude with a look at some of the techniques used by the various styles and strategies discussed.

LESSON 21.1: ASSET ALLOCATION

LO 21.a Discriminate between the major asset classes used in an asset allocation program.

The Theory of Asset Allocation

Asset allocation (more accurately, but rarely stated, asset class allocation) refers to the spreading of portfolio funds among different asset classes with different risk and return characteristics, based on the investment policy statement (IPS). Proponents of asset allocation feel that the mix of assets within a portfolio, rather than individual stock selection or marketing timing, is the primary factor underlying the variability of returns in portfolio performance. There are three major types (each with subclasses) of asset classes:

- Stock (equities), with subclasses based on market capitalization, value versus growth, and foreign equity
- Bonds (debt), with subclasses based on maturity (intermediate versus long term), and issuer (Treasury versus corporate versus non-U.S. issuers)
- Cash (or cash equivalents), focusing mainly on the standard risk-free investment and the 91-day (13-week) Treasury bill but also including other short-term money market instruments

Proper asset allocation takes into consideration the investor's desire for preservation of capital, income, capital growth, or a combination of all of these.

In some instances, tangible assets, such as real estate (usually in the form of REITs), precious metals and other commodities, and certain collectibles (think fine art), are part of the asset allocation because these types of assets tend to reduce inflation risk. Increasingly, institutional investors (and some very high-net-worth individuals due to the high cost of entry) are using such alternative investment asset classes as ETNs, private equity, and venture capital. It is important to understand that asset allocation is not simply spreading the money around helter-skelter to different asset classes—there is a process as described in the following question:

PRACTICE QUESTION



Which of the following best describes the steps of the asset allocation process?

- A. Determine the objectives and constraints, create the IPS, determine the asset allocation, allocate capital, monitor and evaluate.
- B. Determine the objectives and constraints, determine the asset allocation, allocate the capital, create the IPS, monitor and evaluate.
- C. Determine the objectives and constraints, perform asset allocation, create the IPS, monitor and rebalance.
- D. Determine the objectives and constraints, determine capital market expectations, create the IPS, perform asset allocation, monitor and evaluate.

Answer: A. Steps in the asset allocation process are:

Step 1: Determine the objectives and constraints of the asset owner.

Step 2: Create the investment policy statement (IPS).

Step 3: Determine the asset allocation based on the IPS.

Step 4: Allocate capital.

Step 5: Monitor and evaluate investments.

LO 21.b Identify the risk reduction benefits of diversification.

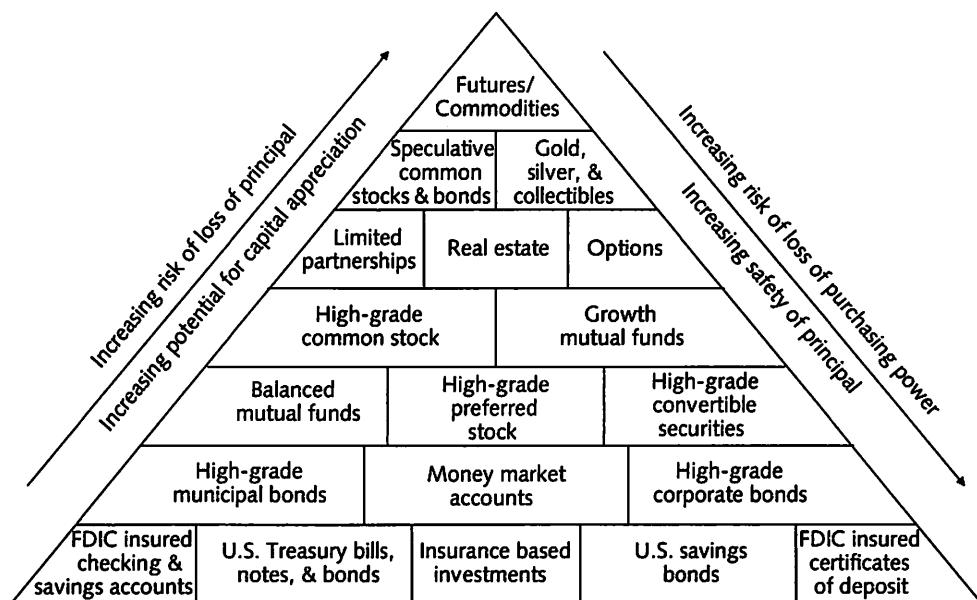
The term *diversification* has been used many times already in this manual. The term is a common one in our everyday life, not restricted to investing. As a technique in portfolio management, portfolio diversification (i.e., committing to an array of separate investments) reduces unsystematic risk, such as business risk, and enhances returns. The securities in a diversified portfolio are selected, in part, because they do not tend to move up or down in relation to each other; when some go down, the loss is offset by those that rise. That is the concept we covered with the correlation coefficient. This kind of diversification is enhanced by the addition of foreign securities to a portfolio, because they are usually not highly correlated with domestic equity.

There are many ways to classify investment and financial products. The investment pyramid (shown below) for example, categorizes products according to their risk and return potential. Another way is to group similar products into specific classes. These classes are generally defined as the following:

- **Cash and cash equivalents**—passbook savings and checking accounts, money market accounts, money market funds, certificates of deposit, T-bills
- **Fixed-income investments**—corporate bonds, municipal bonds, Treasury bonds, bond funds, mortgage-backed securities
- **Equities**—preferred and common stocks of all kinds, growth and income appreciation, stock mutual funds
- **Hard assets**—real estate, collectibles, precious metals, and stones

Each of these asset classes as a whole responds differently to different types of risk; therefore, diversifying or allocating investment resources among these classes is a proven way to reduce risk overall, dampen volatility, and improve the performance of one's portfolio. Fixed-income products, for example, are a hedge against deflation; equities are a hedge against inflation. To minimize market risk, one could diversify among all four asset categories (with additional diversification within the equities category). To minimize interest rate risk, one could diversify within the fixed-income category by staggering bond maturity dates. To minimize business risk, one could allocate among the four categories and purchase mutual funds. To reduce liquidity risk, one would keep a sufficient portion of assets in cash or cash equivalent assets.

Risk-Return Pyramid



EXAMPLE

Simply adding more securities to a portfolio does not necessarily reduce portfolio volatility. For example, if the beta of a portfolio was 1.1, adding which of the following stocks would most likely increase the overall portfolio volatility?

- Stock A, beta 1.5
- Stock B, beta 1.1
- Stock C, beta 1.0
- Stock D, beta 0.7

The addition of a security with a beta higher (Stock A) than that of the current portfolio will increase overall portfolio volatility.

Diversification is not a synonym for asset allocation. For example, an aggressive young professional may invest almost exclusively in common stock. That would be a single asset class. But within that asset class of common stock, the portfolio might consist of the shares of a dozen or more different companies in varied industries.



KNOWLEDGE CHECK 21.1

1. A portfolio manager of an asset allocation fund would be *least* likely to invest in
 - A. common stock.
 - B. debentures.
 - C. raw land.
 - D. U.S. Treasury bills.
2. Professional investment managers believe that a well-diversified portfolio offers protection from which of the following risks?
 - A. Business risk
 - B. Interest rate risk
 - C. Market risk
 - D. Purchasing power risk

LESSON 21.2: ACTIVE AND PASSIVE PORTFOLIO MANAGEMENT STYLES

LO 21.c Describe the difference between active and passive management styles.

Asset Allocation Styles

The two most common forms of asset allocation are tactical and strategic. You may see the terms *active* and *passive* management referring to these two.

Tactical Asset Allocation

Tactical asset allocation refers to short-term portfolio adjustments that adjust the portfolio mix between asset classes in consideration of current market conditions and investor sentiment.

EXAMPLE



If the stock market is expected to do well over the near term, a portfolio manager may allocate greater portions of a portfolio to stocks. If the market is expected to decline, the portfolio manager may allocate greater portions of the portfolio entirely to bonds and cash. This is done in an attempt to create positive alpha for the portfolio.

An **active (tactical) portfolio manager**, using a particular stock selection approach, typically buys and sells individual securities. **Active management** relies on the manager's stock picking and *market timing* ability to outperform market indexes. Market timing is the strategy of making buy or sell decisions, generally regarding stocks, by attempting to predict future price movements. Usually, the focus is on timing the overall market rather than a specific security.

EXAMPLE



An active portfolio manager may position the portfolio in stocks within a few market sectors (such as pharmaceuticals and technology), frequently trading in and out of the stocks. An active manager may change the sector focus to capitalize on relative performance of different sectors during different stages of the business cycle. The goal is to successfully "time the market." The term used to describe this process is *sector rotating*, sometimes called *sector (or segment) rotation*. Different sectors of the economy are stronger at different points in the economic cycle. Each industry sector follows its cycle as dictated by the stage of the economy. Portfolio managers attempt to buy into the next sector that is about to experience a move up. When an industry sector reaches the peak of its move as defined by the business cycle, it is time to start to sell the sector.

TEST TOPIC ALERT



One way to remember that tactical is active is by thinking of the word like this: **tACTical**, where the *act* reminds you that it is *active* portfolio management.

Strategic Asset Allocation

Strategic asset allocation refers to the proportion of various types of investments composing a long-term investment portfolio.

A **passive portfolio manager** believes that no particular management style will consistently outperform market averages and therefore constructs a portfolio that mirrors a market index, such as the S&P 500. In many cases, rather than construct a portfolio, those following this style will simply recommend index funds and/or ETFs. Passive portfolio management seeks low-cost means of generating consistent, long-term returns with minimal turnover.

When a portfolio is passively managed, it can happen that one asset class or even a single security can rise or decline in such a manner as to cause the portfolio to no longer mirror the targeted index (or portfolio balance). When that happens, the manager will *rebalance* the portfolio (we'll demonstrate how in the next LO).



EXAMPLE

A standard asset allocation model suggests subtracting a person's age from 100 to determine the percentage of the portfolio to be invested in stocks. According to this method, a 30-year-old would be 70% invested in stocks and 30% in bonds and cash; a 70-year-old would be invested 30% invested in stocks with the remainder in bonds and cash.



TEST TOPIC ALERT

You may be asked about the relative commission expense when comparing active and passive management. It should be obvious that the more active the portfolio, the greater role commissions will play in determining overall portfolio performance. That is one reason why this style is more appropriate than strategic allocation for wrap-fee accounts.

Rebalancing

A passive portfolio is **rebalanced** to bring the asset mix back to the target allocations. If the stock market should perform better than expected, the client's proportion of stocks to bonds would be out of balance. So, on some timely basis (perhaps quarterly, but not less than annually), stocks would be sold and bonds would be purchased (or funds would be placed in cash) to bring the proportions back to the desired levels.



EXAMPLE

Using the 70% equity/30% debt model described above, the investor's initial investment of \$100,000 is split \$70,000 into equity securities and \$30,000 into debt securities. Let's say the account is to be rebalanced semiannually. Because of a bull market in stocks, six months later, the account value is \$120,000. Analysis of the account indicates that the value of the equities is now \$90,000, whereas the bonds have remained stable at \$30,000. To rebalance—that is, to bring the account back to the 70/30 ratio—it will be necessary to sell \$6,000 of the equity and invest those funds into debt. That will make the account \$84,000 equity and \$36,000 debt, our desired 70/30 ratio. The effect of this is that stocks are sold in a rising market and purchased in a falling market, following the old adage of "buy low and sell high."

Now, you try one:



PRACTICE QUESTION

A conservative client's portfolio is designed to have a 60/40 ratio of debt-to-equity securities. The initial investment was \$250,000. One year later, the value of the portfolio is \$260,000 with \$90,000 of that represented by the equity portion. If the portfolio is rebalanced annually, this would require

- A. selling \$14,000 of debt and buying \$14,000 of equity.
- B. selling \$14,000 of equity and buying \$14,000 of debt.
- C. selling \$6,000 of debt and buying \$4,000 of equity.
- D. buying \$10,000 of equity and selling \$10,000 of debt.

Answer: A. A 60/40 ratio will require that debt represent \$156,000 (60% of \$260,000) and equity represent the balance (\$104,000). Thus, this portfolio will be rebalanced by selling \$14,000 of debt and purchasing \$14,000 of equity, choice A.

Constant Ratio Plan

An investment plan that attempts to maintain the type of relationship shown in our example between debt and equity securities (or other asset classes) is sometimes called a constant ratio plan. Periodically, the account is rebalanced to bring it back to the desired ratio.

Constant Dollar Plan

This is another form of rebalancing. Under this investment plan, the goal is to maintain a constant dollar amount in stocks, moving money in and out of a money market fund when necessary. Using the last example, if the investor had a goal of a constant dollar amount of \$70,000 in stock, the other \$30,000 would be placed into a money market fund. When the stock value rose to \$90,000, \$20,000 would be liquidated and placed into the money market account. At this point, the account would have the desired \$70,000 in stock and now have \$50,000 in money markets. If the stock value should drop to \$55,000, the money market fund would be tapped for \$15,000 to get back to the \$70,000 constant dollar amount.



KNOWLEDGE CHECK 21.2

1. Which of the following statements is *correct* regarding a portfolio manager employing a tactical style?
 - A. The commission expense will likely be higher than one employing a passive style.
 - B. The portfolio will be rebalanced more often than would be the case with a passive style.
 - C. The manager is looking to create a positive beta.
 - D. The portfolio will contain a high percentage of index ETFs.
2. A senior client's IRA \$500,000 portfolio is 30/70 equity/debt mix. Six months later, the portfolio balance is \$520,000, of which \$170,000 is equity. If the investment adviser recommends semiannual rebalancing, the client will
 - A. sell \$14,000 of the equity and use the proceeds to purchase \$14,000 of debt.
 - B. sell \$14,000 of the debt and use the proceeds to purchase \$14,000 of equity.
 - C. stay put because selling now would realize a capital gain.
 - D. sell \$20,000 of equity and leave the debt unchanged to return to the original 30/70 mix at \$500,000.

LESSON 21.3: POPULAR MANAGEMENT STRATEGIES AND TECHNIQUES

LO 21.d Evaluate the methods used to determine the value of equity securities.

The two approaches most commonly used to select investments are fundamental and technical analysis. Both fundamental and technical analysts attempt to forecast prices or values of securities and markets.

Fundamental Analysis

Fundamental analysts evaluate broad-based economic trends; current business conditions within an industry; and the quality of a particular corporation's business, finances, and management. **Technical analysts** attempt to predict the direction of prices on the basis of charts reflecting price and trading volume patterns of specific securities without regard to the issuer's profitability. We will begin our discussion with fundamental analysis.

Fundamental analysis is the study of the business prospects of an individual company within the context of its industry and the overall economy. They do this by examining the company in detail, including the financial statements and company management. We could compare this to an individual receiving a full physical examination that, in addition to all kinds of tests, would include a detailed family medical history. With a company, the financial statement analysis is like the blood tests, x-rays, stress test, and so forth, and the evaluation of the company's management is like the medical history. One of the ways these analysts attempt to determine the value of common stock is through the use of dividend models.

Dividend Models

Some analysts believe that the value of a stock can be determined based upon current or anticipated dividends. The models work best with a company with dividends that are paid with regularity, so it is more popular with larger, well-established organizations than smaller companies with irregular dividend distributions. Two models used are the dividend discount model and the dividend growth model.

Dividend Discount Model

This model states that the fair current market value of a stock should be equal to the present value of all future dividends. There are several methods to use, such as assuming constant or variable dividends, but the concept is still the same. We take the investor's expected future returns (the dividends), and then discount that amount to compute the present value. It is not necessary to know the formula for the exam; however, it can be calculated by dividing the annual dividend by the expected return, sometimes referred to as the required rate of return. For example, if a stock pays a \$1.20 dividend and the required rate of return in the marketplace is 6%, the stock should be worth \$20 ($1.20/.06$). If it is priced above that, it might be overvalued; if less, it might be undervalued.

This tool may also be used to value preferred stock. Let's take a look at the following example:



EXAMPLE

If you have a \$100 par, 6% preferred stock and the required rate of return is 8%, what should the current market price of the stock be? You might encounter a question similar to this on the exam, and you solve it by dividing the \$6 dividend (6% of the \$100 par) by the 8% required rate of return: $\$6.00/.08 = \75 . In other words, if this preferred stock is selling for \$75 per share, the \$6 annual dividend will produce an 8% return on your investment.

Dividend Growth Model

This model assumes that the amount of the annual dividend will grow at a constant rate. Because projections of future growth can be hazy, this model is best used in conjunction with other forecasting tools. It is not necessary to know the formula for the exam; however, it should be obvious that the computed value will be higher when dividends are expected to grow rather than remain the same.



TEST TOPIC ALERT

If you are asked on the exam, "Which model computes a higher current stock price?", it should be common sense that the answer that factors in "growth" is the correct one. Remember, you will never have to do this computation on the test.



PRACTICE QUESTION

Among the popular methods of valuing equity securities is the dividend growth model. One could expect to see an analyst using this to value any of these **except**

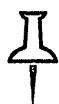
- common stock.
- ADRs representing common stock in a foreign company.
- preferred stock.
- none of these are exceptions.

Answer: C. In order to use the dividend growth model, there must be a possibility of dividend growth. Because preferred stock dividends are fixed, this tool would not make any sense.

Technical Analysis

While fundamental analysis looks at the company, technical analysis looks at the market. A fundamental analyst attempts to measure the business or financial risk inherent in investing in a particular security, whereas technical analysis is used by an analyst to measure the market risk assumed when investing in a particular security. You have to know the goal of technical analysis and several of the more popular technical systems.

Technical analysis is a method of attempting to predict stock price trends over the near term, generally four to six weeks. The prediction is based on current stock price trends and the relationship of the present trend to prior trends. These trends are measured through charts of price movements; therefore, it would be correct to say that a technician uses charts to attempt to predict future price movements in an effort to reduce timing risk. In using these charts of price movements, a technician also uses the trading volume of the stock in an attempt to validate the trends. That is, increasing volume when a stock's price is rising is a bullish sign, and increasing volume when the stock's price is declining is a bearish sign. Let's start by defining some key terms.

**TAKE NOTE**

A technical analyst **charts** a stock's **price** and **volume** over a period of **time**.

**TEST TOPIC ALERT**

Remember that the market price of a security (the number that is being charted) is based on supply and demand.

Trendlines. In an effort to see where the price of stock may be going, the technician charts where it has been. She attempts to determine from her chart what the trend has been by drawing a trendline. A popular saying is, "the trend is your friend."

Support and resistance. Chartists believe that one can understand more about a stock by studying its chart. Two of the most important conclusions drawn from a chart are the support levels and resistance levels. The **support level** is that price where the stock price "bottoms." In other words, once it gets that low, there becomes an imbalance between buyers and sellers (more investors seek to buy than sell) and the price begins to rise. The opposite is the **resistance level**, where the stock's price reaches a high enough level where there are now more sellers than buyers and the stock no longer rises in price. Just think of the English definitions of the terms and they make sense—that is, support is where you stop falling and resistance is where you can't go any higher.

Breakout. When the price movement penetrates the support or the resistance level, it is known as a **breakout**. The analyst believes that once a breakout has been confirmed, there will be rapid price movement in the direction of the break until a new support or resistance level is established. The technician believes that if a breakout through **resistance** can be spotted, it represents a good buying opportunity for those quick enough to take advantage. Conversely, a breakout through the support level would represent a good opportunity for short sellers able to move quickly.

Moving averages. To avoid the volatility frequently present in stock price trends, analysts will use the moving average. A **moving average** attempts to modify the fluctuations of stock prices into a smoothed trend; the distortions are reduced to a minimum. For example, to plot a 13-week moving average on a particular stock, take the Friday closing price for each of the previous 13 weeks, add them together, and divide by 13. That number will be the average closing price for the last 13 weeks, and that number is plotted. The next week you would add the new closing price for that week and delete the closing price for the first week used, 14 weeks ago. This average would be plotted on the same chart as the actual current price movement of the stock. Changes in the trend of the stock being plotted are identified not by a change in the direction of the moving average but by the price of the security crossing over the moving average. If the stock price moved below the moving average, it is usually a signal of a change from a rising market to a declining market. The reverse is also true.

Technical Market Theories

Technical analysts follow various theories regarding market trends.

Short Interest Theory

Short interest refers to the number of shares that have been sold short. Because short positions must be repurchased eventually, some analysts believe that short interest reflects mandatory demand that creates a support level for stock prices. High short interest is a bullish indicator, and low short interest is a bearish indicator.

Odd-Lot Theory

Typically, small investors engage in **odd-lot trading**, which is transactions of fewer than 100 shares. **Odd-lot theorists** believe that small investors invariably buy and sell at the wrong times. When odd-lot traders buy, odd-lot analysts are bearish. When odd-lot traders sell, odd-lot analysts are bullish.

Advance/Decline Theory

The number of issues closing up or down on a specific day reflects market breadth. The number of advances and declines can be a significant indication of the market's relative strength. When declines outnumber advances by a large amount, the market is bearish even if it closed higher. In bull markets, advances substantially outnumber declines. Technical analysts plot daily advances and declines on a graph to produce an advance/decline line that gives them an indication of market breadth trends.

PRACTICE QUESTION



In the assessment of a company's stock, a technical analyst takes into consideration all of the following **except**

- A. earnings.
- B. market price.
- C. price trends.
- D. volume.

Answer: A. A market technician (technical analyst) deals primarily with timing of activity and market trends, while a fundamental analyst centers on a particular industry or company within an industry and its earnings (choice A), relative health, and market potential.

PRACTICE QUESTION



Proponents of which of the following technical theories assume that small investors are usually wrong?

- A. Advance/decline
- B. Moving averages
- C. Odd lot
- D. Short interest

Answer: C. Odd lots are usually traded by small investors; some analysts believe small investors are generally wrong, making choice C correct.

LO 21.e Contrast the different portfolio management strategies, styles, and techniques.

Management Styles and Techniques

There are a number of different styles and techniques used by money managers. For the most part, these can be considered subsets of either active or passive management (or both).

Buy and Hold

A buy-and-hold manager rarely trades in the portfolio. This results in lower transaction costs and capital gains, which are invariably taxed at the lower long-term rate (Unit 15). A low expense ratio in a mutual fund often may reflect a buy-and-hold approach. This is the classic passive strategy used by investors for many years and is probably the easiest of all to implement and follow.

With this strategy, there is always the question, “When do I sell?” As with most investment strategies, there are varying opinions. On an individual investor level, one of the most common reasons for unloading a position is a change in objectives. This is certainly true as one ages, or if one has a windfall, such as an inheritance. Of course, if there is a personal financial need, the asset will be sold to provide the necessary funds. Portfolio managers using this style may sell when the stock’s fundamentals have weakened, such as a sharp decrease in earnings, or there is a change in the competitive arena (think of what digital cameras did to Kodak). Another case would be when the company’s price-to-earnings (P/E) ratio has reached levels well above those for its competitors.

TEST TOPIC ALERT



Maybe you’ve owned a car that was, so to speak, a lemon. That generally means that you had high maintenance costs. Well, one point to know about the buy-and-hold style is that it is just the opposite—it is low *maintenance*.

Indexing

Investment portfolios constructed to mirror the components of a particular stock index, such as the S&P 500, will normally perform in line with the index. Because such portfolios are not actively managed, the costs of managing the portfolio are relatively low. With less frequent portfolio turnover, these funds have lower transaction costs and tend to be more tax efficient. Because most professional money managers are unable to consistently outperform market indexes, indexed mutual fund portfolios are a popular vehicle for investors. With the advent of index funds and ETFs, this has become a very popular passive strategy.

Growth vs. Value

One of the longest running arguments in investment analysis is, “Which is more successful, the growth style or the value style?” The father of value investing was Benjamin Graham, and his text *Security Analysis* (co-authored with David Dodd) is still widely read today. The exam won’t ask you about Graham and Dodd but will want you to know the essential features of both styles.

Growth Style

Portfolio managers using the **growth** style of portfolio management focus on stocks of companies whose earnings are growing faster than most other stocks and are expected to continue to do so. Because rapid growth in earnings is often priced into the stocks, growth investment managers are likely to buy stocks that are at the high end of their 52-week price range. Therefore, in the eyes of some, they might be buying stocks that are overvalued. Because this adds an element of business risk, it is common for growth managers to include some negatively correlated assets to their portfolios.



TEST TOPIC ALERT

Growth managers are looking for **earnings momentum**.

Value

Portfolio managers using the **value** style of management concentrate on undervalued or out-of-favor securities whose price is low relative to the company's earnings or book value and whose earnings prospects are believed to be unattractive by investors and securities analysts. In fact, sometimes value managers think they can find a bargain with companies that are currently operating at a loss (no earnings, hence no P/E ratio). Value investment managers seek to buy undervalued securities before the company reports positive earnings surprises. Their primary source of information is the company's financial statements. Value investment managers are more likely to buy stocks that are at the bottom of their 52-week price range.



TEST TOPIC ALERT

In addition to the pricing models expressed above, growth managers expect to see high P/E ratios (price-to-earnings ratios) or high price-to-book ratios with little or no dividends. On the other hand, value managers expect to see low P/E ratios or low price-to-book ratios and dividends offering a reasonable yield. Another sign of a value stock is a large cash surplus, sometimes referred to as a *rainy day fund*.



EXAMPLE

ABC Co. is a metal processor for parts used in the automotive industry. Earnings per share have grown by a compounded rate of 8% per year for the past 15 years but are somewhat susceptible to downturns in the economy. The stock has paid a quarterly dividend that has increased five times in the past 10 years, and the current market price of the stock is 6 times the earnings. Conservatively managed, the company owns assets and cash that exceed the market value of its common stock. ABC would be attractive to *value* investors because its intrinsic value is higher than its market value, it appears to pay liberal dividends, and it is selling for a low earnings multiple.

Other Portfolio Management Styles

In addition to those already described, there are several other styles you should be familiar with.

Contrarian

A contrarian is an investment manager who takes positions opposite that of other managers or in opposition to general market beliefs. In essence, these managers buy when everyone else is selling and sell when everyone else is buying.

Income vs. Capital Appreciation

At first glance, this might appear to be a rehashing of growth versus value and, although there are some similarities, you should be aware of what each of these styles represents.

Capital appreciation can take several forms, from moderate to aggressive. Although growth stocks will frequently be found in these portfolios, the hunt for appreciation will also involve options and/or futures, special situation stocks (potential takeover or merger candidates), futures, IPOs, and day trading. When recommending a manager using this style, it is critical

to determine where on the risk scale, from lower to moderate to speculative, this manager's philosophy is. Then, and only then, can you attempt to match it with your clients.

As the term implies, the income style focuses on generating portfolio income. When dividends on common stock offer better income opportunities than interest on debt securities, the portfolio will be overweighted in that direction. Frequently, the search for income will lead the portfolio manager to foreign securities and/or high-yield bonds. When recommending a manager using this style, it is important to evaluate the risks being taken to provide income. For the most part, an income style relies heavily on debt securities.

Market Capitalization

Another portfolio management style is using market capitalization to influence security selection. A company's market capitalization (usually referred to as market cap) is the product of the number of outstanding shares and the current market price per share. For example, if a corporation has 100 million shares of common stock outstanding and the market price per share is \$50, the market cap is \$5 billion.

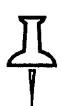
Although the boundaries are imprecise, micro-cap companies are generally those with a market capitalization of less than \$300 million; small-cap companies are generally those with a market capitalization of between \$300 million and \$2 billion; mid-cap companies are those with \$2 billion to \$10 billion; and large-cap companies are those with more than \$10 billion.

It is generally assumed that small companies with a short history, small product line, and limited financial resources represent a larger degree of risk in an economic downturn. As revenues, product diversification, and financial worth increase, the relative risk the company carries in a weak economy diminishes. In Unit 22, we will match each level to its appropriate benchmark index.



TEST TOPIC ALERT

Look out for numbers written in long form. For example, where would you categorize a stock with a market capitalization of \$5,000,000,000? Were you able to fight through all of those zeroes to see that this is \$5 billion and is a mid-cap security?



TAKE NOTE

In a strong economy, small, fast-moving companies with a concentrated product line in a fast-growing sector can dramatically outperform larger, more bureaucratic companies.

Monte Carlo Simulations

Stochastic modeling is a method of financial analysis that attempts to forecast how investment returns on different asset classes vary over time by using thousands of simulations to produce probability distributions for various outcomes. The term *stochastic* comes from the Greek word meaning "to aim or guess."

When an investment adviser is called upon to provide advice on developing a plan for a client's funds to last throughout what might be a 30-year or even longer retirement, all the adviser can do is make an educated guess.

A popular form of stochastic modeling that uses computer-generated distributions is the Monte Carlo simulation (MCS). This simulation is an analytic and risk management tool

widely used in finance. MCS incorporates computer programming to generate thousands of different probabilities.

Consider the uncertainty in retirement planning. Small changes in the projected rate of return will make a dramatic difference in the outcome. Life expectancy is also another important variable that may be incorrectly approximated. MCS uses a random number generator to provide an output with specific probabilities of outcomes. The simulation provides insight into the range of outcomes and provides the user (the investor or adviser) with both best-case and worst-case scenarios.

Advantages:

- MCS can clearly display trade-offs of risk and return. The paths can be ranked from best to worst to assess the probability of any given outcome.
- A clearer understanding of short-term and long-term risk can be gained. For example, reducing the holdings of risky stock would reduce the short-term variability of the portfolio but increase the long-term risk of running out of money.
- MCS can better model the real probability process where return over time depends not only on the starting value of the period but also on the additions or withdrawals to the portfolio at each future period.
- Points along the timeline can be considered to answer questions such as the following: "Do savings need to be increased?" "Can I retire earlier?" "Must I retire later?" "Do I need to reduce my withdrawal rate?" "Can I increase my withdrawal rate?"

Disadvantages:

- Simplistic use of historical data, such as expected returns, for the inputs. Returns change and have a major effect on projected future values of the portfolio.
- Models that simulate the return of asset classes but not the actual assets held. Simulating the return of the Wilshire 5000 or the S&P 500 when a fund with fees will be held could significantly overstate the future value or time period over which distributions can be sustained.

For an individual entering retirement, the timing of the cash flows out of the portfolio and the sequence of returns are critical.



EXAMPLE

Consider two clients, Mr. Jones and Ms. Smith. Both enter retirement with \$1 million, both withdraw \$50,000 per year from their portfolios, and both portfolios generate an average return of 10% over the life of the portfolios. Their yearly results are the same, but they come in different sequences. Mr. Jones experiences 15 up years followed by 5 down years. Ms. Smith experiences 5 down years followed by 15 up years. Mr. Jones will be better off than Ms. Smith, because Ms. Smith will deplete her portfolio in the early years, and hence her portfolio will not benefit fully from the positive return years down the line.

The concept of ill-timed cash flows may be easy for experienced advisers to grasp, but it is not one that clients readily understand. Through the use of MCS, advisers can easily generate charts and graphs to educate clients about sequential return issues.

LO 21.f Compare the three techniques for minimizing interest rate risk.

Most of the substance of the exam will deal with strategies employed in equity investing, but you may be asked about several popular strategies used by bond buyers. Primarily, the goal in all of these strategies is to mitigate the effects of interest rate fluctuations on the value of the principal, the income received, or both. Three in particular that have appeared on the exam are:

- ❑ the barbell strategy;
- ❑ the bullet strategy; and
- ❑ the laddering strategy.

All three of these are considered active rather than passive, and we will look at them individually.

Barbells

Envision a barbell—what do you see? A thin bar with heavy weights of equal size on each end. That's what a bond portfolio using the barbell strategy looks like. The investor purchases bonds maturing in one or two years and an equal amount maturing in 10 (or more) years with no bonds in between.

Assuming a normal yield curve, the long-term end of the barbell contains bonds offering the higher long-term interest rates, while the short-term end provides you with soon-to-be-realized cash (as they mature) that may be reinvested at higher rates if that is the direction the market takes. This is not a passive strategy like buy and hold—you will be actively buying new bonds as the old ones get closer to maturity.

Bullets

For what do you use a bullet? You use it to hit a target, and that is the concept behind the bullet strategy. Let's say the target is funds for a child's college education, and the child is currently 6 years old. This strategy would have the investor purchase bonds today that mature in 12 years (assuming college will start when the child is 18). Two years from now, the investor should purchase some more bonds, but those should have a 10-year maturity. In another 2 years, another purchase is made, this time of bonds that have 8 years to go, and so forth. A picture of this active strategy would reveal bonds purchased at different times but all maturing at the same time. This tends to allow the investor to capture current interest rates as they change rather than having the entire portfolio locked into one rate.

Ladders

Picture a ladder. You see rungs at set intervals going from bottom to top. That is the concept behind a laddered portfolio. Unlike the bullet strategy described previously, where the bonds are bought at different times but all mature together, in a laddered strategy, the bonds are all purchased at the same time but mature at different times (like the steps on the ladder). As the shorter maturities come due, they are reinvested and now become the long-term ones. This has also been a very common strategy with those purchasing CDs at their local bank.

PRACTICE QUESTION

An investor in debt securities might elect to use any one of the following techniques to limit interest rate risk **except**

- A. barbells.
- B. bullets.
- C. increasing the duration.
- D. laddering.

Answer: C. The longer the duration, the greater the interest rate risk, so the investor would not want to do that. The others are useful strategies for reducing interest rate risk.

**KNOWLEDGE CHECK 21.3**

1. An analyst using the dividend discount model is attempting to
 - A. estimate the current earnings of a stock.
 - B. estimate the current price of a stock.
 - C. estimate the current return of a stock.
 - D. calculate the current return of a stock.
2. A portfolio manager who typically purchases common stock when its market price is below the book value per share is most likely categorized as
 - A. a contrarian.
 - B. a growth manager.
 - C. a value manager.
 - D. using the buy-and-hold strategy.
3. Which of the following statements regarding a bond ladder strategy is **correct**?
 - A. A bond ladder strategy involves the purchase of very long-term and very short-term bonds.
 - B. A laddered portfolio of bonds will provide lower yields than a portfolio consisting entirely of short-term bonds.
 - C. A bond ladder strategy is generally more aggressive than a bond barbell strategy.
 - D. A bond ladder strategy is a relatively easy way to immunize a portfolio against interest rate risk.

LESSON 21.4: MODERN PORTFOLIO THEORY

LO 21.g Identify the components of the capital market theory.

Capital Market Theory

Portfolio management theory builds on a foundation of assumptions about investors' behavior and was first introduced by Harry Markowitz in 1952. At its core, modern portfolio theory proceeds from the premise that investors will behave rationally. Pricing models have been introduced to determine what should be the proper market price for investment assets. The most familiar and useful of these models is the capital asset pricing model, known as CAPM, which derives from the work of Markowitz and others, including William Sharpe, after whom the Sharpe ratio was named.

There are several capital market theories, all with the goal of maximizing returns while minimizing risks.

The capital asset pricing model (CAPM) is a securities market investment theory allowing the investor to determine an asset's expected rate of return, a form of risk-adjusted return encapsulating how much risk the investor should assume to obtain a particular return from an investment. The CAPM does so solely on the basis of the asset's *systematic* (nondiversifiable) risk.

It was William Sharpe who first formulated the CAPM in the 1960s. The basic premise is that every investment carries two distinct risks: systematic risk, which cannot be diversified away, and unsystematic risk, which can be mitigated through appropriate diversification. As a result of this work and its further refinements, Professor Sharpe was awarded the Nobel Prize in Economics in 1990 (that isn't tested). You will see several applications of the CAPM in upcoming paragraphs.

Modern Portfolio Theory

Modern portfolio theory (MPT) is an approach that attempts to quantify and control portfolio risk. It differs from a traditional securities analysis in that it emphasizes determining the relationship between risk and reward in the total portfolio rather than analyzing specific securities. Under the CAPM, the investor should be rewarded for the risks taken, so it is proper to assume that the higher the risk, the higher the return.

Instead of emphasizing particular stocks, **MPT** focuses on the relationships among all the investments in a portfolio. This theory holds that specific risk can be diversified away by building portfolios of assets whose returns are not correlated.

MPT diversification allows investors to reduce the risk in a portfolio while simultaneously increasing expected returns.

Diversification reduces risk only when assets whose prices move inversely, or at different times, in relation to each other are combined. In other words, decreased correlation leads to decreased risk.

The theory is that, all factors being equal, the portfolio with the least amount of volatility would do better than one with a greater amount of volatility.

TEST TOPIC ALERT



The goal is to design the optimal portfolio. An **optimal portfolio** is one that returns the highest rate of return consistent with the amount of risk an investor is willing to take. In other words, an optimal portfolio is the portfolio that makes the best trade-off between risk and reward for a given investor's investment profile. Simply stated, given a choice between assets with equal rates of expected return, the risk-averse investor will always select the asset with the lowest level of risk.

PRACTICE QUESTION



Risk aversion means that if two assets have identical expected returns, a risk-averse individual will choose the asset with the

- lower risk level.
- higher standard deviation.
- shorter payback period.
- higher expected return.

Answer: A. Risk-averse investors are those with a low tolerance or capacity for risk. Given a choice between assets with equal rates of expected return, the risk-averse investor will always select the asset with the lowest level of risk, choice A. Standard deviation is a way to quantify risk—the higher the standard deviation, the greater the volatility. The payback period is used to evaluate capital projects, not investment returns.

Capital Market Assumptions

The capital market theory builds upon the Markowitz portfolio model. The main assumptions of the capital market theory are as follows.

1. All investors can borrow or lend money at the risk-free rate of return.
2. All investors are rational and evaluate investments in terms of expected return and variability (standard deviation). Therefore, given a set of security prices and a risk-free rate, all investors use the same information to generate an efficient frontier.
3. The time horizon is equal for all investors: when choosing investments, investors have equal time horizons for the chosen investments.
4. There are no transaction costs or personal income taxes; investors are indifferent between capital gains and dividends.
5. There is no inflation.
6. All assets are infinitely divisible: this indicates that fractional shares can be purchased.
7. There is no mispricing within the capital markets: it is assumed that the markets are efficient and that no mispricings within the markets exist. Another way to state this is that capital markets are in equilibrium.

Capital Market Line

One of the offshoots of the CAPM is the capital market line (CML). The CML provides an expected return based on the total level of risk as measured by the standard deviation. The equation for the CML uses the:

- ❑ expected return of the portfolio;
- ❑ risk-free rate;
- ❑ return on the market;
- ❑ standard deviation of the market; and
- ❑ standard deviation of the portfolio.



TAKE NOTE

Note that the CML, like Markowitz's efficient frontier, uses standard deviation as the measure of risk.



TEST TOPIC ALERT

Please note that alpha and beta are not used in the CML equation, while standard deviation is used.

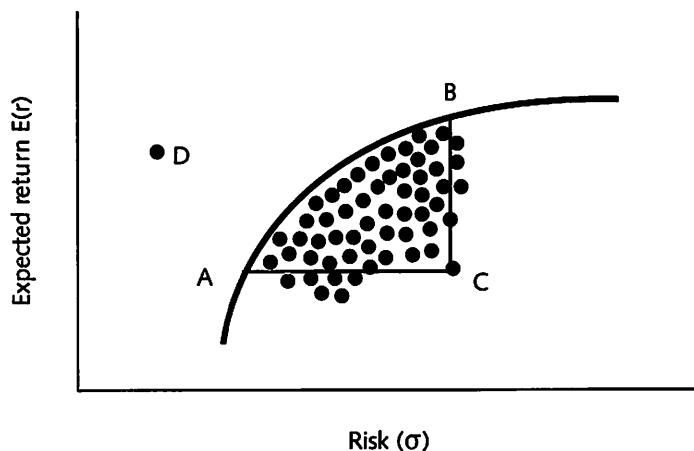
Efficient Portfolios/Efficient Frontier

The goal of modern portfolio theory is to construct the most efficient portfolio. One selects the efficient set from the feasible set. The feasible set of portfolios represents all portfolios that can be constructed from a given set of equities. An efficient portfolio is one that offers:

- the most return for a given amount of risk; or
- the least risk for a given amount of return.

The collection of efficient portfolios is called the **efficient set** or **efficient frontier**. The universe of these portfolios is, in turn, plotted on a risk-return parabola known as the efficient frontier. Specifically, this curve represents that set of portfolios that has the maximum rate of return for every given level of risk. The objective is for the portfolio to lie on the curve. Then, by being **on** the efficient frontier, the optimal portfolio has been created. Any portfolio that is below the curve (not an efficient one) is said to be taking too much risk for too little return. A portfolio above the efficient frontier is impossible. In pictorial terms, the efficient frontier is depicted as follows:

Efficient Frontier



Every portfolio residing **on** the efficient frontier has either a higher rate of return for equal risk or lower risk for an equal rate of return than another portfolio below (underneath) the frontier. For example, in the previous graphic, Portfolios A and B are both equally efficient and are more efficient than Portfolio C because:

1. Portfolio A has an equal expected rate of return as Portfolio C but with a significantly lower level of assumed risk; and
2. Portfolio B has an equal level of assumed risk as Portfolio C but with a significantly higher expected rate of return.

Therefore, Portfolio C is inefficient; it is attainable but not optimal.

Portfolio D is unattainable because it resides above the efficient frontier. As the graphic indicates, the expected rate of return is unattainable because it is located outside the universe of available portfolios.

In the figure, Portfolios A and B are both efficient, but Portfolio C is not.

PRACTICE QUESTION

According to modern portfolio theory, the optimal portfolio is one that

- A. lies above the efficient frontier.
- B. lies below the efficient frontier.
- C. lies on the efficient frontier.
- D. provides the lowest return for the highest risk.

Answer: C. The efficient frontier is a curve representing the amount of return for a specified risk. Portfolios residing on that curve provide the highest return for that level of risk and are considered optimal or efficient portfolios. A portfolio below the efficient frontier is inefficient, and a portfolio cannot lie above the curve.

LO 21.h Calculate the expected return using the security market line.

The CML provides an expected return for a portfolio based on the expected return of the market, the risk-free rate of return, and the standard deviation of the portfolio in relation to the standard deviation of the market. The CML is generally used to evaluate diversified portfolios. The security market line (SML), which is derived from the CML, allows us to evaluate individual securities for use in a diversified portfolio based on:

- The expected return for the asset
- The risk-free rate
- The return on the market
- The beta of the asset

The security market line determines the expected return for a security on the basis of its beta and the expectations about the market and the risk-free rate. Basically, we want to determine how much over the risk-free rate we should earn for taking the investment risk. You may be asked to compute the expected return using the SML. It is done like this:

We start by comparing the market's return to the RF rate (expecting it will be higher because of the risk). Then we multiply that difference by the stock's beta and add that number to the RF rate. Here is the formula:

$$([Return \text{ of } the \text{ market} - the \text{ risk-free} \text{ rate}] \times \text{beta}) + \text{RF} \text{ rate}$$

It is much easier to follow with the numbers.

EXAMPLE

If the beta of ABC Company is 1.2 and the market return is expected to be 13% with a risk-free return of 3%, then the expected return of ABC is 15%, as follows:

Let's follow the formula we just showed you. We begin with the difference between the risk-free rate and market rate ($13\% - 3\% = 10\%$). Then we multiply the expected return in excess of the RF rate by the stock's beta, $(10\% \times 1.2) = 12\%$. Finally, we add the RF rate (3%) to the 12% and arrive at 15%. Therefore, on the basis of the level of systematic risk of ABC Company, it should earn a return of 15%. The SML helps identify how the characteristics of a portfolio will be impacted when a security is added to the portfolio. You should note that the SML accounts for the impact of systematic risk (as measured by beta) only and does not take into consideration unsystematic risk, which is assumed to have been diversified away.

**TEST TOPIC ALERT**

The CML measures the risk through standard deviation (total risk). The SML measures the risk through beta (systematic risk only).

LO 21.i Identify the three forms of the efficient market hypothesis.

The **efficient market hypothesis (EMH)** maintains that security prices adjust rapidly to new information, with security prices fully reflecting all available information. In other words, markets are efficiently priced as a result. This is sometimes referred to as the **random walk theory**. The random walk theory would suggest that “throwing darts” at the stock listings is as good a method as any for selecting stocks for investment.

Eugene F. Fama, professor at the University of Chicago, coined the term in a 1965 *Financial Analysts Journal* article entitled “Random Walks in Stock Market Prices.”

There are three versions of the EMH based upon the level of available information. The more information available, the more likely it is that you should be able to beat the market. But, as we will see, under this theory the conclusion is that under all circumstances, there is **no way** to accurately predict stock prices, and a passive strategy is probably the most suitable for investment success.

Weak Form Market Efficiency

The *weak form* holds that current stock prices have already incorporated all historical market data and that historical price trends are, therefore, of no value in predicting future price changes. Although fundamental analysis and insider information may produce above-market returns under the weak form, technical analysis is of no value. Indeed, none of the forms of EMH attributes any value to technical analysis.

Semi-Strong Form Market Efficiency

The *semi-strong form* holds that current stock prices not only reflect all historical price data but also reflect data from analyzing financial statements, industry, or current economic outlook. Thus, even fundamental analysis is of no value in this form, and only insider information may produce above-market returns. Technical analysis is also of no value.

Strong Form Market Efficiency

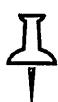
The *strong form* of the EMH states that security prices *fully reflect all information from both public and private sources*. The strong form includes all types of information: past security market, public, and private (inside) information. This means that no group of investors has monopolistic access to information relevant to the formation of prices, and none should be able to consistently achieve positive abnormal returns.

Although some would disagree, the prevailing opinion is that the only thing that will work in this case is the random walk—just throwing darts, because the market is totally efficient, with market prices quickly adjusting to reflect new information.



TAKE NOTE

According to the EMH, if a financial market is weakly efficient, technical analysis will be useless, but it is still possible to use fundamental analysis to seek out mispriced investments. On the other hand, if a financial market is semi-strongly efficient, there is no point in using any fundamental analysis tools—all of that information is already in the hands of all investors. If a financial market is strongly efficient, then everything, including information generally only available to insiders, is known and, without an edge, there is no benefit to be gained by using any analytical tools.



TAKE NOTE

As a base level knowledge of the EMH, you should know that the weak form is based on past security market information; the semi-strong form is based on all public information (including market information); and the strong form is based on both public information and inside or private information.

The following chart may help you with EMH.

The Three Forms of EMH

| Form | Won't Work | Will Work |
|-------------|----------------------|--|
| Weak | Technical analysis | Fundamental analysis and insider information |
| Semi-strong | Fundamental analysis | Insider information |
| Strong | Insider information | Random walk |



TEST TOPIC ALERT

You may have to know that there is no such term as **semi-weak** EMH. We can't imagine what would be weaker than **weak** anyway.



PRACTICE QUESTION

Followers of the efficient market hypothesis believe that

- A. following the business cycle is the best way to maximize returns.
- B. concentration, rather than diversification, will produce superior returns.
- C. by following the pundits on TV, you'll wind up rich.
- D. an efficient market is one that produces random results.

Answer: D. EMH is really just an extension of the random walk theory, which states that “throwing darts” at the stock market page is as good as any way to select investments. If the market is truly efficient, no one has an edge.



KNOWLEDGE CHECK 21.4

1. The capital asset pricing model (CAPM) is a securities market investment theory allowing the investor to determine an asset's expected rate of return, a form of risk-adjusted return encapsulating how much risk the investor should assume to obtain a particular return from an investment. The theory includes a number of assumptions. Which of the following is *not* one of those assumptions?
 - A. All investors can borrow or lend money at the risk-free rate of return.
 - B. The time horizon is equal for all investors.
 - C. There are no transaction costs or personal income taxes other than those on capital gains.
 - D. There is no inflation.

2. If the beta of KMS Company is 0.7 and the market return is expected to be 20% with a risk-free return of 2%, then, using the SML, the expected return of ABC is
 - A. 14.0%.
 - B. 14.6%.
 - C. 17.4%.
 - D. 25.7%.
3. Which form of the efficient market hypothesis (EMH) states that excess returns cannot be obtained using technical analysis?
 - A. Semi-strong form
 - B. Strong form
 - C. Weak form
 - D. All of these

LESSON 21.5: AVERAGING AND HEDGING TECHNIQUES

LO 21.j Illustrate how dollar cost averaging results in lowering an investor's average cost per share.

One common fear of investors is buying at the top of the market. One can never know when a bull market will reverse its course. Conversely, we all want to get in at the bottom, but how do you know when the bear market is over? Because no one knows all of the answers, one popular technique is time-based investing to average your cost. The most tested time-based investment program used by investors is **dollar cost averaging**.

Investors use **dollar cost averaging** as a means to invest consistent amounts of money in a mutual fund or stock at regular periodic intervals, such as monthly or quarterly. This form of investing allows the individual to purchase more shares when prices are low and fewer shares when prices are high. This has the effect of reducing timing risk, the risk that all of your money will be invested at a market top. In a fluctuating market, the average cost per share is lower than the average price per share.



EXAMPLE

The following table illustrates how average price and average cost may vary with dollar cost averaging.

| Month | Amount Invested | Price per Share | No. of Shares |
|----------|-----------------|-----------------|---------------|
| January | \$600 | \$20 | 30 |
| February | \$600 | \$24 | 25 |
| March | \$600 | \$30 | 20 |
| April | \$600 | \$40 | 15 |
| Total | \$2,400 | \$114 | 90 |

The average cost per share equals \$2,400 (the total investment) divided by 90 (the total number of shares purchased), or \$26.67 per share, whereas the average price per share is \$28.50 ($\$114 \div 4$). With any market fluctuations, this strategy will produce a lower cost (\$26.67) than average price (\$28.50). This average cost of \$26.67, not the average price paid of \$28.50, is the investor's cost basis when the shares are subsequently sold.

**TEST TOPIC ALERT**

Although it is unlikely that you will have to compute the average price or average cost per share, a question may ask the purpose of dollar cost averaging. The purpose of dollar cost averaging is to reduce the investor's average cost to acquire a security over the buying period relative to its average price.

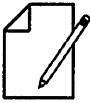
LO 21.k Describe the use of put and call options to hedge positions.

Hedging Strategies

The final strategy discussed in this unit is using options to hedge a position. In the real world, these are very popular tools to limit risk, and the exam usually contains one question on their use. An investor with a long position in a stock (she owns it) can use options to hedge the position's risks. Remember the term *hedge*, used in this context, means to protect.

Long Stock and Long Puts

What if the investor is concerned about a potential drop in the price of her stock? An investor who owns a stock can protect against a decline in market value by buying a put. Doing so allows the investor to sell the stock by exercising the put if the stock price declines before expiration, which will offset the decline in the stock price. This strategy is called **portfolio insurance** or the purchase of a **protective put**. Any profits in the stock are offset by the cost of the put premiums.

**EXAMPLE**

A concerned (*afraid*) investor who owns 100 shares of stock with a current market value of \$50 purchases a 50 put at \$2.50 for protection. If the stock goes down to \$40 per share, the investor has the ability to exercise the put, deliver the stock, and receive \$50 per share. The only cost for this protection is the **premium** of \$2.50 paid for the put. So, instead of losing \$1,000, the loss was held to only \$250.

**TEST TOPIC ALERT**

This strategy is also useful for managers of large portfolios, such as pension funds. If the portfolio consisted of large-cap stocks, a way to hedge against a down market would be to purchase put options on an index that mirrors the portfolio. In the case of large-cap stocks, that would generally be the S&P 500 index (more about that in Unit 22).

Long Stock and Short Calls (Covered Call Writing)

A **covered call** is a call written (sold) on a stock an investor owns. The covered call writer reduces the risk of that long stock position and *generates income* with the dollars received in premiums from selling the call. If the call is not exercised, the call writer keeps the premium. If the call is exercised, the covered call writer can deliver the stock owned. The covered call writer limits potential gain in exchange for the partial protection against a loss.

Partial protection. By writing a covered call and receiving the premium, an investor, in effect, reduces the stock cost by the premium amount. If the stock price falls below the purchase price minus the premium received, the investor incurs a loss. Should the stock price rise dramatically, the stock will likely be called.



EXAMPLE

An investor buys 100 shares of RST at 53 and writes 1 RST 55 call for 2. The premium offsets the stock price by the \$2 per share premium received. The maximum gain equals \$400: if the stock price rises above 55, the call will be exercised; thus, the investor will sell the stock for a gain of \$200, in addition to the \$200 premium received. The \$200 premium initially received lowers the true cost of the stock to \$51 per share, so the investor is protected against loss for the first 2 points of market decline. The maximum loss is \$5,100 (instead of \$5,300) should the stock become worthless.



TAKE NOTE

A covered call provides partial protection that generates income but reduces the stock's potential gain. Buying puts provides nearly total loss protection that costs money yet does not reduce the stock position's potential gain. The benefit of the covered call is that it does offer some hedging with no cost. In fact, the investor actually receives income in the form of the premium.

Short Stock and Long Calls

An investor who sells a stock short sells borrowed stock, expecting the price to decline. The short seller must buy stock to repay the stock loan and hopes to do so at a lower price. A short seller can buy calls to protect against a price rise. If you are not familiar with the concept of short selling, it will be covered in Unit 23.



EXAMPLE

An investor sells short 100 shares of RST at 58 and buys an RST 60 call for 3. The maximum loss is no longer unlimited as it would normally be for a short sale. Instead, it is \$500: no matter how high the stock price rises above \$60, the investor will exercise the call to buy the stock for 60, incurring a \$200 loss on the short sale, in addition to the \$300 paid for the call.



TEST TOPIC ALERT

The majority of our students report a question on protecting against loss on a short sale. As shown above, the best way to hedge is to buy a call option on the stock underlying the short sale. This strategy offers full protection against loss. Please notice that in protecting the long or short position, the investor buys an option. It is useful to remember that "you buy protection; you don't sell it." The same logic is true with futures contracts. The way to hedge is to buy. That creates what is called a *long hedge*.

**KNOWLEDGE CHECK 21.5**

1. An investor has set up an automatic bank draft to purchase \$200 of the KAPCO Balanced Fund every month. Over the past five months, per share prices when the purchases were executed were \$10.00, \$12.00, \$15.00, \$14.00, and \$11.00. Using this dollar-cost averaging program resulted in an average cost per share of
 - A. \$12.00.
 - B. \$12.13.
 - C. \$12.40.
 - D. \$82.47.
2. An investor owns 100 shares of Lockstone Pipeline Incorporated (LPI) and is concerned that the stock's price has downside volatility. Without a cash outlay, this investor could partially hedge the position by
 - A. buying an LPI call.
 - B. buying an LPI put.
 - C. selling an LPI put.
 - D. selling an LPI call.

KNOWLEDGE CHECK ANSWERS

Knowledge Check 21.1

1. **C** The primary asset classes for asset allocation purposes are equity, debt, and cash (or cash equivalents). In addition, many consider real estate to be an asset allocation class. However, fund managers usually invest in that asset through liquid investments, such as REITs, not raw land.

LO 21.a

2. **A** Diversifiable risks are those unsystematic risks we covered in Unit 19. By investing in a number of different companies and industries, the business risk of the failure of one of them is minimized. It is the old saying: “Don’t put all of your eggs in one basket.” Interest rate, market, and purchasing power risks are all systematic risks and are considered nondiversifiable. For example, regardless of how well a bond portfolio is diversified, it will be affected by changes in interest rates and the inflation rate.

LO 21.b

Knowledge Check 21.2

1. **A** A tactical portfolio management style is an active one with frequent trading. As such, commissions will be a larger portion of the operating expenses than would be the case with a passive strategy. Rebalancing is an integral part of passive management. The very nature of tactical management makes rebalancing unnecessary. Tactical asset managers are looking to create positive alpha, not beta, and it is the passive manager who invests in indexes through ETFs and/or index funds.

LO 21.c

2. **A** Rebalancing involves getting the account back to its original percentage mix (not original market value). The proper allocation with a current value of \$520,000 would be \$156,000 equity and \$364,000 debt. With the equity above 30%, the rebalancing is done by selling \$14,000 of the equity and using the proceeds to purchase \$14,000 of debt. In an IRA, taxation is deferred until withdrawal.

LO 21.c

Knowledge Check 21.3

1. **B** The dividend discount model is a quantitative tool that estimates the fair current market value of a stock. The calculation assumes that a fair price should be equal to the present value of all future dividends.

LO 21.d

2. **C** Value managers look for undervalued stocks. In general, those stocks are selling below the book value per share. A contrarian buys when others are selling (and the reverse). That could be when the stock’s value has gotten quite high when compared to its book value and others don’t believe it can continue its run. Growth stocks invariably trade at prices well in excess of their book value; investors are buying future growth.

LO 21.e

3. **D** A bond ladder strategy is a relatively easy way to immunize (protect) a portfolio against interest rate risk. By holding many positions across the yield curve, the individual is diversified in the event that yields behave differently in one part of the curve than in another. The laddered portfolio will generally provide higher (not lower) yields than a portfolio consisting entirely of short-term bonds. Purchasing very long-term and very short-term bonds describes the bond barbell strategy, a more aggressive strategy than the bond ladder strategy.

LO 21.f

Knowledge Check 21.4

1. **C** The CAPM assumes no personal income taxes at all, not on dividends or capital gains.
LO 21.g
2. **B** Using the formula we showed you, we begin with the difference between the risk-free rate and market rate ($20\% - 2\% = 18\%$). Then we multiply the expected return in excess of the RF rate by the stock's beta, $(18\% \times 0.7) = 12.6\%$. Finally, we add the RF rate (2%) to the 12.6% and arrive at 14.6%. The choice of 14% would be correct if we did not have the RF rate given in the question. The choice of 25.7% is immediately discarded because, with a beta below 1.0, the expected return cannot be higher than the market return.
LO 21.h
3. **C** The weak form of EMH assumes that current stock prices fully reflect all currently available public information such as prices and volume. Because those are already figured into the stock's price, the EMH concludes that excess returns cannot be achieved using technical analysis (price and volume charts).
LO 21.i

Knowledge Check 21.5

1. **B** For the five months, the investor purchased a total of 82.468 shares. This is calculated by taking the \$200 investment and dividing it by the cost per share for each transaction. In sequence, those purchases were: 20 shares, 16.667 shares, 13.333 shares, 14.286 shares, and 18.182 shares. To find the average cost per share, we divide the total investment (1,000) by the total number of shares (82.468), and the result is approximately \$12.13. If you take the five purchase prices and find the average, it is \$12.40. That is the average price paid per transaction, not per share. Dollar cost averaging saved this investor about \$0.27 per share.
LO 21.j
2. **D** The only possible answers are the option writers. Buying an option requires a cash outlay, while selling one brings in cash premium. When an investor is long a stock, the partial hedge position is the short call. When one is short the stock, the partial hedge is the short put. Remember, hedging means taking an opposite position. When you are long a stock, you are bullish, while writing a call is bearishly neutral.
LO 21.k