

Introduction to Finance

Prepared by
Dr. Mohamed Hussein
Assistant Professor of Accounting

MGM 237
Risk and Return

Lecture 7



Chapter

7

Risk and Return

Learning Outcomes**Students will be able to:**

- Compute realized and expected returns.
- Measure risk using variance, standard deviation, and coefficient of variation (CV).
- Explain diversification, correlation, systematic risk, and beta.
- Use the Capital Asset Pricing Model (CAPM) to estimate the required return on equity.

Why Risk and Return Are Central in Finance

Risk and return guide investment decisions and required returns.

01

Finance decisions always compare reward with uncertainty.

02

Investors require higher expected returns when they bear more risk.

03

Managers use risk and return to estimate required rates of return.

04

The same logic affects valuation, cost of capital, and capital budgeting.

Return

Expected reward

Risk

Uncertainty of reward

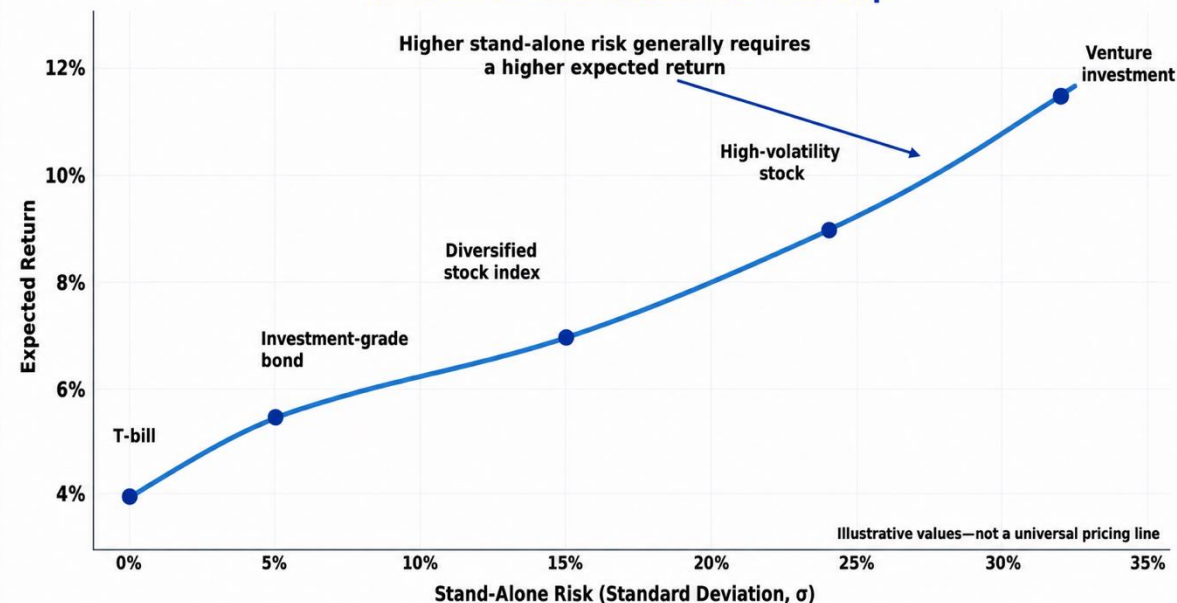
Decision

Accept only if reward justifies risk

Manager's Insight

A project or security is attractive only when expected return is sufficient for its risk.

Illustrative Risk-Return Relationship



Quick Example

A safe Treasury bill may offer 4%, while a risky stock may need 12% to attract investors.

Definition of Return

Risk and return guide investment decisions and required returns.

01

Return measures the gain or loss from an investment over a period.

02

It is usually expressed as a percentage of the amount invested.

03

Return includes price changes and any cash income received.

04

Return allows comparison across investments of different sizes.

Basic idea

$$\text{Return} = \text{Total gain} \div \text{Beginning value}$$

Total gain includes both price change and income.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Always convert gain into a percentage before comparing investments.

Quick Example

A \$10 gain on a \$100 investment is 10%; a \$10 gain on a \$1,000 investment is only 1%.

Holding Period Return

Risk and return guide investment decisions and required returns.

01 Holding period return measures the total return earned while holding an asset.

02 It combines income received and price appreciation or depreciation.

03 P0 is beginning price; P1 is ending price; Income is cash received.

04 The result can be positive or negative.

Holding period return

$$\text{HPR} = (\text{P1} - \text{P0} + \text{Income}) / \text{P0}$$

Use decimal or percentage form consistently.

Symbol	Meaning
P0	Beginning price
P1	Ending price
Income	Dividend or interest received

Manager's Insight

Holding period return is the starting point for measuring investment performance.

Quick Example

Buy at \$50, sell at \$56, receive \$2 dividend: $\text{HPR} = (56 - 50 + 2) \div 50 = 16\%$.

Capital Gain Component

Risk and return guide investment decisions and required returns.

01

Capital gain is the change in market price over the holding period.

02

It is positive when the asset price increases.

03

It is negative when the asset price decreases.

04

It excludes dividends and interest income.

Capital gain return

$$\text{Capital Gain Return} = (P1 - P0) / P0$$

This isolates the price-change part of total return.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Separating capital gain from income helps explain where investment performance came from.

Quick Example

A stock rises from \$40 to \$46: capital gain return = $6 \div 40 = 15\%$.

Income Component

Risk and return guide investment decisions and required returns.

01

Income return comes from cash paid by the investment.

02

For bonds, income is usually coupon interest.

03

For stocks, income is usually dividends.

04

Income return is measured relative to beginning price.

Income return

$$\text{Income Return} = \text{Income} / P_0$$

Add this to capital gain return to get total HPR.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Some investors prefer income-producing assets because cash income is visible and recurring.

Quick Example

A stock bought at \$40 pays \$2 dividend: $\text{income return} = 2 \div 40 = 5\%$.

Realized Return

Risk and return guide investment decisions and required returns.

01

Realized return is the return that actually happened.

02

It is calculated after the investment period is complete.

03

It can be compared with the expected return to evaluate accuracy.

04

Realized returns are useful for historical performance analysis.

Before

Expected return



After

Realized return



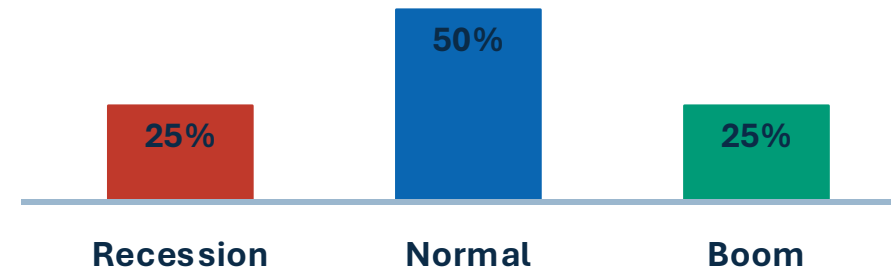
Evaluate

Compare
expectation with
result

Manager's Insight

Managers and investors learn by comparing what was expected with what actually occurred.

Probability distribution



Quick Example

If you expected 10% but earned 6%, the realized return was below expectation.

Probability Distribution of Returns

Risk and return guide investment decisions and required returns.

01 A probability distribution lists possible returns and their probabilities.

02 The probabilities should add to 100%.

03 It shows both expected reward and uncertainty.

04 A wider range of possible returns usually means more risk.

State	Probability	Return
Recession	25%	-2%
Normal	50%	10%
Boom	25%	18%

Manager's Insight

Do not look only at the most likely outcome; examine the full range of possible outcomes.

Quick Example

A project with returns from -20% to +35% is riskier than one ranging from 4% to 9%.

Expected Return

Risk and return guide investment decisions and required returns.

01

Expected return is the return investors anticipate before the outcome is known.

02

It is not guaranteed; it is a probability-weighted estimate.

03

It helps compare investments before making a decision.

04

Expected return is the “best estimate” of average future return.

Expected return

$$E(r) = \sum [P(s) \times r(s)]$$

Multiply each possible return by its probability, then add.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Expected return is useful only when the assumptions about probabilities and outcomes are reasonable.

Quick Example

If good and bad outcomes are equally likely, expected return is their average.

Weighted Average Expected Return

Risk and return guide investment decisions and required returns.

01 Expected return uses probability weights.

02 Higher-probability outcomes have more influence on the final result.

03 Low-probability outcomes still matter, especially if they are extreme.

04 The formula works for securities, portfolios, and projects.

Weighted average

$$E(r) = P_1r_1 + P_2r_2 + \dots + P_nr_n$$

Each return is weighted by its probability.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Expected return is not a simple average unless all probabilities are equal.

Quick Example

Returns: -2%, 10%, 18%; probabilities 25%, 50%, 25%. $E(r)=9\%$.

Risk Definition

Risk and return guide investment decisions and required returns.

01

Risk means uncertainty about actual future returns.

02

In finance, risk is often measured by variability around expected return.

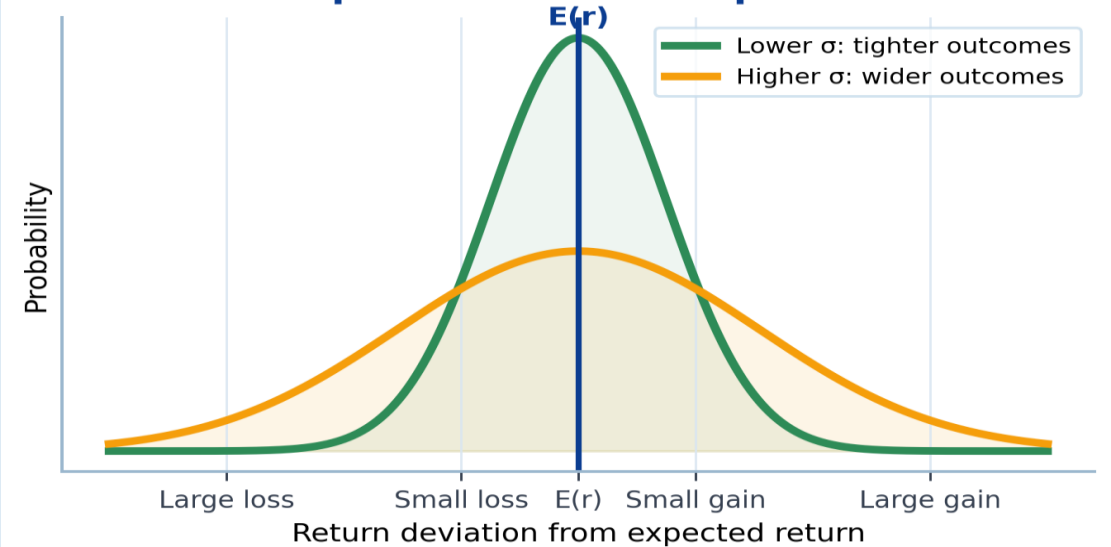
03

A riskier asset has a wider range of possible outcomes.

04

Risk can create losses but also the possibility of higher gains.

Risk = Dispersion Around Expected Return



Manager's Insight

Risk is not simply “bad”; it is uncertainty that must be priced and managed.

Quick Example

A guaranteed 5% return is less risky than a return that could be -10% or +25%.

Stand-Alone Risk

Risk and return guide investment decisions and required returns.

01

Stand-alone risk is the risk of one asset considered by itself.

02

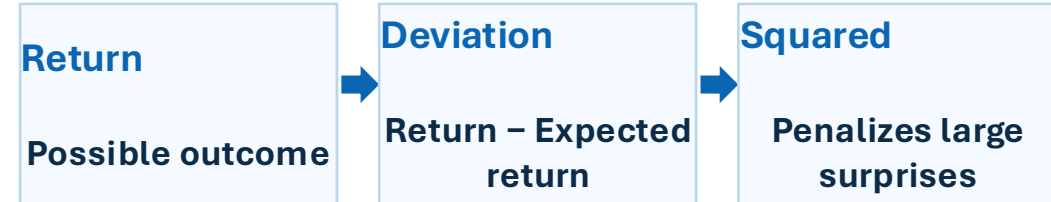
It ignores how the asset interacts with other investments.

03

Variance and standard deviation are common stand-alone risk measures.

04

Stand-alone risk is useful but incomplete for diversified investors.



Risk logic

Variance → Standard deviation

Standard deviation converts risk back into percentage units.

Manager's Insight

A security that looks risky alone may reduce risk when added to a portfolio.

Quick Example

A stock with high volatility may still be useful if it moves differently from the rest of the portfolio.

Variance

Risk and return guide investment decisions and required returns.

01

Variance measures how far possible returns are from expected return.

02

It squares deviations, so large surprises receive more weight.

03

For expected outcomes, multiply each squared deviation by probability.

04

Variance is useful, but its units are squared percentages.

Variance

$$\sigma^2 = \sum P(s) \times [r(s) - E(r)]^2$$

Deviation = possible return minus expected return.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Variance is the mathematical foundation for standard deviation.

Quick Example

If possible returns are far from $E(r)$, variance becomes larger.

Standard Deviation

Risk and return guide investment decisions and required returns.

01

Standard deviation is the square root of variance.

02

It measures risk in the same units as return: percentage points.

03

A larger standard deviation means returns are more spread out.

04

It is one of the most common risk measures in finance.

Standard deviation

$$\sigma = \sqrt{\text{Variance}}$$

Higher σ means higher stand-alone risk.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Standard deviation helps compare the uncertainty of different investments.

Quick Example

Investment A has $\sigma = 5\%$; Investment B has $\sigma = 18\%$. B has more variable returns.

Coefficient of Variation

Risk and return guide investment decisions and required returns.

01

Coefficient of variation compares risk per unit of expected return.

02

It is useful when investments have different expected returns.

03

A lower CV means less risk for each unit of expected return.

04

It should not be used mechanically without judgment.

Coefficient of variation

$$CV = \sigma / E(r)$$

Risk per unit of expected return.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

CV helps compare investments when one has both higher risk and higher expected return.

Quick Example

A: $\sigma=6\%$, $E(r)=12\%$, $CV=0.50$. B: $\sigma=10\%$, $E(r)=15\%$, $CV=0.67$. A has less risk per return.

Risk-Return Trade-off

Risk and return guide investment decisions and required returns.

01

Investors generally expect higher returns for accepting higher risk.

02

Low-risk assets usually offer lower expected returns.

03

High-risk assets must offer higher expected returns to attract capital.

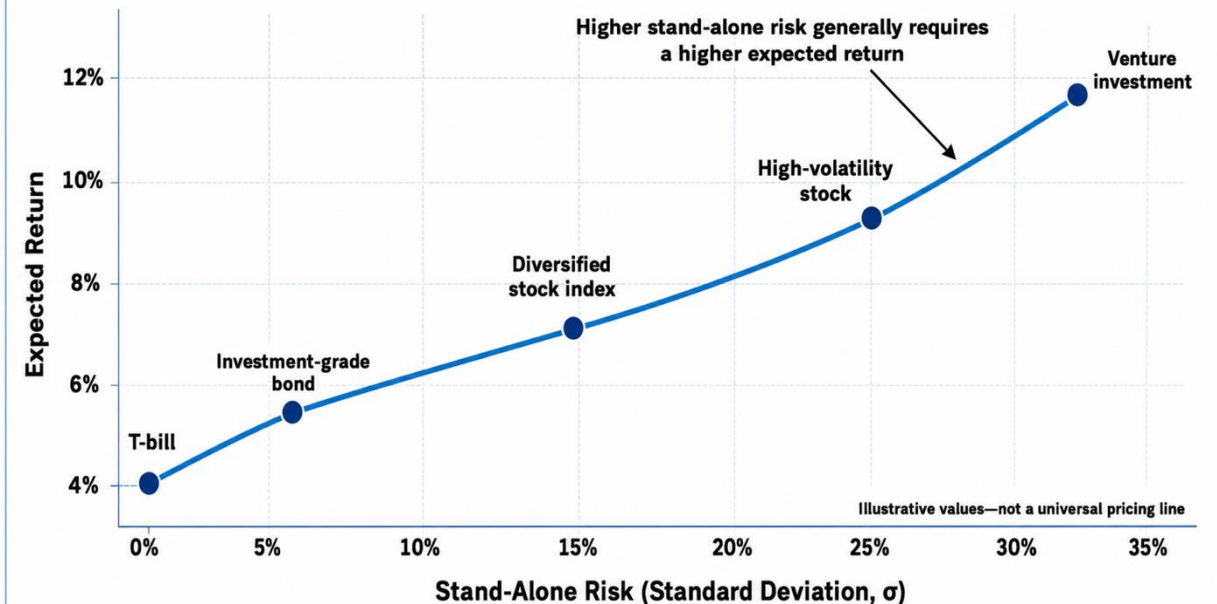
04

The trade-off is central to valuation and investment decisions.

Manager's Insight

No investment should be judged by return alone; it must be judged against risk.

Illustrative Risk-Return Trade-off



Quick Example

A 14% expected return may be unattractive if the risk is extremely high.

Risk Aversion

Risk and return guide investment decisions and required returns.

01

Risk aversion means investors dislike risk when return is the same.

02

A risk-averse investor requires compensation for bearing additional risk.

03

Most finance models assume investors are risk averse.

04

Risk aversion explains why risk premiums exist.

Same return

Choose lower risk

More risk

Demand more return

Risk premium

Compensation for uncertainty

Manager's Insight

Risk aversion is why risky securities need higher expected returns than safe securities.



Quick Example

If two investments both expect 8%, most investors choose the less risky one.

Required Rate of Return

Risk and return guide investment decisions and required returns.

01

Required return is the minimum return investors demand.

02

It reflects time value of money and risk.

03

It is used as a discount rate in valuation.

04

Higher risk leads to a higher required return.

Required return idea

Required Return = Risk-free return + Risk premium

The premium compensates investors for uncertainty.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Required return connects this lecture directly to bond, stock, and firm valuation.

Quick Example

If risk-free return is 4% and risk premium is 6%, required return is 10%.

Chapter 07

HISTORY

Historical Returns Overview



Risk and return guide investment decisions and required returns.

01

Historical returns show how investments performed in the past.

02

Stocks historically have offered higher average returns than safer securities.

03

Higher historical return usually came with higher volatility.

04

Past performance informs judgment but does not guarantee the future.



Manager's Insight

Historical data helps students see the risk-return trade-off in real markets.

Quick Example

Common stocks may outperform bonds over long periods, but with larger short-term losses.

Risk-Free Return

Risk and return guide investment decisions and required returns.

01

The risk-free return is the return on an investment with no default risk and very low uncertainty over the chosen period.

02

Treasury securities are commonly used as practical benchmarks.

03

It represents compensation for time value of money.

04

Risky assets should normally offer more than the risk-free return.

Benchmark role

Risk-free return = Base return for valuation

Risk premiums are added to this base.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Risk-free return is the starting point for estimating required returns.

Quick Example

If Treasury bills yield 4%, a risky stock must offer more than 4% to be attractive.

Risk Premium

Risk and return guide investment decisions and required returns.

01

Risk premium is extra expected return above the risk-free rate.

02

It compensates investors for uncertainty.

03

Riskier assets require larger risk premiums.

04

Risk premiums change with market conditions and investor confidence.

Risk premium

Risk Premium = Expected Return – Risk-free Return

It measures the reward for bearing risk.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Risk premium is the price investors charge for accepting uncertainty.

Quick Example

Expected return = 11%, risk-free = 4%. Risk premium = 7%.

Market Risk Premium

SML = Security Market Line; MRP = Market Risk Premium.

01

Market risk premium is the extra return investors expect from the market portfolio over the risk-free rate.

02

It is a key input in CAPM.

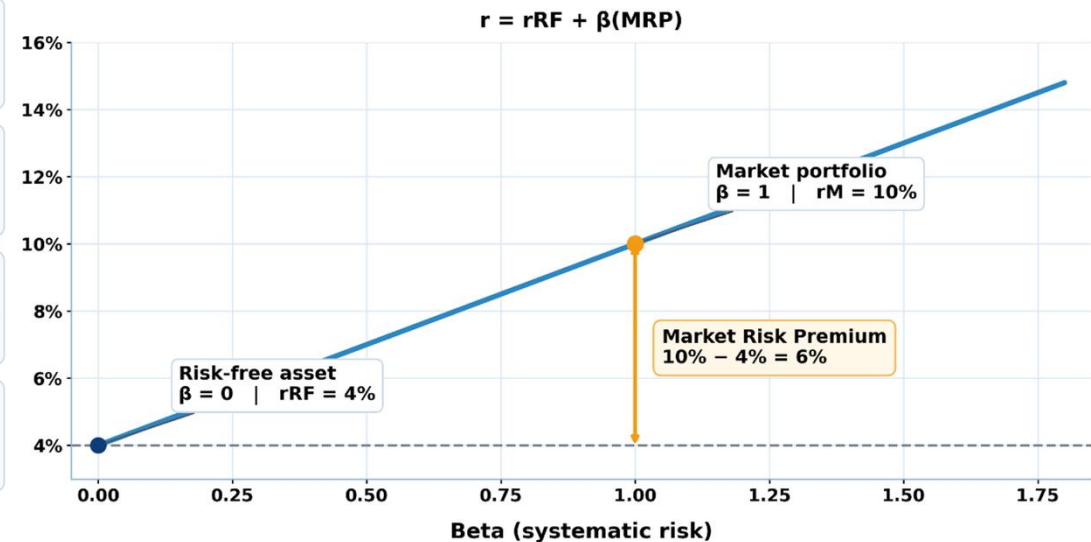
03

It reflects economy-wide risk that cannot be diversified away.

04

A higher market risk premium increases required return on equity.

Security Market Line (SML)



Manager's Insight

CAPM scales the market risk premium by beta.

Quick Example

If expected market return is 10% and risk-free is 4%, $MRP = 6\%$.

Diversification Principle

Risk and return guide investment decisions and required returns.

01

Diversification means spreading funds across different assets.

02

It can reduce risk without necessarily reducing expected return.

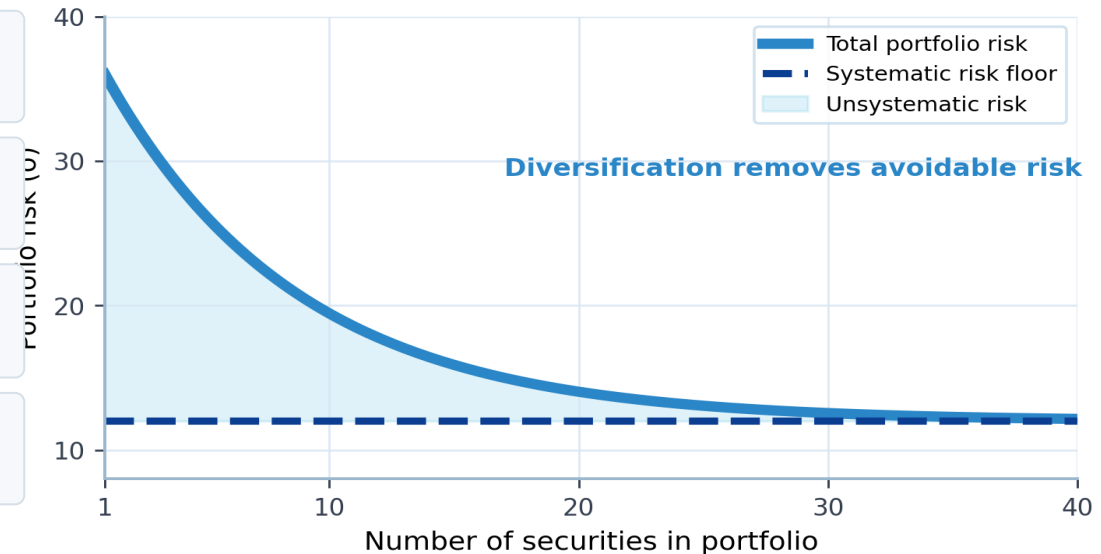
03

The benefit is stronger when assets do not move together perfectly.

04

Diversification does not eliminate all risk.

Diversification Reduces Portfolio Risk



Manager's Insight

Diversification is one of the most practical risk management tools in finance.

Quick Example

Owning stocks from different industries is less risky than owning one company only.

Portfolio Return

Risk and return guide investment decisions and required returns.

01

A portfolio is a collection of investments.

02

Portfolio expected return is a weighted average of asset expected returns.

03

Weights are based on the percentage of funds invested in each asset.

04

The weights should normally sum to 100%.

Portfolio expected return

$$E(r_p) = \sum w_i \times E(r_i)$$

w_i = portfolio weight of asset i .

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Portfolio return is easy to calculate; portfolio risk requires correlation.

Quick Example

60% in Asset A at 10% and 40% in Asset B at 5% gives $E(r_p)=8\%$.

Portfolio Risk

Risk and return guide investment decisions and required returns.

01

Portfolio risk is not simply the weighted average of individual risks.

02

It depends on how asset returns move together.

03

Correlation is the key driver of diversification benefit.

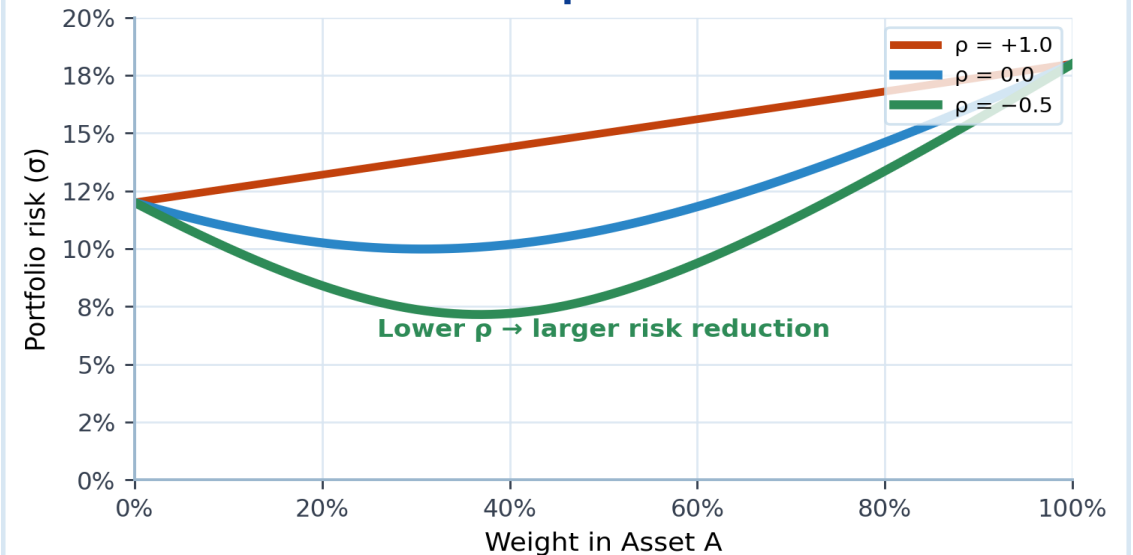
04

Lower correlation usually means lower portfolio risk.

Manager's Insight

Two risky assets can create a less risky portfolio if they offset each other.

Portfolio Risk Depends on Correlation



Quick Example

If one asset performs well when another performs poorly, portfolio risk can fall.

Correlation Concept

Risk and return guide investment decisions and required returns.

01

Correlation measures how two returns move together.

02

It ranges from -1 to $+1$.

03

Positive correlation means returns tend to move in the same direction.

04

Negative correlation means returns tend to move in opposite directions.

Correlation

Meaning

Diversification benefit

$+1$

Move together

Weakest

0

No clear pattern

Moderate

-1

Move opposite

Strongest

Manager's Insight

Diversification works best when correlation is low or negative.

Quick Example

Airline stocks and fuel producers may react differently to oil price changes.

Positive Correlation

Risk and return guide investment decisions and required returns.

01

Move in the same direction.

02

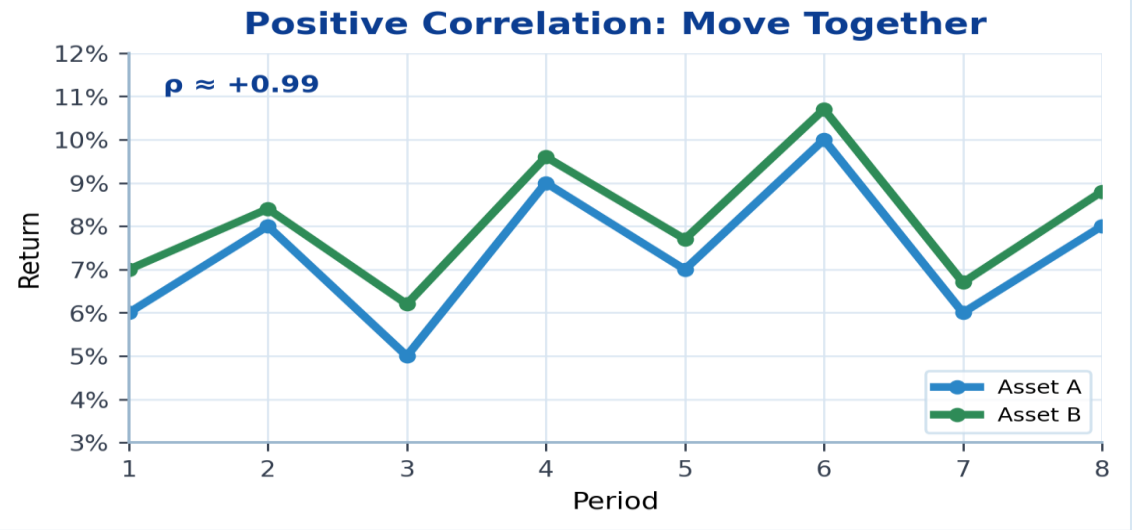
ρ close to +1 gives weak diversification.

03

Common within one industry or sector.

04

Similar movement, not identical returns.



Manager's Insight

A portfolio of very similar assets may not be as diversified as it appears.

Quick Example

Two bank stocks may both fall when interest rate uncertainty increases.

Negative Correlation

Risk and return guide investment decisions and required returns.

01

Move in opposite directions.

02

Can strongly reduce portfolio risk.

03

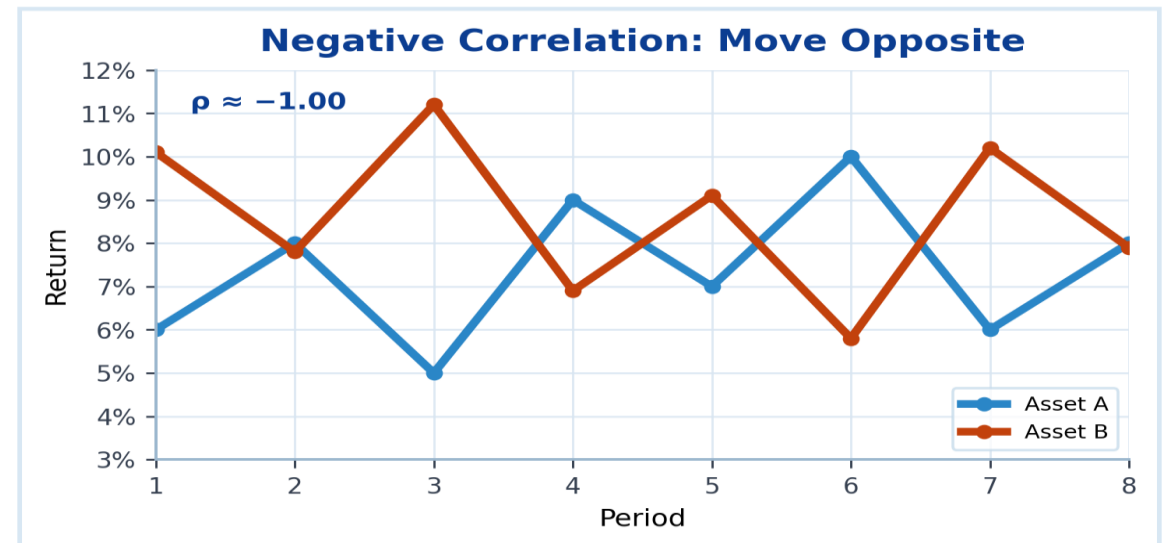
Perfect $\rho = -1$ is rare in real markets.

04

Even imperfect negative ρ is valuable.

Manager's Insight

The goal is not to find only high-return assets, but assets that work well together.



Quick Example

When one investment loses 5% while another gains 4%, the portfolio loss is reduced.

Zero Correlation

Risk and return guide investment decisions and required returns.

01

No consistent linear relationship.

02

One asset does not predict the other.

03

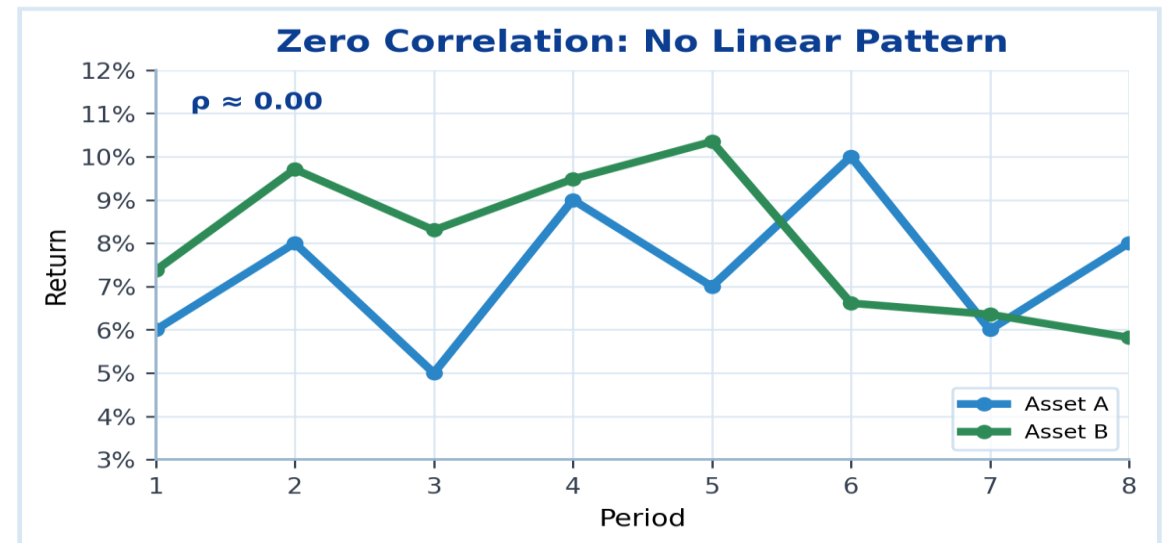
Diversifies better than $\rho = +1$.

04

Common across unrelated assets.

Manager's Insight

Unrelated assets often improve diversification more than assets in the same business area.



Quick Example

A technology stock and a utility bond may have weak or near-zero correlation.

Diversifiable Risk

Risk and return guide investment decisions and required returns.

01 Diversifiable risk is risk specific to a company or industry.

02 It can be reduced by holding a diversified portfolio.

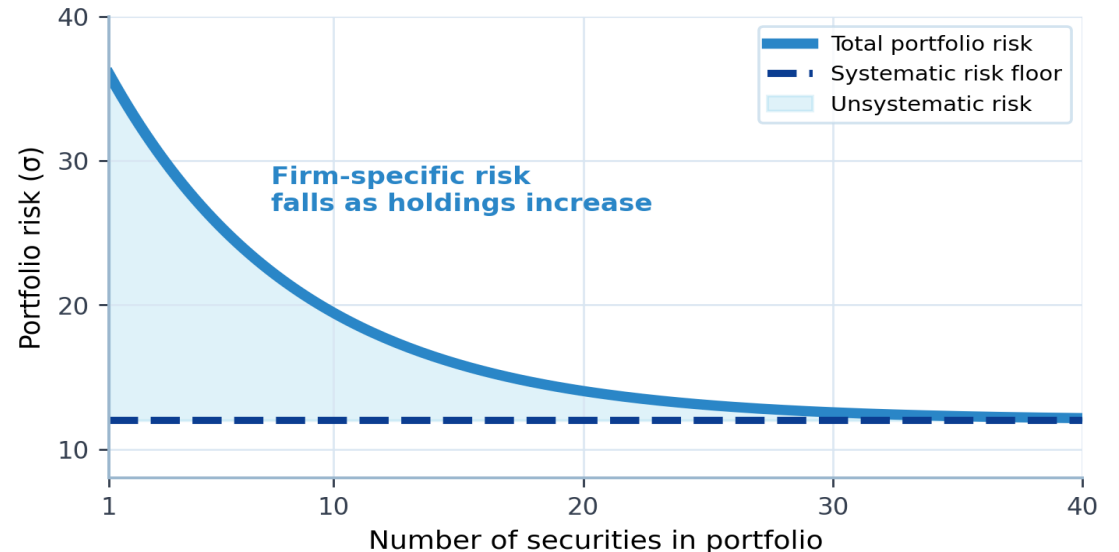
03 Examples include product failure, labor strike, or management problems.

04 It is also called unsystematic risk.

Manager's Insight

Investors are generally not rewarded for bearing risk that they could diversify away.

Diversifiable Risk Falls With More Securities



Quick Example

A factory fire affects one firm, not necessarily the entire market.

Non-Diversifiable Risk

Risk and return guide investment decisions and required returns.

01

Non-diversifiable risk affects the overall market or economy.

02

It cannot be eliminated by holding many securities.

03

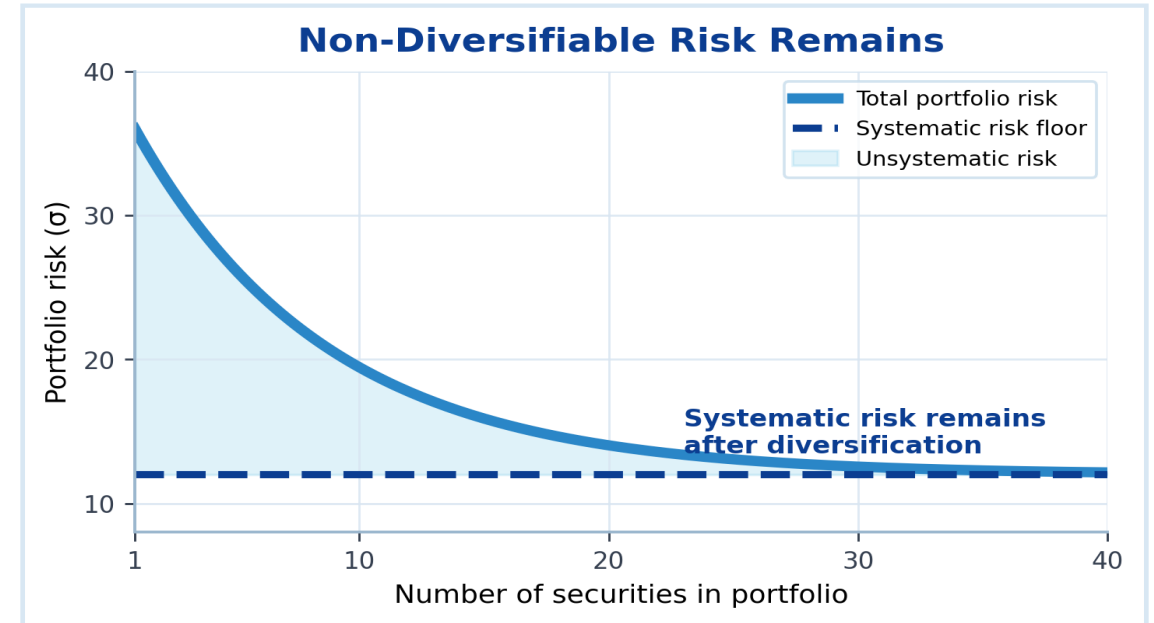
Examples include recessions, inflation shocks, and major interest rate changes.

04

It is also called systematic or market risk.

Manager's Insight

Non-diversifiable risk is the risk that matters most for required return in CAPM.



Quick Example

A recession can reduce returns across many stocks at the same time.

Systematic Risk

Risk and return guide investment decisions and required returns.

01

Systematic risk is economy-wide or market-wide risk.

02

It affects many securities simultaneously.

03

It remains even in a well-diversified portfolio.

04

Beta measures systematic risk relative to the market.

Key idea

Systematic risk remains after diversification

This is the risk investors must be compensated for.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Systematic risk drives the required return in the CAPM framework.

Quick Example

Interest rate increases can affect banks, manufacturers, and consumers at the same time.

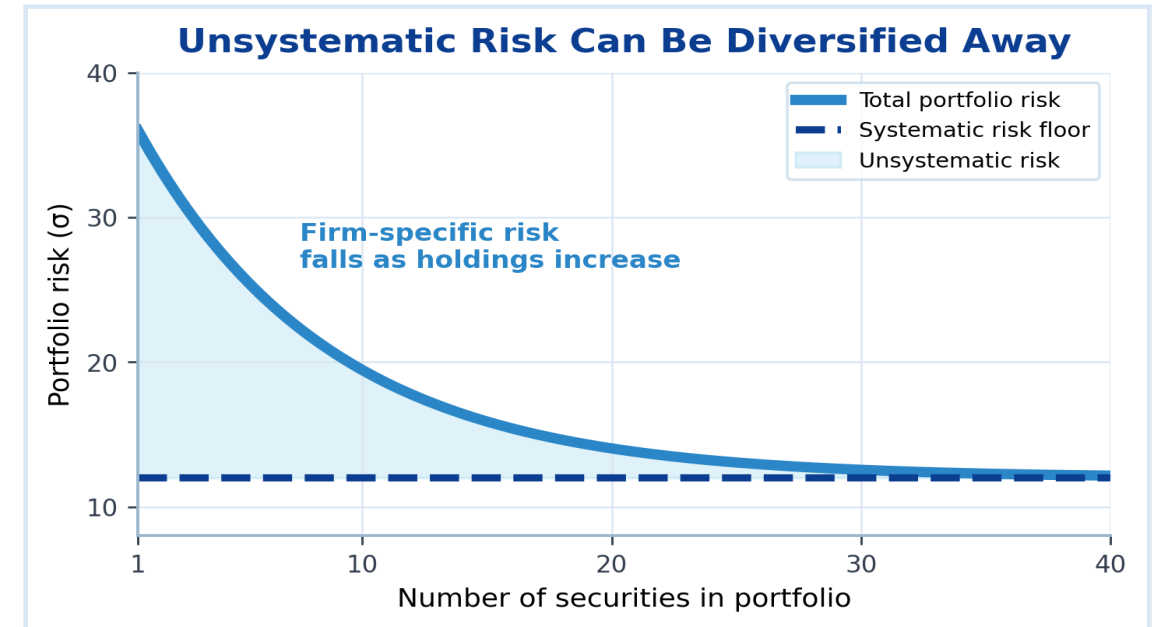
Unsystematic Risk

Risk and return guide investment decisions and required returns.

- 01 Unsystematic risk is firm-specific or industry-specific risk.
- 02 It can be reduced through diversification.
- 03 It includes events such as lawsuits, management errors, or supplier problems.
- 04 A diversified investor should not require a premium for avoidable unsystematic risk.

Manager's Insight

Good portfolio construction reduces exposure to avoidable company-specific shocks.



Quick Example

If one company loses a major customer, a diversified portfolio may absorb the impact.

Beta Coefficient

Risk and return guide investment decisions and required returns.

01

Beta measures an asset's systematic risk relative to the market.

02

The market portfolio has beta equal to 1.0.

03

Beta focuses on market-related movement, not total stand-alone volatility.

04

Beta is a central input in CAPM.

Beta compared with market

$\beta < 1$

Lower market
sensitivity

$\beta = 1$

Market-level
sensitivity

$\beta > 1$

Higher market
sensitivity

Manager's Insight

Beta tells us how sensitive an investment is to broad market movements.

Quick Example

A beta of 1.5 indicates about 50% greater sensitivity to market movements than the market portfolio.

Interpreting Beta

Risk and return guide investment decisions and required returns.

01

$\beta = 1.0$: the asset tends to move with the market.

02

$\beta > 1.0$: the asset is more sensitive than the market.

03

$\beta < 1.0$: the asset is less sensitive than the market.

04

A negative beta would move opposite the market, but is uncommon.

Beta	Interpretation	Approx. movement if market +10%
0.5	Lower market sensitivity	Approx. +5%
1.0	Market-level sensitivity	Approx. +10%
1.4	Higher market sensitivity	Approx. +14%

Manager's Insight

Beta is relative market risk, not a full measure of all possible risk.

Quick Example

A defensive utility stock may have beta below 1; a technology growth stock may have beta above 1.

Capital Asset Pricing Model Overview

Risk and return guide investment decisions and required returns.

01 CAPM links required return to systematic risk.

02 It assumes diversified investors care mainly about market risk.

03 Beta measures the amount of systematic risk.

04 Higher beta leads to higher required return.

CAPM

$$r = r_{RF} + \beta \times (r_M - r_{RF})$$

Required return equals risk-free return plus a beta-adjusted market risk premium.

Risk-free

Time value



Beta

Systematic risk



Premium

Reward for market risk

Manager's Insight

CAPM provides a practical bridge between risk measurement and required return.

Quick Example

Managers use CAPM to estimate the cost of equity for valuation and capital budgeting.

CAPM Formula

Risk and return guide investment decisions and required returns.

01 CAPM starts with the risk-free return.

02 It adds a risk premium based on beta.

03 The market risk premium is the reward for market risk.

04 The formula estimates required return on equity.

CAPM

$$r_j = r_{RF} + \beta_j \times (r_M - r_{RF})$$

Required return = risk-free rate + beta-adjusted market premium.

Symbol	Meaning
r_{RF}	Risk-free return
β_j	Beta of asset j
$r_M - r_{RF}$	Market risk premium

Manager's Insight

CAPM says only systematic risk should increase required return for diversified investors.

Quick Example

If $\beta = 1.2$ and market premium = 6%, the risk premium is 7.2%.

Required Return on Equity Using CAPM

Risk and return guide investment decisions and required returns.

01

The required return on equity is the return shareholders demand.

02

It becomes the cost of equity for the firm.

03

A higher beta means a higher cost of equity.

04

The cost of equity affects firm valuation and project decisions.

Cost of equity by CAPM

$$r_s = r_{RF} + \beta_s \times \text{Market Risk Premium}$$

Use shareholder risk, not debt risk.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

A firm with higher market risk must earn more to satisfy shareholders.

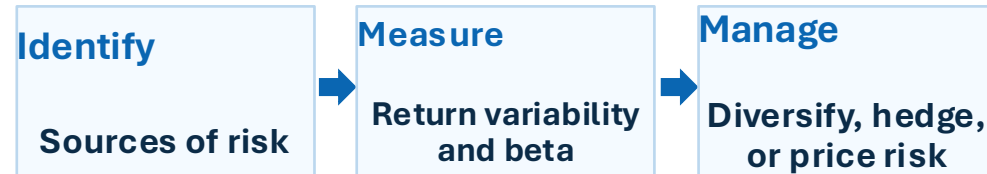
Quick Example

$r_{RF}=4\%$, $\beta=1.3$, market premium=6% $\rightarrow r_s=4\%+7.8\%=11.8\%$.

Risk Management Implications

Risk and return guide investment decisions and required returns.

- 01 Risk measurement helps managers make better investment choices.
- 02 Diversification can reduce avoidable exposure.
- 03 Required returns must reflect risk.
- 04 Risk management protects value, but cannot remove all uncertainty.



Manager's Insight

Managing risk does not mean avoiding all risk; it means accepting risks that are properly rewarded.



Quick Example

A firm may hedge exchange rate risk but still accept market demand risk if the expected return is high.

Risk and Capital Budgeting

Risk and return guide investment decisions and required returns.

01

Capital budgeting evaluates long-term investment projects.

02

Risk affects the discount rate used in net present value (NPV) analysis.

03

Higher-risk projects require higher required returns.

04

Risk analysis helps avoid accepting projects that look profitable only under unrealistic assumptions.

Capital budgeting link

Higher project risk → Higher discount rate → Lower NPV

Risk changes the value of expected cash flows.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

NPV decisions are only reliable if the discount rate matches project risk.

Quick Example

A project in a volatile new market should use a higher required return than a stable replacement project.

Risk and Cost of Capital

Risk and return guide investment decisions and required returns.

01

Cost of capital is the required return demanded by capital providers.

02

Debt holders and equity holders face different risks.

03

Higher business or financial risk can increase the cost of capital.

04

Cost of capital is used in valuation and project evaluation.

Decision link

Risk $\uparrow$ $\rightarrow$ Required return $\uparrow$ $\rightarrow$ Cost of capital $\uparrow$

Higher required return makes financing and projects more expensive.

Interpretation

Identify the inputs, substitute carefully, and interpret the answer.

Manager's Insight

Reducing unnecessary risk can lower required return and support firm value.

Quick Example

A firm with stable cash flows may borrow at a lower cost than a firm with unpredictable cash flows.

Worked Example: Expected Return

Risk and return guide investment decisions and required returns.

01 State probabilities and returns are given.

02 Multiply each return by its probability.

03 Add the weighted returns.

04 Interpret the result as the average expected return before uncertainty is resolved.

State	Probability	Return	Weighted return
Recession	25%	-2%	-0.50%
Normal	50%	10%	5.00%
Boom	25%	18%	4.50%
Expected return			9.00%

Manager's Insight

The expected return is a probability-weighted average, not the most likely return.

Quick Example

In this example, $E(r) = -0.50\% + 5.00\% + 4.50\% = 9.00\%$.

Worked Example: Standard Deviation

Risk and return guide investment decisions and required returns.

01

Start from expected return: 9%.

02

Compute each deviation from 9%.

03

Square each deviation and multiply by probability.

04

Add the weighted squared deviations, then take the square root.

State	Return	Deviation	Weighted squared deviation
Recession	-2%	-11%	30.25
Normal	10%	1%	0.50
Boom	18%	9%	20.25
Variance			51.00
Standard deviation			7.14%

Manager's Insight

Standard deviation expresses risk in percentage points, making it easier to interpret.

Quick Example

A standard deviation of 7.14% means returns commonly vary around the 9% expected return.

Worked Example: CAPM Required Return

Risk and return guide investment decisions and required returns.

01 Identify the risk-free rate, beta, and market risk premium.

02 Multiply beta by the market risk premium.

03 Add the risk-free return.

04 Interpret the answer as the return shareholders require.

Solved CAPM

$$r = 4\% + 1.2 \times 6\% = 11.2\%$$

$$\text{Risk premium} = 1.2 \times 6\% = 7.2\%.$$

Interpretation

The required return is 11.2% because the beta-adjusted premium is added to the risk-free return.

Manager's Insight

CAPM converts systematic risk into a required return.

Quick Example

If a project has similar risk to this equity, 11.2% may be used as a benchmark discount rate.

Lecture Summary and Applied Practice

Risk and return guide investment decisions and required returns.

01 Return measures the reward from investing.

02 Risk measures uncertainty around expected return.

03 Diversification reduces unsystematic risk, but systematic risk remains.

04 Beta and CAPM connect systematic risk to required return.

Manager's Insight

Risk and return are not separate topics; they drive valuation, capital budgeting, and cost of capital.

Practice item	Student task
Expected return	Calculate weighted average return.
Risk	Compute variance and standard deviation.
Portfolio	Explain diversification using correlation.
CAPM	Estimate required return using beta.

Quick Example

Final practice: compute expected return, standard deviation, and CAPM return for one investment case.

Assessment Practice 1

Solved questions: concepts, calculations, and applications.

QUESTION 01/10



Which statement best describes the risk-return trade-off?

A Higher risk normally requires lower expected return

B Higher risk normally requires higher expected return

C Risk and return are unrelated

D Risk eliminates the need for return

ANSWER

B Higher risk normally requires higher expected return

EXPLANATION

Risk-averse investors demand compensation for bearing additional uncertainty.

EXAM TECHNIQUE: Compare expected reward with the uncertainty accepted.

Assessment Practice 2

Solved questions: concepts, calculations, and applications.

QUESTION 02/10

A stock is bought for \$40, sold for \$46, and pays a \$2 dividend. What is the holding period return?

A 10%

B 15%

C 20%

D 25%

ANSWER

C 20%

EXPLANATION

$$\text{HPR} = (46 - 40 + 2) / 40 = 8 / 40 = 20\%.$$

EXAM TECHNIQUE: Add capital gain and income before dividing by beginning price.

Assessment Practice 3

Solved questions: concepts, calculations, and applications.

QUESTION 03/10

A project has returns of -2%, 10%, and 18% with probabilities 25%, 50%, and 25%. What is expected return?

A 6%

B 8%

C 9%

D 12%

ANSWER

C 9%

EXPLANATION

$$E(r) = 0.25(-2\%) + 0.50(10\%) + 0.25(18\%) = 9\%.$$

EXAM TECHNIQUE: Expected return is a probability-weighted average.

Assessment Practice 4

Solved questions: concepts, calculations, and applications.

QUESTION 04/10



Which measure is the square root of variance?

A Beta

B Standard deviation

C Risk premium

D Correlation

ANSWER

B Standard deviation

EXPLANATION

Standard deviation converts variance back into percentage units of return.

EXAM TECHNIQUE: Variance first, then square root for standard deviation.

Assessment Practice 5

Solved questions: concepts, calculations, and applications.

QUESTION 05/10



What does coefficient of variation measure?

A Total income received

B Risk per unit of expected return

C Market value per share

D Only systematic risk

ANSWER

B Risk per unit of expected return

EXPLANATION

CV = standard deviation divided by expected return.

EXAM TECHNIQUE: Use CV when comparing investments with different expected returns.

Assessment Practice 6

Solved questions: concepts, calculations, and applications.

QUESTION 06/10



What type of risk can diversification reduce?

A Systematic risk

B Market risk

C Unsystematic risk

D Risk-free return

ANSWER

C Unsystematic risk

EXPLANATION

Firm-specific or industry-specific risk can be reduced by holding many different assets.

EXAM TECHNIQUE: Diversification reduces company-specific risk, not broad market risk.

Assessment Practice 7

Solved questions: concepts, calculations, and applications.

QUESTION 07/10

A portfolio invests 60% in Asset A with expected return 10% and 40% in Asset B with expected return 5%. What is portfolio expected return?

A 6%

B 7%

C 8%

D 10%

ANSWER

C 8%

EXPLANATION

$$E(r_p) = 0.60(10\%) + 0.40(5\%) = 6\% + 2\% = 8\%.$$

EXAM TECHNIQUE: Use portfolio weights as the multipliers.

Assessment Practice 8

Solved questions: concepts, calculations, and applications.

QUESTION 08/10



Which correlation gives the strongest diversification benefit?

A +1.0

B +0.8

C 0.0

D -1.0

ANSWER

D -1.0

EXPLANATION

The lower the correlation, the greater the potential risk reduction; -1.0 is perfect opposite movement.

EXAM TECHNIQUE: Low or negative correlation is best for diversification.

Assessment Practice 9

Solved questions: concepts, calculations, and applications.

QUESTION 09/10

A stock has a beta of 1.4. What does this indicate?

A Its market sensitivity is lower than the market's

B It has no systematic risk

C Its market sensitivity is about 40% higher than the market's

D It is risk-free

ANSWER

C Market sensitivity is about 40% higher than the market's

EXPLANATION

A beta of 1.4 indicates that, on average, the stock is about 40% more sensitive to market movements than the market portfolio.

EXAM TECHNIQUE: Beta measures systematic market sensitivity; market beta equals 1.0.

Assessment Practice 10

Solved questions: concepts, calculations, and applications.

QUESTION 10/10

Using the Capital Asset Pricing Model (CAPM), if the risk-free return (r_{RF}) = 4%, $\beta = 1.2$, and market risk premium = 6%, what is the required return?

A 7.2%

B 10.0%

C 11.2%

D 12.0%

ANSWER

C 11.2%

EXPLANATION

Required return = $4\% + 1.2 \times 6\% = 4\% + 7.2\% = 11.2\%$.

EXAM TECHNIQUE: Multiply beta by the market risk premium, then add the risk-free rate.

Abbreviations and Short Labels

Use the full meaning first; then the shortened form becomes easier to remember.

01

HPR — Holding Period Return

02

CV — Coefficient of Variation

03

CAPM — Capital Asset Pricing Model

04

MRP — Market Risk Premium

Symbol / term	Meaning
SML	Security Market Line
NPV	Net Present Value
T-bill	Treasury bill
MGM 237	Course code

Manager's Insight: Abbreviations shorten repeated terms; always connect each one to its full meaning.

Quick Example: CAPM means Capital Asset Pricing Model—not a separate return measure.

Return and Probability Symbols

Subscripts identify a time, state, asset, or portfolio in the formula.

01

P_0 — Price at the beginning

02

P_1 — Price at the end

03

$E(r)$ — Expected return

04

$P(s)$ — Probability of state s

Symbol / term	Meaning
$r(s)$	Return in state s
Σ	Sum of all outcomes
$E(r_p)$	Expected portfolio return
$w_i / E(r_i)$	Asset weight / expected return

Manager's Insight: Read the main letter first, then use the subscript to identify the time, state, or asset.

Quick Example: P_0 is the starting price, while P_1 is the ending price.

Risk and CAPM Symbols

Greek letters describe risk; r symbols describe required or expected returns.

01

σ — Standard deviation

02

σ^2 — Variance

03

ρ — Correlation coefficient

04

β — Beta: market sensitivity

Symbol / term	Meaning
r_{RF}	Risk-free return
r_M	Expected market return
r_j / r_s	Required return for asset j / stock s
$r_M - r_{RF}$	Market risk premium

Manager's Insight: Higher beta means the asset is more sensitive to movements in the overall market.

Quick Example: $\beta = 1.2$ means the asset tends to move 20% more than the market.



Risk and Return

Thank You