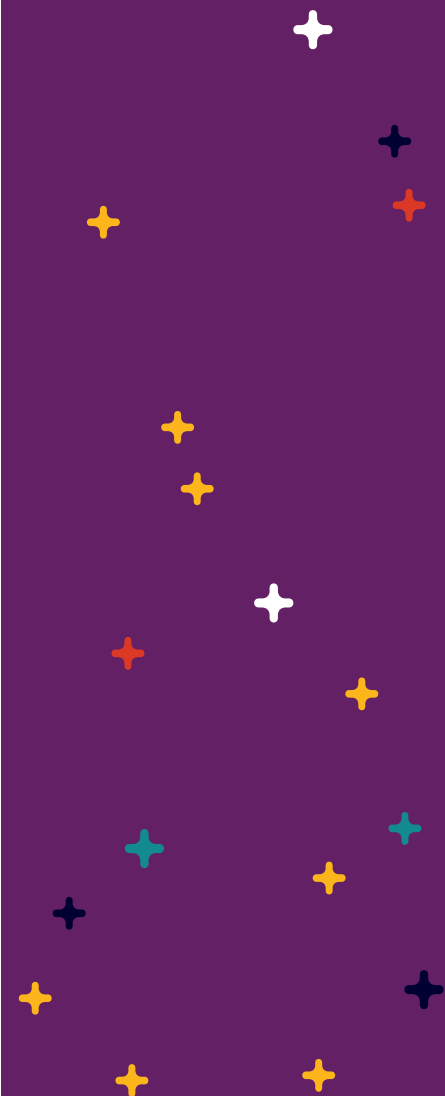


2B. Corporate Finance

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NOTES

This module covers the following content from the IMA *Learning Outcome Statements*.

CMA LOS Reference: Part 2—Section B.1. Risk and Return

The candidate should be able to:

- a. calculate rates of return
- b. identify and demonstrate an understanding of systematic (market) risk and unsystematic (company) risk
- c. identify and demonstrate an understanding of credit risk, foreign exchange risk, interest rate risk, market risk, industry risk, and political risk
- d. demonstrate an understanding of the relationship between risk and return
- e. distinguish between individual security risk and portfolio risk
- f. demonstrate an understanding of diversification
- g. define beta and explain how a change in beta impacts a security's price
- h. demonstrate an understanding of the capital asset pricing model (CAPM) and calculate the expected risk-adjusted returns using CAPM

1 Rates of Return

LOS 2B1a

The rate of return refers to the measure of the cash flows from an investment compared with the amount of the investment. The return on an investment (both the expected return and actual return) is crucial to the investment decision.

1.1 Annual Return

- **Definition:** Annual returns include two components: capital return and income return. Capital return is the change in value of the underlying investment from one period to the next period.
- **Computation:** Returns are generally calculated over a 12-month (annual) period. The formula for calculating annual return is:

$$\text{Annual return} = \frac{\text{Ending value} - \text{Beginning value} + \text{Income}}{\text{Beginning value}}$$

$$\text{Capital return} = \frac{\text{Ending value} - \text{Beginning value}}{\text{Beginning value}}$$

Income return includes dividends, interest, or royalties earned on that underlying investment during the period.

$$\text{Income return} = \frac{\text{Income}}{\text{Beginning value}}$$

The total return is capital return plus income return over either the life of an investment or a specified period. The total return for a single year is equal to the annual return described above.

$$\text{Total return} = \text{Capital return} + \text{Income return} = \frac{\text{Ending value} - \text{Beginning value} + \text{Income}}{\text{Beginning value}}$$

Example 1 Calculating Return

Facts: On January 1, Year 1, an investor paid €1,000 for 500 shares of stock worth €1,700 on December 31, Year 1. During the year, dividends were paid at €0.50 per share.

Required: Calculate the capital return, income return, and total annual return.

Solution:

$$\text{Capital return} = \frac{\text{€1,700 ending value} - \text{€1,000 beginning value}}{\text{€1,000 beginning value}} = 0.70 = 70\%$$

$$\text{Income return} = \frac{500 \text{ shares} \times \text{€0.50 dividend per share}}{\text{Beginning value}} = 0.25 = 25\%$$

The total return is:

$$\text{Total return} = \frac{\text{Ending value} - \text{Beginning value} + \text{Dividend income}}{\text{Beginning value}}$$

$$\text{Total return} = \frac{\text{€1,700} - \text{€1,000} + \text{€250}}{\text{€1,000}} = 0.95 = 95\%$$

$$\text{Total return} = 70\% \text{ capital return} + 25\% \text{ income return} = 95\%$$

1.2 Holding Period Return

- **Definition:** The holding period return is the return earned over either a specified increment of time or a period of time.
- **Computation:** The annualized rate of return is calculated by multiplying the holding period return by the number of holding periods in a year.

Example 2 Annualizing Rates of Return

Facts: An investor paid €1,000 for 500 shares of a stock on January 1, Year 1, and sold them for €1,200 on June 30, Year 1. During the first six months of the year the investor received €125 in dividends.

Required: Calculate the annualized return.

Solution:

$$\text{Six-month holding period return} = \frac{\begin{array}{l} \text{€1,200} \\ \text{selling} \\ \text{price} \end{array} - \begin{array}{l} \text{€1,000} \\ \text{purchase} \\ \text{price} \end{array} + \begin{array}{l} \text{€125} \\ \text{dividend} \\ \text{income} \end{array}}{\text{€1,000 purchase price}} = 0.325 = 32.5\%$$

The annualized return = 32.5% six-month holding period return × 2 six-month holding periods in a year = 65%.

Note that the annual holding period return may be the same as the total return if the evaluation period is one year.

1.3 Geometric Return

- **Definition:** Compounding occurs in investing when an asset's earnings generate additional earnings. Each year, the change in the asset's value along with any income earned will establish a new base on which the next year's return is computed.

An arithmetic average is simply the summation of all percentage returns divided by the number of returns. This overstates the true return because it does not account for year-over-year compounding. For shorter periods of time and lower investment amounts, the arithmetic average can serve as a reasonable proxy for the true return. For longer periods of time and higher investment amounts, the geometric average is most appropriate because it more accurately accounts for the effects of compounding.

- **Computation:** The formula for calculating the geometric average is as follows:

$$\text{Geometric average} = \sqrt[n]{(1 + r_1)(1 + r_2) \dots (1 + r_n)} - 1$$

Or:

$$[(1 + r_1)(1 + r_2) \dots (1 + r_n)]^{1/n} - 1$$

Example 3 Arithmetic and Geometric Average Returns

Facts: An investor invests \$10,000 and earns the following capital returns each year over four years:

- Year 1: 10 percent
- Year 2: (25 percent)
- Year 3: 21 percent
- Year 4: 6 percent

Required: Calculate the arithmetic return and the geometric return. Determine the value for the investment at the end of four years.

Solution:

The arithmetic return is calculated as follows:

$$\text{Arithmetic return} = (0.10 - 0.25 + 0.21 + 0.06) / 4 = 0.03 \text{ or } 3\%$$

The incorrect value of the investment, if the arithmetic return is used, is \$11,255.08:

$$\text{Incorrect value at end of Year 4} = \$10,000 \text{ beginning value} \times (1.03)^4 = \$11,255.08$$

The geometric return is calculated as follows:

$$\text{Geometric average} = \sqrt[4]{(1.10) \times (0.75) \times (1.21) \times (1.06)} - 1 = 0.0142296 = 1.42296\%$$

The correct value of the investment, if the geometric return is used, is \$10,581.45:

$$\text{Value at end of Year 4} = \$10,000 \text{ beginning value} \times (1.0142296)^4 = \$10,581.45$$

To determine the value in the investment account manually, the value is adjusted each year based on that year's return:

- \$10,000 value at beginning of first year $\times 1.10 =$ \$11,000 value at end of first year
- \$11,000 value at end of first year $\times 0.75 =$ \$8,250 value at end of second year
- \$8,250 value at end of second year $\times 1.21 =$ \$9,982.50 value at end of third year
- \$9,982.50 value at end of third year $\times 1.06 =$ \$10,581.45 value at end of fourth year

1.4 Stated Interest Rate

- **Definition:** The stated interest rate (sometimes referred to as nominal interest rate) represents the rate of interest charged before any adjustment for compounding or market factors.
- **Computation:** The stated interest rate is the rate shown in the agreement of indebtedness (e.g., a bond indenture or promissory note).

Example 4 Stated Interest Rate

Facts: A \$10,000 promissory note states that payments will be made quarterly at a 10 percent interest rate per annum.

Required: Calculate the stated interest rate. **Hint:** You do not need a calculator.

Solution: Stated rate = 10 percent

1.5 Effective Interest Rate

- **Definition:** The effective interest rate represents the actual finance charge associated with a borrowing after reducing loan proceeds for charges and fees related to a loan origination.
- **Computation:** The effective interest rate is computed by dividing the amount of interest paid based on the loan agreement by the net proceeds received.

Example 5 Effective Interest Rate

Facts: A \$10,000 promissory note has a stated rate of 10 percent per annum and is due in one year. The bank charges a loan origination fee of \$75 and the state in which the loan is made levies a \$50 documentary stamp charge. Taxes and fees are taken from loan proceeds.

Required: Compute the effective interest rate.

Solution:

Interest paid ($10,000 \times 10\%$)	\$ 1,000
Divided by net proceeds ($10,000 - 75 - 50$)	$\div 9,875$
Effective interest rate	<u>10.13%</u>

1.6 Annual Percentage Rate

- **Definition:** The annual percentage rate represents a noncompounded version of the effective annual percentage rate described and computed below. The annual percentage rate is the rate required for disclosure by federal regulations.
- **Computation:** The annual percentage rate is computed as the effective periodic interest rate times the number of periods in a year. Annual percentage rate emphasizes the amount paid relative to funds available.

Example 6 Annual Percentage Rate

Facts: A \$10,000 promissory note displays a stated rate of 8 percent with interest to be paid semiannually. The bank charges a \$75 loan origination fee and a documentary tax of \$50 is assessed by the state.

Required: Calculate the annual percentage rate.

Solution:

Step 1: Compute the effective periodic interest rate (as per above)

Interest paid ($10,000 \times 8\% \times 6/12$)	\$ 400
Divided by available funds ($10,000 - 75 - 50$)	$\div 9,875$
Effective periodic interest rate	<u>4.05%</u>

Step 2: Multiply the effective periodic interest rate by the number of periods in a year

Effective periodic interest rate	4.05%
Periods in a year	$\times 2$
Annual percentage rate	<u>8.10%</u>

1.7 Effective Annual Percentage Rate

- **Definition:** The effective annual percentage rate is the stated interest rate adjusted for the number of compounding periods per year. The effective annual percentage rate is abbreviated EAR.
- **Computation:** The EAR is computed as follows:

$$\text{Effective annual interest rate} = [1 + (i/p)]^p - 1$$

i = Stated interest rate

p = Compounding periods per year

Example 7 Effective Annual Percentage Rate

Facts: A note has an 8 percent stated rate of interest compounded semiannually (two times per year).

Required: Compute the effective annual percentage rate or EAR.

Solution:

$$\text{Effective annual interest rate} = [1 + (i/p)]^p - 1$$

$$\text{Effective annual interest rate} = [1 + (0.08/2)]^2 - 1$$

$$\text{Effective annual interest rate} = [1 + (0.04)]^2 - 1$$

$$\text{Effective annual interest rate} = 1.0816 - 1$$

$$\text{Effective annual interest rate} = 8.16\%$$

2 Investment Risk

LOS 2B1b

LOS 2B1c

All investments carry some level of risk. Even even guaranteed government notes are at risk for currency devaluation. Risk comes from many sources, including both macroeconomic factors affecting the overall market (increases in interest rates, unemployment rate) and microeconomic factors (raw materials shortages, price wars).

2.1 Market/Systematic/Nondiversifiable Risk

The exposure of a security or firm to fluctuations in value as a result of operating within an economy is referred to as market risk. Market risk is sometimes referred to as systematic risk because it is a risk inherent in operating within the economy. Systematic risk is attributable to factors such as war, inflation, international incidents, and political events.

Market/systematic risk is also referred to as nondiversifiable risk because it cannot be diversified away and remains even in a fully diversified portfolio. Compensation for this risk is factored into models used to forecast expected return.

Illustration 1 Market Risk

The prices on publicly traded stocks generally increase and decrease together with overall market activity. Although the prices may not increase or decrease identically, they often move in the same direction. A technology company's stock, for example, might increase in value on a given day from \$37.00 per share to \$37.75 per share. This increase in the stock price is consistent with the overall 2 percent increase in the NASDAQ on that trading day.

2.2 Unsystematic/Firm-Specific/Diversifiable Risk

Diversifiable risk (which is also referred to as nonmarket, unsystematic, or firm-specific risk) represents the portion of a firm's or industry's risk that is associated with random causes and can be eliminated through diversification. Diversifiable risk is attributable to firm-specific or industry-specific events (e.g., strikes, lawsuits, regulatory actions, or the loss of a key account).



Pass Key

It is important to be able to classify risk into two broad categories:

- **D**iversifiable risk =
 - **U**nsystematic risk (nonmarket/firm-specific)
- and
- **N**ondiversifiable risk =
 - **S**ystematic risk (market)

Remember the mnemonic **DUNS** to keep these risk types and their alternative names clear.

2.3 Credit Risk

Investors who purchase bonds are exposed to credit risk (default risk), which is the risk that the investor (lender) will not receive interest and/or principal due because the borrower is unable to make the payments. A direct relationship exists between credit risk and interest rates. The higher the credit risk, the higher the interest rate required by the lender to compensate the lender for the risk associated with lending money.

2.4 Foreign Exchange Risk

Investors seeking to diversify by investing either in securities issued by companies in other countries or in another currency confront foreign exchange risk (currency risk). The value of the currency in which an investment is denominated could decrease, which would decrease the purchasing power in the home currency. Exposures due to foreign exchange risks include transaction, economic, and translation exposures.

2.4.1 Transaction Exposure

Foreign exchange risk is defined, in part, by transaction exposure. Transaction exposure is defined as the potential that an organization could suffer economic loss or experience economic gain upon settlement of individual transactions as a result of changes in the exchange rates. Measurement of transaction exposure is generally done in two steps:

1. Project foreign currency inflows and foreign currency outflows.
2. Estimate the variability (risk) associated with the foreign currency.

Illustration 2 Transaction Exposure

Seattle Import/Export, a U.S. import/export company, imports commodities from Canada that it pays for in Canadian dollars and exports commodities to Canada for which it receives Canadian dollars. If Seattle Import/Export anticipated that it would export C\$10,000,000 to Canada over the next year while importing C\$8,000,000 over the same period, the net exposure in Canadian dollars is a C\$2,000,000 inflow (receivable).

If the current exchange rate is \$0.75/C\$1, the net exposure in U. S. dollars is \$1,500,000 (C\$2,000,000 × 0.75). If the rate is anticipated to fluctuate five cents, between \$0.70 and \$0.80, the total U.S. dollar fluctuation exposure would be expected to be between \$1,400,000 and \$1,600,000.

2.4.2 Economic Exposure

Foreign exchange risk also includes economic exposure. Economic exposure is defined as the potential that the present value of an organization's cash flows could increase or decrease as a result of changes in the exchange rates. Economic exposure is generally defined through local currency appreciation or depreciation and is measured in relation to organization earnings and cash flows.

■ Currency Appreciation and Depreciation

Currency appreciation (depreciation) refers to the strengthening (weakening) of a currency in relation to other currencies.

● Effect of Currency Appreciation

As a domestic currency appreciates in value or becomes stronger, it becomes more expensive in terms of a foreign currency. As a currency appreciates, the volume of outflows tends to decline as domestic exports become more expensive. However, the volume of inflows tends to increase as foreign imports become less expensive.

- **Effect of Currency Depreciation**

As a domestic currency depreciates in value or becomes weaker, it becomes less expensive in terms of a foreign currency. As a currency depreciates, the volume of outflows tends to rise as domestic exports become less expensive. However, the volume of inflows tends to decline as foreign imports become more expensive.

The economic exposure created by domestic currency appreciation or depreciation with respect to a foreign currency depends on the net inflow or outflow of foreign currency.

2.4.3 Translation Exposure

Foreign exchange risk includes translation exposure, in addition to the transaction and economic exposures. Translation exposure is the risk that assets, liabilities, equity, or income of a consolidated organization that includes foreign subsidiaries will change as a result of changes in exchange rates. Translation exposure is generally defined by the degree of foreign involvement, the location of foreign subsidiaries, and the accounting methods used and measured in relation to the effect on the organization's earnings or comprehensive income.

- **Degree of Foreign Involvement:** Translation exposure increases as the proportion of foreign involvement by subsidiaries increases.

Illustration 3 Translation Risk

Domestic International Inc. has no foreign subsidiaries but is deeply involved in exporting to neighboring countries. Global International Inc. has 12 foreign subsidiaries which, combined, make up 65 percent of consolidated revenues. Domestic International has less translation exposure than Global International because it has no foreign subsidiaries. Domestic's international business does expose the company to exchange rate risks, however, in terms of both transaction and economic exposure.

Because of Global International's extensive foreign operations, the parent company has significant exposure to foreign currency translation exposure, and depending on the entity's export/import activity, Global International may also be exposed to foreign exchange transaction and economic risks.

- **Locations of Foreign Investments:** Measurements of financial results of foreign investments frequently occur in the foreign currency in which the investee company operates. The exposure of the parent company to translation risk is affected by the stability of the foreign currency in comparison to the parent's domestic currency. The more stable the exchange rate, the lower the translation risk. The more volatile the exchange rate, the higher the translation risk.

2.5 Interest Rate Risk

Investors who purchase bonds, debt, or other interest-bearing financial instruments are subject to interest rate risk. Interest rate risk is the possibility that the market interest rate may change and impact the value of the interest-bearing instrument. The value of a fixed rate, interest-bearing instrument decreases as interest rates rise. If interest rates fall, the value of the fixed-rate, interest-bearing instrument rises.

Illustration 4 Interest Rate Risk

On January 2, Pat paid the local bank \$10,000 and the bank issued to Pat a one-year, noncancelable certificate of deposit paying 5 percent interest. On January 3, the bank increased its rate for a one-year, noncancelable certificate of deposit from 5 percent to 6 percent. Pat will still receive \$500 interest and \$10,000 principal on January 2 of the next year. If Pat had waited one day to purchase the one-year certificate of deposit, Pat would have received an additional \$100 on January 2 of the next year.

The value of Pat's certificate of deposit acquired on January 2 decreases after the January 3, Year 1, interest rate increase. As of January 3, Year 1, that one-year certificate of deposit for which Pat paid \$10,000 is worth only \$9,905.66: $\$10,500 / 1.06 = \$9,905.66$.

Proof: On January 3, Year 1, an investor need only pay the local bank \$9,905.66 in order to receive \$10,500 in one year at the new rate of 6 percent:

- $\$9,905.66 \times 6\% \text{ interest rate} = \594.34
- $\$9,905.66 \text{ principal} + \$594.34 \text{ interest} = \$10,500$

An easy method of remembering that a debt instrument's value moves in the opposite direction as market rates change is to think about how Pat feels about buying the certificate of deposit on January 2, Year 1, rather than buying the certificate of deposit on January 3, Year 1. Pat is unhappy. Pat could have earned an extra \$100 merely by waiting a day to buy that \$10,000 certificate of deposit at the higher interest rate. To summarize: "Unhappy" = Loss and loss in value; "Happy" = Gain and gain in value.

2.6 Industry Risk

Industry risk is specific to an industry in which a company operates or otherwise has significant exposure. Each industry has unique dependencies and exposures to the overall economy, but companies within each industry are subject to challenges often faced by only that industry. For instance, the auto industry is constrained by negotiations with labor unions as well as fuel efficiency standards required by the federal government. Increased industry risk is also seen in sectors in which the entire industry is performing poorly. Although this circumstance may provide an opportunity for an innovative company to achieve above-average industry returns, industry-wide poor performance potentially indicates declining consumer demand and the resulting adverse impact on the industry as a whole.

2.7 Political Risk

Political risks represent noneconomic events or environmental conditions that are potentially disruptive to financial operations. Ultimately, political climates or actions can disrupt cash flows. Although expropriation of productive resources represents the most extreme political risk, other features of political risk also must be considered, including:

- Bureaucracies and related inefficiencies or barriers to trade
- Corruption
- The host government's attitude toward foreign firms
- The attitude of consumers toward foreign firms
- Inconvertibility of foreign currency
- War

3 Balancing Risk and Return

LOS 2B1d

Generally, there is a direct relationship between risk and the required rate of return: higher (lower) levels of risk require higher (lower) expected returns. Investor risk tolerances vary, ranging from risk-averse to risk-neutral to risk-seeking. Investors who are risk-averse require lower levels of risk and accept lower levels of return, whereas risk-seekers accept higher risk in exchange for higher rates of return. If given a choice between two assets that offer the same rate of return, rational investors will choose the investment with the lower risk. Alternatively, if investors must choose between two assets with the same level of risk, rational investors will choose the investment that has the higher rate of return.

3.1 Diversification

LOS 2B1e

LOS 2B1f

Owning individual securities exposes an investor to individual security risk, also known as firm-specific or unsystematic risk. Investors can reduce individual security risk by forming a portfolio of different investments. As an investor combines individual securities or different asset classes into a portfolio, there will be a portfolio risk.

The key to minimizing portfolio risk is diversification, which reduces risk by combining investments with different risk profiles. For example, an investment in a company that has cyclical performance (its returns move with the economy in general, with seasonal fluctuations or other normal industry cycles) can be combined with an investment in a company that is counter-cyclical (its returns move in the opposite direction of fluctuations in the industry or economy).

Diversification entails investing in a variety of securities so that a loss in one security will have a minimal effect on the whole portfolio. Risk reduction can be achieved in a portfolio when the securities held are not correlated with one another. By properly diversifying the investments in a portfolio, an investor can minimize risk for a given level of return or maximize return for a given level of risk.

The expected return for any portfolio is the weighted average of the returns of each investment in the portfolio.

$$R_p = W_1R_1 + W_2R_2 + \dots + W_nR_n$$

Where:

$W_1, W_2 \dots W_n$ are the weights of each investment in the total portfolio

$R_1, R_2, \dots R_n$ are the expected returns of each investment in the portfolio

Example 8 Calculating Expected Return

Facts: Consider an individual bond with an expected return of 6 percent and an individual stock with an expected return of 10 percent. The bond and the stock are both equivalent in value in the portfolio.

Required: Calculate the expected return.

Solution: With both the bond and stock equivalent in value, each will represent 50 percent of the portfolio's value as a whole. The portfolio has an expected return of 8 percent:

$$R_p = (0.50)(0.06) + (0.50)(0.10) = 0.08 = 8\%$$

Asset allocation is the process of selecting assets in a portfolio to achieve the best risk/return trade-off. The assets can include bonds, stocks, derivatives, real estate, alternative investments (such as precious metals or oil and gas wells) as well as high-risk, low-risk, long-term, short-term, and other types of investments needed to achieve the correct balance of risk and return. When sufficient assets have been combined to achieve the full benefits of diversification, the portfolio is called a fully diversified or efficient portfolio. A fully diversified, efficient portfolio provides the highest possible rate of return for a level of risk or the lowest possible level of risk for a particular rate of return.

LOS 2B1h

3.2 The Capital Asset Pricing Model (CAPM)

The capital asset pricing model (CAPM) is used to determine the expected return on an investment based on its level of risk, factoring in both firm-specific risk and systematic (market) risk.

$$R_{ce} = R_f + \beta[R_m - R_f]$$

Where:

R_{ce} = Required rate of return on common equity

R_f = Risk-free rate of return

β = Beta of the security

R_m = Market return

Under the CAPM formula, the $[R_m - R_f]$ term is also known as the market risk premium.

- Risk-free rate is the theoretical rate of return on an investment with zero (or very low) risk.
- Beta is a numerical representation of the risk of the stock relative to the risk of the overall market. A beta of 1 means that the stock has the same volatility as the market, and a beta of greater (less) than 1 means that the stock is more (less) volatile than the market.
- Market risk premium is the systematic (nondiversifiable) risk associated with the overall stock market. The market risk premium is equal to the difference between the overall market return and the risk-free rate.

Example 9 Capital Asset Pricing Model

Facts: Assume that a firm's beta is 1.25, the risk-free rate is 8.75 percent, and the market rate of return is 14.25 percent.

Required: Compute the expected return using the capital asset pricing model (CAPM).

Solution: Expected return using the capital asset pricing model (CAPM):

$$\begin{aligned} \text{Expected return} &= R_{ce} = R_f + \beta[R_m - R_f] \\ &= 0.0875 + [1.25 \times (0.1425 - 0.0875)] \\ &= 0.0875 + [1.25 \times 0.0550] \\ &= 0.0875 + 0.0688 \\ &= 0.1563 = 15.63\% \end{aligned}$$

3.2.1 Beta

Beta (the beta coefficient) is a measure of the movement of the price of a particular stock compared with the movement of the market as a whole during the same period. Beta is a measure of systematic risk, which cannot be diversified away and remains even in a fully diversified portfolio. The beta of the overall market is 1.0. For an individual stock, beta is interpreted as follows:

- **Beta > 1.0:** The stock or portfolio is more volatile (riskier) than the market. More volatility requires a higher return.
- **Beta < 1.0:** The stock or portfolio is less volatile than the market. Less volatility requires a lower return.
- **Beta = 1.0:** A beta of exactly 1.0 means that the stock or portfolio has the same volatility as the market.

Note that the beta is calculated using historical data, so a beta can change over time and may be different depending on the historical return data used.

A security's price at any point represents the present value of the security's expected future cash flows. Cash flows are discounted using an investor's required rate of return, which is driven in part by a security's beta. The higher the beta, the higher the risk associated with that investment. Higher risk will increase the investor's required return. An inverse relationship exists between the required return (and beta) and the price of the security. The higher the required return, the higher the discount rate, and the lower the price (or present value) of the security.

Question 1

MCQ-12661

Assume that a stock has a beta of 1.24 based on five years of monthly data. The risk-free rate is 3 percent and the overall market return is 10 percent.

Using the CAPM, calculate the investor's required return for the stock.

- a. 8.68 percent
- b. 11.68 percent
- c. 12.40 percent
- d. 15.40 percent