

STUDY UNIT TEN

RISK MANAGEMENT AND PROFITABILITY

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This study unit covers certain aspects of the management of financial risk other than those that can be minimized by the purchase of insurance. Following a brief identification of particular types of risk in the first subunit, the second subunit describes some basic measures of risk. The third subunit addresses portfolio theory, one of the most basic concepts in finance. The fourth subunit discusses treatment of derivatives, another fundamental (and well-publicized) subject. Subunits five and six deal with ratios and how they can affect financing decisions. The AICPA seems to be asking conceptual questions concerning ratios in BEC. Thus, it is not likely that you will be asked to calculate a ratio.

10.1 TYPES OF RISK

1. **Risk** is the possibility of an unfavorable event. **Investment risk** is analyzed in terms of the probability that the actual return will be lower than the expected return. The concepts of probability distributions and expected value are basic to risk management.
 - a. The risk of a security may be considered in isolation or from the perspective of its inclusion in a portfolio of assets chosen to minimize the riskiness of the whole.
2. **Specific Types of Risks**
 - a. **Interest-rate risk** is the risk of fluctuations in the value of an asset due to changes in interest rates. In general, it is greater the longer the maturity of the asset.
 - 1) One component of interest-rate risk is **price risk**. Thus, the value of bonds declines when interest rates increase.
 - 2) A second component of interest-rate risk is **reinvestment-rate risk**. If interest rates decline, lower returns will be available for reinvestment of interest and principal payments received.
 - 3) **Immunization** is protection against interest-rate risk by holding assets and liabilities such that the product of (a) the value of the assets and their duration equals the product of (b) the value of the liabilities and their duration.
 - b. **Purchasing-power risk** is the risk that a general rise in the price level will reduce what can be purchased with a fixed sum of money. Accordingly, required returns include an inflation premium.
 - c. **Default risk** is the risk that a borrower will be unable to repay debt. Hence, the higher the default risk, the higher the return required by an investor.
 - d. **Market risk** is the risk that changes in price will result from changes that affect all firms. Prices of all securities, even the values of portfolios, are correlated to some degree with broad swings in the economy. Market risk is also known as systematic risk or nondiversifiable risk.
 - e. **Nonmarket risk** or **company-specific risk** is the risk that is influenced by an individual firm's policies and decisions. Nonmarket risk is diversifiable because it is firm-specific. Thus, it is also known as diversifiable or unsystematic risk.

- f. **Portfolio risk** is the risk remaining after allowing for the risk-reducing effects of combining securities into a portfolio.
- g. **Stand-alone risk** is the risk of a single asset, whereas market risk is its risk if it is held in a large portfolio of diversified securities.
- h. **Liquidity risk** is the possibility that an asset cannot be sold on short notice for its market value. If an asset must be sold at a deep discount, it is said to have a substantial amount of liquidity risk.
- i. **Business risk (or operations risk)** is the risk of fluctuations in earnings before interest and taxes or in operating income when the firm uses no debt. It is the risk inherent in its operations that excludes **financial risk**, which is the risk to the shareholders from the use of financial leverage. Business risk depends on factors such as demand variability, sales price variability, input price variability, and amount of operating leverage.
- j. **Exchange-rate risk** is the risk that a foreign currency transaction will be negatively exposed to fluctuations in exchange rates.
- k. **Commodities risk** includes many possibilities, for example, that an entire investment may be lost, that it may be impossible to liquidate a position under certain market conditions, that spread positions may not be less risky than simple long or short positions, that the use of leverage can lead to large losses, and that managed commodity accounts are subject to substantial management fees. A thorough knowledge of the market is necessary to be able to manage commodities risk.
- l. **Political risk** is the probability of loss from actions of governments, such as from changes in tax laws or environmental regulations or from expropriation of assets.
- m. **Total risk** is the risk of a single asset. It includes diversifiable and undiversifiable risk.

10.2 RISK MEASUREMENT

1. **Probability** provides a method for mathematically expressing doubt or assurance about the occurrence of a chance event. There are two types of probability -- objective and subjective. They differ in how they are calculated.
 - a. **Objective probabilities** are calculated from either logic or actual experience. For example, when rolling a six-sided die, logic indicates that the probability for each outcome (a given face turned upward) is about .167, assuming that each face is equally likely to be turned upward. An estimate of this probability can be objectively determined by rolling the die many times and counting how often each face is turned upward.
 - b. **Subjective probabilities** are estimates, based on personal judgment, of the likelihood of future events. In finance, subjective probability can indicate the degree of confidence a person has that a certain outcome will occur, e.g., the future performance of a stock.
2. A **probability distribution** is the set of all possible outcomes of a decision, with a probability assigned to each outcome. For example, a simple probability distribution might be defined for the possible returns on a stock investment. A different return could be estimated for each of a limited number of possible states of the economy, and a probability could be determined for each state. Such a probability distribution is **discrete** because the outcomes are limited.

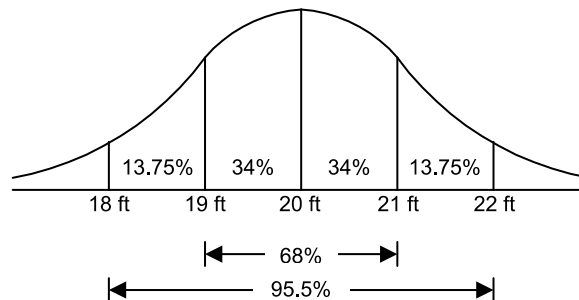
- a. A **continuous distribution** is one for which the outcomes are theoretically infinite. The normal distribution is the best-known continuous distribution. The **normal distribution** has a symmetrical, bell-shaped curve centered about the mean.

- 1) Normal distributions have the following fixed relationships concerning the area under the curve and the distance from the mean.

<u>Distance in Standard Deviations</u>	<u>Area under the Curve</u>
1.0	68%
2.0	95.5%
3.0	99.7%

- 2) EXAMPLE:

- a) A certain species of pine tree has an average adult height of 20 feet, with each standard deviation representing 1 foot.
- b) We can conclude that 68% of all trees in this species will reach a height between 19 and 21 feet (1 standard deviation), 95.5% will be between 18 and 22 feet (2 standard deviations), and 99.7% will be between 17 and 23 feet (3 standard deviations).



3. The **expected rate of return** on an investment is determined using an expected value calculation. It is an average of the outcomes weighted according to their probabilities. Consequently, the expected rate of return is the mean of the probability distribution of the possible outcomes. If k_i is the return from the i^{th} possible outcome and if p_i is its probability, the expected return (\hat{k}) may be expressed as

$$\hat{k} = \sum_{i=1}^n k_i p_i$$

- a. This is an intimidating formula, but it simply means that you multiply each expected outcome by its probability and then add the products to get the expected value.
- 1) For example, if the value of a grape could be \$3, \$4, or \$5, the expected value is $(1/3)(3) + (1/3)(4) + (1/3)(5) = 4$
- b. The greater the standard deviation of the expected return, the riskier the investment because the less certainty of the outcome. A large standard deviation implies that the range of possible returns is wide, i.e., the probability distribution is broadly dispersed. Conversely, the smaller the standard deviation, the tighter the probability distribution and the lower the risk because of the higher confidence of the outcome.
- c. The **standard deviation** gives an exact value for the tightness of the distribution and, therefore, the riskiness of the investment. The standard deviation (σ) is the square root of the **variance**. If k_i is the return from the i^{th} outcome, p_i is its probability, and \hat{k} is the expected (mean) return, the variance (σ^2) can be calculated as follows:

$$\sigma^2 = \sum_{i=1}^n (k_i - \hat{k})^2 p_i$$

1) EXAMPLE:

Stock X			
Return (k_i)	Probability (p_i)	$k_i \times p_i$	$(k_i - \hat{k})^2 p_i$
4.5	0.25	1.125	4.6764063
-5.2	0.25	-1.30	7.2226563
6.3	0.25	1.575	9.3789063
-4.9	0.25	-1.225	6.4389063
		<u>0.175</u>	<u>27.716875</u>
$\hat{k} = 0.175$			
$\sigma^2 = 27.716875$			
$\sigma = 5.264681852$			

Stock Y			
Return (k_i)	Probability (p_i)	$k_i \times p_i$	$(k_i - \hat{k})^2 p_i$
10.2	0.25	2.55	7.317025
-8.07	0.25	-2.0175	41.3449
9.63	0.25	2.4075	5.8564
7.4	0.25	1.85	1.703025
		<u>4.79</u>	<u>56.22135</u>
$\hat{k} = 4.79$			
$\sigma^2 = 56.22135$			
$\sigma = 7.498089757$			

Stock Y, having the greater standard deviation, is the riskier investment.

- d. The **coefficient of variation** is useful when the rates of return and standard deviations of two investments differ. It measures the risk per unit of return because it divides the standard deviation (σ) by the expected return (\hat{k}).

$$\text{Coefficient of variation} = \frac{\sigma}{\hat{k}}$$

1) EXAMPLE:

Stock X	Stock Y
$\sigma \div \hat{k} = 5.264681852 \div 0.175$	$\sigma \div \hat{k} = 7.498089757 \div 4.79$
$= 30.0839$	$= 1.5654$

Thus, when compared on a per-unit-of-return basis, Stock X is far riskier.

4. Whether the expected return on an investment is sufficient to entice an investor depends on its risk, the risks and returns of alternative investments, and the investor's attitude toward risk.
- Most serious investors are **risk averse**. They have a diminishing marginal utility for risk. The utility of a gain for serious investors is less than the disutility of a loss of the same amount.
 - A **risk-neutral** investor adopts an expected value approach because (s)he regards the utility of a gain as equal to the disutility of a loss of the same amount. Thus, a risk-neutral investor has a purely rational attitude toward risk.
 - A **risk-seeking** investor has an optimistic attitude toward risk. (S)he regards the utility of a gain as exceeding the disutility of a loss of the same amount.

5. **Portfolios.** The previous sections apply to investments in individual securities. When a portfolio is held, however, additional considerations apply. Risk and return should be evaluated for the entire portfolio, not for individual assets.
- The expected return on a portfolio is the weighted average of the returns on the individual securities.
 - However, the risk of the portfolio is usually not an average of the standard deviations of the particular securities. Thanks to the diversification effect, combining securities results in a portfolio risk that is less than the average of the standard deviations because the returns are imperfectly correlated.
 - The **correlation coefficient (r)** has a range from 1.0 to -1.0. It measures the degree to which any two variables, e.g., two stocks in a portfolio, are related. Perfect positive correlation (1.0) means that the two variables always move together, and perfect negative correlation (-1.0) means that the two variables always move in the opposite direction.
 - Given perfect positive correlation, risk for a two-stock portfolio with equal investments in each stock would be the same as that for the individual assets because they move exactly the same.
 - Given perfect negative correlation, risk would in theory be eliminated.
 - In practice, securities are usually positively but imperfectly correlated. The normal range for the correlation of two randomly selected stocks is .50 to .70. The result is a reduction in, but not an elimination of, risk.
 - The measurement of the standard deviation of a portfolio's returns is based on the same formula as that for a single security.
 - An important measurement used in portfolio analysis is the **covariance**. It measures the volatility of returns together with their correlation with the returns of other securities. In other words, covariance explains how much two stocks move together.
 - The computation of covariance will not be required on the CPA exam, but the candidate should understand the concept.
 - The **correlation coefficient (r)** mentioned earlier is calculated to facilitate comparisons of covariances. It standardizes the covariance by dividing by the product of the standard deviations of the two assets. Moreover, if r_{xy} , σ_x , and σ_y are known, the covariance can be determined.

$$r_{xy} = \frac{COV_{xy}}{\sigma_x \sigma_y}$$

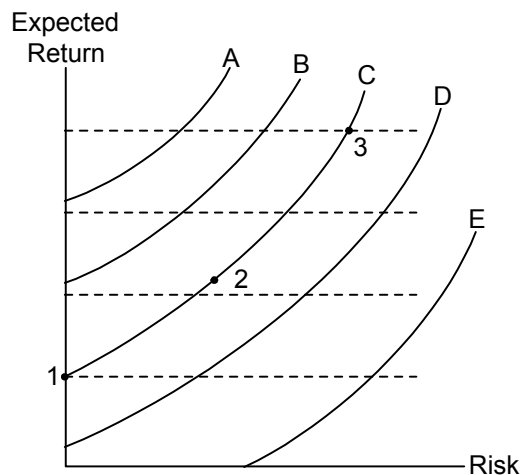
- EXAMPLE: The following is based on the data from the previous Stock X and Stock Y examples:

$$\begin{aligned} COV_{xy} &= 27.23 \\ \sigma_x &= 5.264681852 \\ \sigma_y &= 7.498089757 \\ r_{xy} &= 27.23 \div (5.26 \times 7.5) \\ &= 0.69 \end{aligned}$$

- Covariance will always be given. If a question asks for a covariance, it can be found using this formula and solving for the unknown variable.

10.3 PORTFOLIO MANAGEMENT

1. An investor wants to maximize expected return and minimize risk when choosing a portfolio. A feasible portfolio that offers the highest expected return for a given risk or the least risk for a given expected return is an **efficient portfolio**.
2. An **optimal portfolio** is a portfolio that is selected from the efficient set of portfolios; it is tangent to the investor's highest indifference curve.
 - a. An **indifference curve** represents combinations of portfolios having equal utility to a particular investor. Given that risk and returns are plotted on the horizontal and vertical axes, respectively, and that the investor is risk averse, the curve has an increasingly positive slope. It is positively sloped because as risk increases, the additional required return per unit of additional risk also increases. The steeper the slope of an indifference curve, the more risk-averse an investor is. The higher the curve, the greater is the investor's level of utility of expected return.
 - 1) In the diagram below, A, B, C, D, and E are indifference curves. A represents the highest level of utility and E the lowest. On a given curve, each point represents the same total utility to a risk-averse investor. For example, points 1, 2, and 3 are different combinations of risk and return that yield the same utility. The investor is indifferent as to which combination is chosen.



3. Two important decisions are involved in managing a firm's portfolio:
 - a. The amount of money to invest
 - b. The securities in which to invest
4. The investment in securities should be based on **expected net cash flows** and **cash flow uncertainty evaluations**.
 - a. Arranging a portfolio so that the maturity of funds will coincide with the need for funds will maximize the average return on the portfolio and provide increased flexibility.
 - 1) **Maturity matching** ensures that securities will not have to be sold unexpectedly.
 - b. If its cash flows are relatively uncertain, a security's marketability and market risk are important factors to be considered. Transaction costs are also a consideration.
 - 1) Higher yield, long-term securities provide less certainty.
 - c. When cash flows are relatively certain, the maturity date is a paramount concern.

5. **Financial instruments.** Financial managers may select from a wide range of financial instruments in which to invest and with which to raise money.
- a. Ranked from the lowest rate of return to the highest, the following is a short list of widely available long-term financial instruments:
 - 1) U.S. Treasury bonds
 - 2) First mortgage bonds
 - 3) Second mortgage bonds
 - 4) Subordinated debentures
 - 5) Income bonds
 - 6) Preferred stock
 - 7) Convertible preferred stock
 - 8) Common stock
 - b. These instruments also are ranked according to the level of risk of the security backing them. An unsecured financial instrument is much riskier than a secured instrument. Thus, the riskier asset earns a higher rate of return. Mortgage bonds are secured by assets, but common stock is completely unsecured. Accordingly, common stock will earn a higher rate of return than mortgage bonds.
 - c. Short-term financial instruments increase the liquidity of an entity.
6. **Risk Management**
- a. **Portfolio theory** concerns the composition of an investment portfolio that is efficient in balancing the risk and rate of return of the portfolio. **Diversification** reduces risk.
 - 1) **Asset allocation** is a key concept in financial planning and money management. It is the process of dividing investments among different kinds of assets, such as stocks, bonds, real estate, and cash, to optimize the risk-reward tradeoff based on specific situations and goals. The rationale is that the returns on different types of assets are not perfectly positively correlated. Asset allocation is especially useful for such institutional investors as pension fund managers, who have a duty to invest with prudence.
 - 2) The goal is to create a theoretically efficient portfolio that is also the firm's optimal portfolio.
 - b. The **expected rate of return of a portfolio** is the weighted average of the expected returns of the individual assets in the portfolio.
 - c. The **variability (risk) of a portfolio's return** is determined by the correlation of the returns of individual portfolio assets.
 - 1) To the extent the returns are not perfectly positively correlated, variability is decreased.
 - 2) In principle, **diversifiable risk** should continue to decrease as the number of different securities held increases. However, in practice, the benefits of diversification become extremely small when more than 30 to 40 different securities are held.
 - 3) **Portfolio insurance** is a strategy of hedging a stock portfolio against market risk by purchasing and selling derivatives, such as stock index futures and options.

- d. **Firm-specific (investee-specific) risk** or **unsystematic risk** is associated with a specific firm's (investee's) operations: new products, patents, acquisitions, competitors, activities, etc.
- 1) This risk can be largely eliminated by proper diversification of investments.
 - 2) The **relevant risk of an individual security** held in a portfolio is its contribution to the overall risk of the portfolio.
 - 3) When much of a security's risk can be eliminated by diversification, its relevant risk is low.
- e. The risk of an individual security that is unaffected by diversification is **market** or **systematic risk** and is measured by the **beta coefficient**.
- 1) The capital asset pricing model (CAPM) equation is

$$R_{\text{return}} = R_f + \beta (M - R_f)$$
 - a) R_f equals the risk-free interest.
 - b) M equals the market return rate.
 - 2)
$$\beta = \frac{R_{\text{return}} - R_f}{M - R_f} = \frac{\text{COV}_{\text{market \& security}}}{\sigma_{\text{market}}^2}$$
 - 3) According to the CAPM, **beta measures the volatility** of the returns of a security relative to the returns on the **market portfolio** (a portfolio of all securities).
 - a) An average-risk stock has a beta of 1.0 because its returns are perfectly positively correlated with those on the market portfolio. For example, if the market return increases by 20%, the return on the security increases by 20%.
 - b) A beta of less than 1.0 means that the security is less volatile than the market; e.g., if the market return increases by 20% and the security's return increases by 10%, the security has a beta of .5.
 - c) A beta over 1.0 indicates a volatile security; e.g., if the return increases 30% when the market return increases by 15%, the security has a beta of 2.0.
 - 4) The word **beta** is derived from the equation for regressing the return of an individual security (the dependent variable) to the overall market return. The beta coefficient is the **slope of the regression line**.
 - 5) Beta is the best measure of the risk of an individual security held in a diversified portfolio because it determines how the security affects the risk of the portfolio.
 - a) The **beta of a portfolio** is the weighted average of the betas of the individual securities. For example, adding high-beta securities to a portfolio tends to increase its risk.
- f. The **value-at-risk (VAR) model** uses statistical analysis of historical market trends and volatilities to estimate the likelihood that a given portfolio's losses will exceed a certain amount. It is preferable to sensitivity analysis because it states the probability (stated at a specified confidence level) that a given change in a variable (e.g., a foreign currency exchange rate or an interest rate) will result in a given loss. Simulation and variance-covariance methods are among the techniques used to calculate VAR, sometimes called the maximum normal loss.

10.4 DERIVATIVE FINANCIAL INSTRUMENTS

1. A **derivative** is defined informally as an investment transaction in which the buyer purchases the right to a potential gain with a commitment for a potential loss. It is a wager on whether the value of something will go up or down. The purpose of the transaction is either to speculate (incur risk) or to hedge (avoid risk).
 - a. Thus, a derivative is an executory contract that results in cash flow between two **counterparties** based on the change in some other indicator of value. Examples of these indicators include prices of financial instruments, such as common shares or government bonds; currency exchange rates; interest rates; commodity prices; or indexes, such as the S&P 500 or the Dow Jones Industrial Average.
 - b. Derivative instruments (derivatives) should be contrasted with financial instruments, which include cash, accounts receivable, notes receivable, bonds, preferred shares, common shares, etc.
2. Options and futures are derivative securities. They are not claims on business assets, such as those represented by equity securities. Instead, they are contracts by parties who agree to buy, sell, or exchange assets, such as stocks, commodities, or bonds, at a specified price in the future.
 - a. An **American option** is a contractual arrangement that gives the owner the right to buy or sell an asset at a fixed price at any moment in time before or on a specified date. A **European option** differs from an American option because it is exercisable only at the expiration date.
 - b. Exercising the option is the act of buying or selling **the underlying**. The underlying is the technical term for the asset to be bought, sold, or traded under the terms of the option. For example, the underlying for a stock option on IBM stock is IBM stock.
 - c. An option is a right of the owner or holder of the option. The seller has sold the rights.
 - d. The **exercise or striking price** is the price at which the owner can purchase or sell the asset underlying the option contract. The **option price**, also called **option premium**, is the amount paid to acquire an option.
 - 1) The **bid-ask spread** is the difference between what a buyer is willing to bid and what a seller is asking.
 - e. An option usually has an expiration date after which it can no longer be exercised.
 - f. The longer the time before its expiration, the more valuable the option. The reason is the increased time available for the asset's price to rise or fall.
3. There are two types of options: calls and puts.
 - a. A **call option** is the most common type of option. It gives the owner the right to purchase the underlying asset at a fixed price. Thus, it represents a **long position** because the owner gains from a price increase in the underlying. The profit is the difference between the price paid and the value at the closing date, minus the brokerage fee.
 - 1) Call options usually involve common stock as the underlying asset; however, any type of asset may underlie an option such as a stock index.
 - 2) If the value of the asset underlying a call option is less than the exercise price of the option, the option is "out-of-the-money," or not worth exercising. If the value of the asset underlying the option is greater than the exercise price, it is "in-the-money" and can earn the owner a profit. If the value of the asset is at the strike price, the option is at-the-money.
 - 3) A call option's expiration value equals the excess of the current price of the asset over the exercise price. If the exercise price exceeds the current price, the option is worthless.

4) Net gain or loss on a call option

- a) For the purchaser (long position), the gain or loss is the following:

$$[(\text{Market price} - \text{Exercise price}) \times (\# \text{ of shares})] - \text{Amount paid for option}$$
- b) For the seller (short position), the loss or gain is the following:

$$[(\text{Exercise price} - \text{Market price}) \times (\# \text{ of shares})] + \text{Amount option sold for}$$
- c) The call option will not be exercised unless the market price is greater than the exercise price. The seller profits only when
 - i) The option is not exercised, and
 - ii) The price paid for the option exceeds the difference between the exercise price and the market price.
- d) EXAMPLE: If the exercise price is \$100, the market price is \$105, and 100 options were sold for \$3 each, the purchaser has a gain of \$200 $\{[(\$105 - \$100) \times 100 \text{ options}] - (\$3 \times 100 \text{ options})\}$. The seller has a loss of \$200 $\{[(\$100 - \$105) \times 100 \text{ options}] + (\$3 \times 100 \text{ options})\}$.

b. A **put option** gives the owner the right to sell the underlying asset for a fixed price. It represents a **short position** because the owner benefits from a price decrease.

- 1) If the value of the asset underlying a put option is greater than the option's exercise price, the put option is worthless or "out-of-the-money."
- 2) If the value of the asset underlying the put option is less than the option's exercise price, the put is "in-the-money." Therefore, the option has **intrinsic value**, which is the difference between the exercise price and the market price of the underlying security.
- 3) Put options also may be referred to as "at-the-money" and "out-of-the-money," just like call options.
- 4) A put option's expiration value equals either zero or the excess of the exercise price over the current market price.

5) Net gain or loss on a put option

- a) For the purchaser (long position), the gain or loss is the following:

$$[(\text{Exercise price} - \text{Market price}) \times (\# \text{ of shares})] - \text{Amount paid for option}$$
- b) For the seller (short position), the loss or gain is the following:

$$[(\text{Market price} - \text{Exercise price}) \times (\# \text{ of shares})] + \text{Amount option sold for}$$
- c) The put option will not be exercised unless the exercise price is greater than the market price. The seller profits only when
 - i) The option is not exercised, and
 - ii) The price paid for the option exceeds the difference between the market price and the exercise price.
- d) EXAMPLE: If the exercise price is \$105, the market price is \$100, and 100 options were sold for \$3 each, the purchaser has a gain of \$200 $\{[(\$105 - \$100) \times 100 \text{ options}] - (\$3 \times 100 \text{ options})\}$. The seller has a loss of \$200 $\{[(\$100 - \$105) \times 100 \text{ options}] + (\$3 \times 100 \text{ options})\}$.

4. While there are two types of options, the method in which they are used can be referred to as a type of option.

- a. A **covered option** is one that is written against stock held in the option writer's portfolio.
- b. A **naked (uncovered) option** is one that does not have the backing of stock.
- c. In other words, put and call options can be referred to as naked options if the holder is not using the options as a hedge because (s)he does not own the underlying.

5. Stock options also can be named after the underlying. Again, there are still only puts and calls.
 - a. A **stock option** is an option to buy a specific stock at some future time.
 - b. An **index option** is an option whose underlying security is an index. If exercised, settlement is made by cash payment because physical delivery is not possible.
 - c. **Long-term equity anticipation securities (LEAPS)** are examples of long-term stock options or index options, with expiration dates up to three years away.
 - d. **Foreign currency options** give the holder the right to buy a specific foreign currency at a designated exchange rate.
6. **Put-call parity.** For European options, given market equilibrium for all relevant prices (no arbitrage possibilities), equal exercise prices for the put and the call, and the same expiration date, the put-call parity theorem states that a fixed relationship applies to the market values of the put and call options on a security.

Call price – put price = Underlying price – PV of exercise price
7. The value of a call option is based on its exercise price, its expiration date, the price of the underlying asset, the variability of that asset, and the risk-free interest rate. The well-known **Black-Scholes option-pricing model** uses these factors.
 - a. The CPA exam may ask questions concerning the volatility of the stock or market and the effect it has on the price of a call or a put.
 - 1) Volatility (i.e., variances of daily trading prices) and interest rates vary directly with the prices of puts and calls.
8. A **forward contract** is an agreement negotiated between two parties for the purchase and sale of a stated amount of a commodity, foreign currency, or financial instrument at a stated price, with delivery or settlement at a stated future date. Forward contracts are usually specifically negotiated agreements and are not traded on regulated exchanges. Thus, the parties are subject to default risk (i.e., that the other party will not perform).
9. A **futures contract** is a specific kind of **forward contract**, which is simply an executory contract. A futures contract is a definite agreement that allows a trader to purchase or sell an asset at a fixed price during a specific future month. Futures contracts for agricultural commodities, metals, oil, and financial assets are traded on numerous exchanges.
 - a. One characteristic of a futures contract is that it may be highly leveraged. The initial **margin** paid may be a very small percentage of the price. Thus, the risk of either gain or loss to a speculator may be great.
 - b. A futures contract differs from a forward contract in part because it is traded on an exchange and it is standardized. The result is a liquid market in futures that permits buyers and sellers to net out their positions. For example, a party who has sold a contract can net out his/her position by buying a futures contract.
 - c. Another distinguishing feature of futures contracts is that their prices are **marked to market** every day at the close of the day to each person's account. Thus, the market price is posted at the close of business each day. A mark-to-market provision minimizes a futures contract's chance of default because profits and losses on the contracts must be received or paid each day through a clearinghouse. This requirement of **daily settlement** minimizes default and is necessary because futures contracts are sold on margin (i.e., they are highly leveraged).

- d. A futures contract is entered into as either a speculation or a hedge. A financial manager can protect a firm against adverse changes in prices and interest rates by hedging in the futures market. **Hedging** is the process of using offsetting commitments to minimize or avoid the impact of adverse price movements.
 - 1) **Long hedges** are futures contracts that are purchased to protect against price increases.
 - 2) **Short hedges** are futures contracts that are sold to protect against price declines.
 - 3) **EXAMPLE:** In the commodities market, a firm might have a contract with a farmer to buy soybeans at a future date. The price is agreed upon as the current price. The firm would lose money if the soybean prices declined before the beans were delivered. To avoid any loss (or gain), the firm could sell soybeans in the future at today's price. If the price of soybeans does decline before the delivery date, it will lose money on the beans bought from the farmer, but it will gain money on the beans sold through the futures contract by buying cheap beans in the future to cover the delivery.
 - a) Because commodities can be bought and sold **on margin**, considerable leverage is involved. This high degree of leverage is most beneficial to the speculator who is looking for large returns and is willing to bear the risk to get them. For hedgers, however, the small margin requirement is useful only because the risk can be hedged without tying up a large amount of cash.
- e. **Swaps** are contracts to hedge risk by exchanging cash flows. The simplest form, sometimes called a **plain vanilla swap**, is an exchange of interest rates without any change in the initial debt arrangement.
 - 1) In an **interest-rate swap**, one firm exchanges its fixed interest payments for a series of payments based on a floating rate. Such contracts are highly customized. If a firm has debt with fixed charges, but its revenues fluctuate with interest rates, it may prefer to swap for cash outflows based on a floating rate. The advantage is that revenues and the amounts of debt service will then move in the same direction, and interest-rate risk will be reduced.
 - 2) A **currency swap** is an exchange of an obligation to pay out cash flows denominated in one currency for an obligation to pay in another. For example, a U.S. firm with revenues in euros has to pay suppliers and workers in dollars, not euros. To minimize exchange-rate risk, it might agree to exchange euros for dollars held by a firm that needs euros. The exchange rate will be an average of the rates expected over the life of the agreement.
 - 3) A **swaption** is an option on a swap, usually on an interest-rate swap, that provides the holder with the right to enter into a swap at a specified future date at specified terms (freestanding option on a swap) or to extend or terminate the life of an existing swap (embedded option on a swap).
- f. **Arbitrage** is the simultaneous purchase and sale of identical or equivalent financial instruments or commodity futures to benefit from a discrepancy in their price relationship. This sometimes involves selling in one market while simultaneously buying in another market.
- g. **Program trading**, also known as index arbitrage or computer-assisted trading, exploits the price discrepancies between indexes of stocks and futures contracts by using sophisticated computer models to hedge positions and trade instantaneously. Program trading arose with the advent of telecommunication technology that permits transactions in different markets to be monitored simultaneously.

- h. Interest rate caps, floors, and collars.
- 1) An **interest rate cap** is an option that limits the risk of interest rate increases. If interest rates rise above a certain level, the cap holder receives the excess of the actual interest rate over a designated interest rate (the strike or cap rate) based on the notional principal amount. The cap holder's loss is limited to the premium paid to the cap writer. The cap writer has unlimited risk from potential increases in interest rates above the specified rate.
 - 2) An **interest rate floor** is an option that limits the risk of interest rate decreases. If rates fall below a specified level, the floor holder receives cash payments equal to the excess of a designated rate (the strike or floor rate) over the actual rate based on the notional principal amount. The buyer pays the writer a premium to receive this right, and the floor writer faces significant risk from potential decreases in rates below the specified rate.
 - 3) A **collar** is an option that combines the strategies of a cap and a floor. The buyer acquires a cap and writes a floor. The writer writes a cap and buys a floor. Collars fix the rate a variable-rate lender will receive or a borrower will pay between the cap and floor rate levels. Collars help reduce the cost of buying outright a cap or floor. Because a borrower or lender is usually only interested in protecting against movements in interest rates in one direction, the premium received for writing a cap or floor serves to reduce the cost of the cap or floor purchased.

10.5 RATIOS

1. **Liquidity ratios** measure the relationship of a firm's liquid assets to current liabilities. Thus, such ratios provide information about the short-term viability of the business, i.e., the firm's ability to pay its current obligations and to continue operations.
 - a. The **current ratio** (working capital ratio) equals current assets divided by current liabilities and is the most common measure of near-term solvency.
 - 1)
$$\frac{\text{Current assets}}{\text{Current liabilities}}$$
 - 2) A low ratio indicates a possible solvency problem. An overly high ratio indicates that management may not be investing idle assets productively.
 - 3) The general principle is that the current ratio should be proportional to the operating cycle. Thus, a shorter cycle may justify a lower ratio.
 - b. A conservative version of the current ratio is the **acid test** or **quick ratio**, which divides the quick assets (cash, cash equivalents, net receivables, and marketable securities) by current liabilities.
 - 1)
$$\frac{\text{Cash} + \text{Cash equivalents} + \text{Net receivables} + \text{Marketable securities}}{\text{Current liabilities}}$$
 - 2) This ratio measures the firm's ability to pay its short-term debts from its most liquid assets and avoids the problem of inventory valuation.

- c. **Free cash flow** is an analytical measure of financial flexibility. It is the cash from operations remaining after subtracting amounts that must be paid to sustain the current level of productive capacity. The elements subtracted, however, vary in practice.
- 1) Most models subtract all **capital expenditures** to arrive at free cash flow. But some authorities treat capital expenditures to increase capacity as discretionary items and do not subtract them.
 - 2) Some models also subtract **interest, dividends, and taxes** to arrive at free cash flow because these amounts may be viewed as nondiscretionary.
2. **Leverage ratios** measure the firm's use of debt to finance assets and operations. Financial leverage (**trading on the equity**) is advantageous when earnings from borrowed funds exceed borrowing costs. However, risk increases as interest rates increase and returns decrease. Accordingly, as leverage increases, both the risk that the firm may not be able to meet its maturing obligations and the risk borne by creditors increase. Nevertheless, interest is tax deductible, so leverage increases the firm's return when it is profitable. Furthermore, debt financing permits the owners to retain control.
- a. **Solvency** is a firm's financial ability to survive in the long term by paying its long-term obligations. It is contrasted with **liquidity**, the ability to pay short-term obligations.
 - b. The key ingredients of solvency are capital structure and earning power.
 - 1) **Capital structure** includes the firm's sources of financing, whether long-term or short-term, of its assets. Capital structure consists of equity and debt.
 - a) **Equity** is the ownership interest in the firm. It represents permanent capital that cannot be withdrawn at the discretion of the owner, and its return is uncertain, ordinarily with no designated pattern of payment (e.g., dividends). Thus, equity is sometimes called the risk capital of the firm.
 - b) **Debt** is the creditor interest in the firm. It must be repaid according to a designated pattern (e.g., interest and principal payments for long-term debt). The greater the debt burden, the greater the fixed payments and the greater the risk. However, when the return on debt capital exceeds interest paid, borrowing improves earnings. Moreover, the interest on debt, unlike the payments to owners (dividends), is tax deductible.
 - 2) **Earning power** is the capacity of the firm's operations to produce cash inflows. A predictably stable pattern of earnings is the optimal source of funds for payment of long-term debt and other fixed charges. Furthermore, it enhances the firm's credit standing, allowing it to borrow on favorable terms when its cash balance is low.
 - c. The **total debt ratio** equals total liabilities divided by total assets (total capital).
 - 1)
$$\frac{\text{Total liabilities}}{\text{Total assets (capital)}}$$

The total debt ratio measures the percentage of funds provided by creditors. It determines long-term debt-payment ability and the degree to which creditors are protected from the firm's insolvency. Hence, creditors prefer this ratio to be low as a cushion against losses.
 - d. The **total debt-to-equity ratio** equals total debt divided by total equity.
 - 1)
$$\frac{\text{Total liabilities}}{\text{Equity}}$$
 - 2) It compares the resources provided by creditors with resources provided by shareholders.

- e. The **times-interest-earned ratio** (interest coverage ratio) equals earnings before interest and taxes (EBIT), divided by interest.
- 1)
$$\frac{EBIT}{Interest\ expense}$$
 - 2) This ratio is an income statement approach to evaluating debt-payment ability. It indicates the margin of safety for payment of fixed interest charges, so a consistently high ratio is desirable.
 - 3) Interest is tax deductible. Hence, interest and tax must be added to net income to determine the amount available to pay interest.
- f. The **operating cash flow to total debt ratio** equals the net cash provided by operations divided by total debt.
- 1)
$$\frac{Operating\ cash\ flow}{Total\ debt}$$
 - 2) A high ratio is desirable. Moreover, the most conservative approach is to include all debt items in the denominator.
- g. The **asset coverage ratio** measures the extent to which a firm's assets cover its debt obligations.
- 1)
$$\frac{Total\ tangible\ assets}{Total\ liabilities}$$
3. **Asset management ratios** measure the firm's use of assets to generate revenue and income. Thus, they also relate to liquidity.
- a. The **inventory turnover ratio** equals cost of sales divided by average inventory.
- 1)
$$\frac{Cost\ of\ sales}{Average\ inventory}$$
 - 2) A high turnover implies that the firm does not hold excessive stocks of inventories that are unproductive and that lessen the firm's profitability.
 - 3) A high turnover also implies that the inventory is truly marketable and does not contain obsolete goods.
- b. The **number of days of inventory** (days' sales in average inventory) equals the number of days in the year divided by the inventory turnover ratio.
- 1)
$$\frac{365, 360, \text{ or } 300}{Inventory\ turnover\ ratio}$$
 - 2) This ratio measures the average number of days that inventory is held before sale. Thus, it reflects the efficiency of inventory management.
- c. The **receivables turnover ratio** equals net credit sales divided by average accounts receivable. (However, net sales is often used because credit sales data may be unavailable.)
- 1)
$$\frac{Net\ credit\ sales}{Average\ accounts\ receivable}$$
 - 2) This ratio measures the efficiency of accounts receivable collection.
 - 3) A high turnover is preferable.

- d. The **number of days of receivables** (days' sales in average receivables, also called the average collection period) equals the number of days in the period divided by the receivables turnover ratio.
 - 1)
$$\frac{365, 360, \text{ or } 300}{\text{Receivables turnover ratio}}$$
 - 2) This ratio is the average number of days to collect a receivable.
 - 3) The number of days of receivables should be compared with the firm's credit terms to determine whether the average customer is paying within the credit period.
 - 4) The **operating cycle** (conversion period) of an enterprise may be estimated by adding the number of days' sales in average inventory to the number of days' sales in average receivables.
 - e. The **total assets turnover ratio** equals net sales divided by average total assets.
 - 1)
$$\frac{\text{Net sales}}{\text{Average total assets}}$$
 - 2) This ratio measures the level of capital investment relative to sales volume.
 - 3) For all turnover ratios, high turnover is preferable because it implies effective use of assets to generate sales.
 - 4) Certain assets, for example, investments, do not relate to net sales. Their inclusion decreases the ratio.
 - f. The **plowback ratio** is the percentage of net income available for reinvestment.
 - 1)
$$\frac{\text{Amount available for reinvestment}}{\text{Net income}}$$
 - 2) A high rate means less external financing.
4. **Cost management ratios** measure how well a firm controls its costs. However, they may be difficult for an external analyst to determine because firms conceal their detailed cost data from competitors.
- a. The **gross margin** (gross profit percentage) equals net sales minus cost of sales, divided by net sales.
 - 1)
$$\frac{\text{Net sales} - \text{Cost of sales}}{\text{Net sales}}$$
 - 2) A high gross margin implies effective cost control. This ratio measures how much can be spent for such items as marketing, R&D, and administrative costs while still reaching targeted net income.
5. **Profitability ratios** measure earnings relative to some base, for example, productive assets, sales, or capital.
- a. Increased profits benefit owners not only because they make additional funds available for dividend payments but also because they may result in appreciation of a corporate entity's stock price.
 - b. Profits also provide a cushion for debt coverage. Hence, profitability ratios are used by investors, creditors, and others to evaluate management's stewardship of the firm's assets.
 - c. These ratios are based on accounting profits, which may differ from economic profits. **Economic profits** include all explicit and implicit revenues and costs (including the cost of capital). **Accounting profits** include only the explicit revenues and costs of a single firm. **Social profits** deduct the external factors (e.g., pollution), which impact parties other than the firm and its customers.

d. The **profit margin on sales** equals net income divided by net sales.

$$1) \frac{\text{Net income after interest and taxes}}{\text{Net sales}}$$

2) The numerator may also be stated in terms of the net income available to common shareholders.

3) Another form of the ratio excludes nonrecurring items from the numerator, e.g., unusual or infrequent items, discontinued operations, extraordinary items, and effects of accounting changes. The result is sometimes called the **net profit margin**. This adjustment may be made for any ratio that includes net income.

a) Still other numerator refinements are to exclude equity-based earnings and items in the other income and other expense categories.

e. The **return on investment** or **ROI** (also called **return on total assets** or **return on invested capital**) may be defined in many ways, for example, as net income divided by average total assets.

$$1) \frac{\text{Net income after interest and taxes}}{\text{Average total assets}}$$

2) The numerator may be defined in various ways. One possibility is net income available to common shareholders, which subtracts preferred dividends. Another numerator adjustment is to add back a minority interest in the income of a consolidated subsidiary when invested capital is defined to include the minority interest. Still another numerator adjustment is to add back interest expense when invested capital equals total debt plus equity capital. A final example is the **basic earning power ratio**, which divides EBIT by average total assets. This ratio enhances comparability of firms with different capital structures and tax planning strategies.

3) The denominator also may be defined in many ways, for example, to include only operating assets. Investments, intangible assets, and the other asset category are excluded. Other potential definitions of the investment base include (a) adjustments to eliminate unproductive assets (e.g., idle plant), intangible assets, or accumulated depreciation; (b) excluding current liabilities to emphasize long-term capital; (c) excluding debt and preferred stock to arrive at equity capital; and (d) stating invested capital at market value.

4) This ratio tells investors whether management is using invested funds wisely. It also provides a profitability measure relating both to the income statement and the balance sheet that can be adjusted to reflect the contributions of creditors or equity providers. Other uses of this ratio are in forecasting earnings, planning, budgeting, and control.

f. The **return on common equity** equals the net income available to common shareholders divided by their average equity.

$$1) \frac{\text{Net income after interest and taxes} - \text{Preferred dividends}}{\text{Average common equity}}$$

2) The average common equity includes total equity minus the preferred shareholders' capital and any minority interest.

3) This ratio and the next one measure the return on the carrying amount of equity.

4) A variation of the return on common equity is the **marginal return on common equity** (change in net income ÷ change in common equity).

- g. The **return on total equity** equals net income minus dividends on redeemable preferred stock, divided by average total equity.
- 1)
$$\frac{\text{Net income after interest and taxes} - \text{Dividends on redeemable preferred stock}}{\text{Average total equity}}$$
 - 2) **Redeemable preferred stock** is usually considered to be equivalent to debt. Indeed, the SEC requires it to be reported separately from other equity.
6. A concept similar to residual income, but often applied at the overall firm level as well as at the departmental level, is that of **economic value added**, or **EVA**. It is a registered trademark of Stern Stewart & Co., which developed the concept.
- a. Although many refinements and adjustments are possible, basic EVA equals net operating profit after taxes (NOPAT) minus the capital charge or total cost of capital.
 - 1) **NOPAT** is profit before interest and taxes minus an amount of taxes that is calculated on the assumption that the firm has no debt or financial assets. This assumption is made to improve the comparability of EVA calculations. Otherwise, firms with different debt structures could have the same operating performance but different net incomes.
 - 2) The capital charge equals the after-tax weighted-average cost of capital (calculated based on fair values of debt and equity) times the investment base or capital employed (fixed assets plus net working capital, or total assets minus current liabilities).
 - b. Investors earn a real profit only after capital costs have been deducted.
 - c. Investors can easily earn the average stock market return by investing in an index fund; thus, they are no better off investing in an individual stock unless they can earn more than the average cost of capital. EVA measures this excess return.
 - 1) The cost of capital (required rate of return) is based on the after-tax weighted-average cost of debt as well as equity capital.
 - 2) The capital charge is a real cost, but the traditional income statement does not include a deduction for the costs of equity capital because it is an opportunity cost. EVA is considered an improvement over traditional income measures because it does include a deduction for the costs of all forms of capital.
 - d. The real profit (economic profit) to investors is the profit after deducting the capital charge.
 - e. A company generates a positive result only after it has earned more than the average return for a company in its risk class.
 - f. For internal purposes, EVA is a better measure of profitability than ROI because a manager with a high ROI would be reluctant to invest in a new project with a lower ROI than is currently being earned, even though that return might be higher than the cost of capital. Thus, including a capital charge on departmental income statements helps managers to make decisions that will benefit the company.
 - g. **EXAMPLE:** A company with \$100,000 in equity capital (stated at fair value) and \$100,000 in 8% debt (also at fair value) had \$50,000 in operating income before taxes and interest. Assume also that \$200,000 equals capital employed. The combined state and federal tax rate is 40%. If that company's weighted-average after-tax cost of capital is 14%, the EVA is \$2,000, calculated as follows:

Operating income before interest and tax	\$50,000
Minus taxes (\$50,000 × 40%)	(20,000)
After-tax operating income	\$30,000
Capital charge (\$200,000 × 14%)	(28,000)
EVA	<u>\$ 2,000</u>

- 1) The company's traditional income statement reports income of \$25,200, calculated as follows:

Operating income before interest and tax	\$50,000
Minus interest (\$100,000 × 8%)	(8,000)
Taxable income	42,000
Income taxes (\$42,000 × 40%)	(16,800)
Net income after taxes	<u>\$25,200</u>

- 2) Initially, a 25.2% return on equity (\$25,200 of net income ÷ \$100,000 of equity capital) seems favorable, but what is the cost of that equity capital? Given equal amounts of debt and equity, the cost of the equity capital must be 23.2% because the after-tax weighted-average cost of capital was 14%, and the after-tax cost of debt capital was 4.8% [$8\% \times (1.0 - 40\% \text{ tax rate})$] [$14\% = (8\% + X) \div 2$]. Thus, \$23,200 of the \$25,200 of net income is nothing more than the opportunity cost of equity capital. The \$2,000 of EVA is the only portion of earnings that has created value for the shareholders. Accordingly, if income after taxes had been only \$19,000 (a 19% return on equity), shareholder value would have been reduced because the cost of equity capital would have exceeded the return.
- h. Some studies have shown a direct correlation between EVA and increases in stock prices. Simply having a continuing stream of income is not enough; that income must exceed the cost of capital for a stock to rise significantly in the stock market.
- i. Although most companies adopt EVA for purposes of internal reporting and for calculating bonuses, some are publishing the results in the corporate annual reports. For example, Eli Lilly reports EVA in the Financial Highlights section of the annual report.
- j. EVA may be treated as a type of **residual income**, that is, income minus some required amount of return on the investment in the reporting entity. However, under the residual income method, the cost of capital may be an arbitrary hurdle rate. In contrast, EVA is based on the calculated weighted-average cost of capital. Both methods can be traced to the work of the economist David Ricardo, who in the mid-1800s used the term **super normal rent** to describe EVA.
- k. One aspect that makes EVA so popular is that it uses dollars instead of percentages to measure changes. For example, it is much more appealing to report that the company generated \$1 million in shareholder value than to say that the ROI increased from 10% to 15%.
7. **Growth ratios** measure the changes in the economic status of a firm over a period of years. Firms compare their growth in sales, operating income, net income, EPS, and dividends per share with the results of competitors and the economy as a whole.
- a. The most accurate analysis adjusts nominal growth rates for **price level changes** to determine real growth rates. Other aspects of **earnings quality** should be addressed before relying on earnings-based measures. For example, income based on FIFO inventory valuation may not be as meaningful as income from a LIFO-based inventory valuation. Similarly, the impact on income from using straight-line depreciation or an accelerated method should be evaluated.
- b. **Cash flow per share** equals net cash provided by operations minus preferred dividends, divided by common shares outstanding.
- 1)
$$\frac{\text{Cash provided by operations} - \text{Preferred dividends}}{\text{Common shares outstanding}}$$
- 2) This ratio is a better indicator of short-term capacity to make capital outlays and dividend payments than EPS. However, it is not a substitute for EPS as a measure of profitability. Hence, the FASB has stated that cash flow per share is not to be reported in the financial statements.

- c. The **dividend payout ratio** equals dividends per common share divided by EPS.
- 1)
$$\frac{\text{Cash dividends per common share}}{\text{EPS}}$$
 - 2) Firms develop dividend policies based on recurring earnings because they usually prefer a stable pattern of dividends.
 - 3) The appropriate ratio depends on the firm's unique circumstances, including shareholder preferences regarding dividend income and capital gains. The general principle, however, is that growth companies have a low payout.
8. **Valuation ratios** are broad performance measures. They reflect the basic principle that corporate management's ultimate goal is to maximize shareholder value reflected in the price of the firm's stock.
- a. **Book value per share** equals the amount of net assets available to the shareholders of a given type of stock divided by the number of those shares outstanding.
- 1)
$$\frac{\text{Equity}}{\text{Shares outstanding}}$$
 - 2) When a company has preferred as well as common stock outstanding, the computation of book value per common share must consider potential claims by preferred shareholders, such as whether the preferred stock is cumulative and in arrears or participating. It must also consider whether the call price (or possibly the liquidation value) exceeds the carrying amount of the preferred stock.
 - 3) Book value per share is ordinarily based on historical cost expressed in nominal dollars. Accordingly, it may be misleading because book values ordinarily differ materially from fair values.
- b. The book value per share is used to calculate the **market-to-book ratio** (price-to-book ratio).
- 1)
$$\frac{\text{Market price per share}}{\text{Book value per share}}$$
 - 2) Well-managed firms should sell at high multiples of their book value, which reflects historical cost.
- c. The **price-to-earnings (P-E) ratio** equals the market price per share of common stock divided by EPS.
- 1)
$$\frac{\text{Market price}}{\text{EPS}}$$
 - 2) Growth companies are likely to have high P-E ratios. A high ratio may also indicate that the firm is relatively high risk or that its choice of accounting methods results in a conservative EPS.
 - 3) Because of the widespread use of the P-E ratio and other measures, the relationship between accounting data and stock prices is crucial. Thus, managers have an incentive to "manage earnings," sometimes by fraudulent means.

10.6 LIMITATIONS OF RATIO ANALYSIS

1. Although ratio analysis provides useful information pertaining to the efficiency of operations and the stability of financial conditions, it has inherent limitations.
 - a. Development of ratios for comparison with **industry averages** is more useful for firms that operate within a particular industry than for conglomerates (firms that operate in a variety of industries).
 - b. **Inflation** misstates a firm's balance sheet and income statement because of the effects on fixed assets and depreciation, inventory costs, long-term debt, and profitability.
 - c. Ratio analysis may be affected by **seasonal factors**. For example, inventory and receivables may vary widely, and year-end balances may not reflect the averages for the period.
 - d. A firm's management has an incentive to **window dress** financial statements to improve results.
 - e. **Comparability** of financial statement amounts and the ratios derived from them is impaired if different firms choose different accounting policies. Also, changes in a firm's own accounting policies may create some distortion in the comparison of the results over a period of years.
 - f. Misleading conclusions may result if **improper comparisons** are selected.
 - g. Whether a certain level of a ratio is favorable depends on the **underlying circumstances**. For example, a high quick ratio indicates high liquidity, but it may also imply that excessive cash is being held.
 - h. Different ratios may yield opposite conclusions about a firm's financial health. Thus, the net effects of a set of ratios should be analyzed.
 - i. **Industry averages** may include data from capital-intensive and labor-intensive firms. They also may include data from firms with far different leverage policies.
 - 1) Some industry averages may be based on **small samples**.
 - j. **Different sources** of information may compute ratios differently.
 - k. Some data may be presented either before or after **taxes**.
 - l. Comparability among firms may be impaired if they have **different fiscal years**.
 - m. The **geographical locations** of firms may affect comparability because of differences in labor markets, price levels, governmental regulation, taxation, and other factors.
 - n. **Size differentials** among firms affect comparability because of differences in access to and cost of capital, economies of scale, and width of market.
2. **Asset composition** addresses how liquid a company wants to be. A conservative company, or one with a low level of inventory, may prefer to hold highly liquid assets. A competitor might prefer a less-liquid composition.