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CFA一级培训项目

Portfolio Management



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Topic Weightings in CFA Level I

Session NO.	Content	Weightings
Study Session 1	Ethics & Professional Standards	15
Study Session 2-3	Quantitative Analysis	12
Study Session 4-6	Economics	10
Study Session 7-10	Financial Reporting and Analysis	20
Study Session 11	Corporate Finance	7
Study Session 12	Portfolio Management	7
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Framework of Portfolio Management

➤ SS 12 — Portfolio Management

- R41 Portfolio Management: An Overview
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- R43 Portfolio Risk and Return: Part I
- R44 Portfolio Risk and Return: Part II
- R45 Basic of Portfolio Planning and Construction

Portfolio Risk and Return: Part I

2015.06 (2)

➤ An individual investment:

- Expected Return
$$E(R) = \sum_{i=1}^n P_i R_i = P_1 R_1 + P_2 R_2 + \cdots + P_n R_n$$

- Variance of Return
$$\text{Var} = \sigma^2 = \sum_{i=1}^n [R_i - E(R)]^2 P_i$$

- Standard Deviation of Return
$$\text{SD} = \sigma = \sqrt{\sum_{i=1}^n [R_i - E(R)]^2 P_i}$$

Portfolio Risk and Return: Part I

2015.06 (1)

➤ Covariance

$$Cov_{1,2} = \sum_{i=1}^n P_i [R_{i,1} - E(R_1)][R_{i,2} - E(R_2)]$$

➤ Correlation

$$\rho_{1,2} = \frac{Cov_{1,2}}{\sigma_1 \sigma_2} \quad Cov_{1,2} = \rho_{1,2} \sigma_1 \sigma_2$$

Portfolio Risk and Return: Part I

2015.12 (3) 2015.06 (2)

2014.12 (1) 2014.06 (2)

➤ The portfolio standard deviation formula

- The risk of a portfolio of risky assets depends on the asset weights and the standard deviations of the assets returns, and crucially on the correlation (covariance) of the asset returns.
- The lower the correlation between the returns of the stocks in the portfolio, all else equal, the greater the diversification benefits.
- Two-asset portfolio:

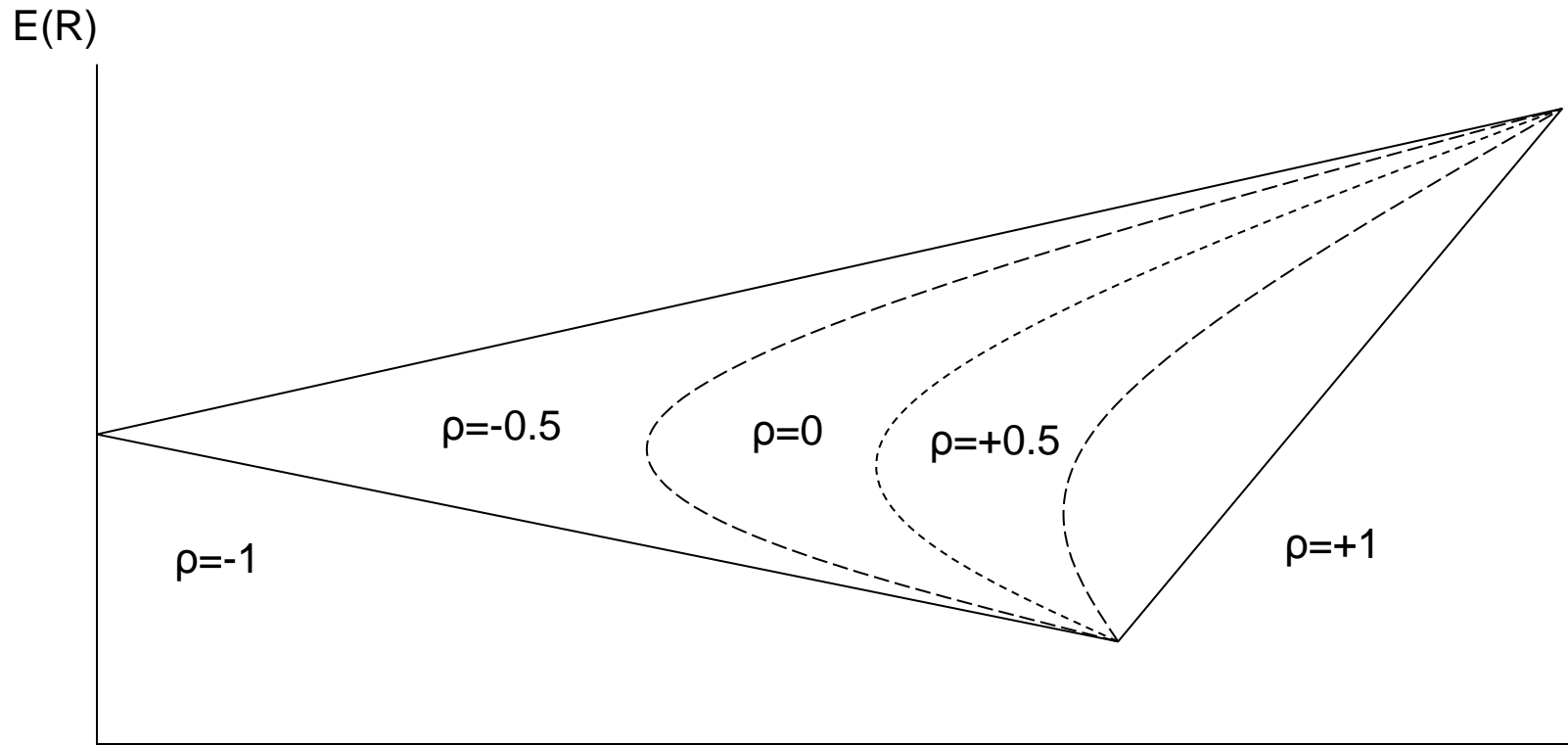
$$\sigma_P^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \text{COV}_{1,2}$$

$$\sigma_P^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \sigma_1 \sigma_2 \rho_{1,2}$$

$$\sigma_P = \sqrt{\sigma_P^2} = \sqrt{\sum_{i=1}^n w_i^2 \sigma_i^2 + \sum_{i=1}^n \sum_{j=1}^n w_i w_j \text{Cov}_{i,j}}$$

Portfolio Risk and Return: Part I

➤ Risk and return for different values of correlation

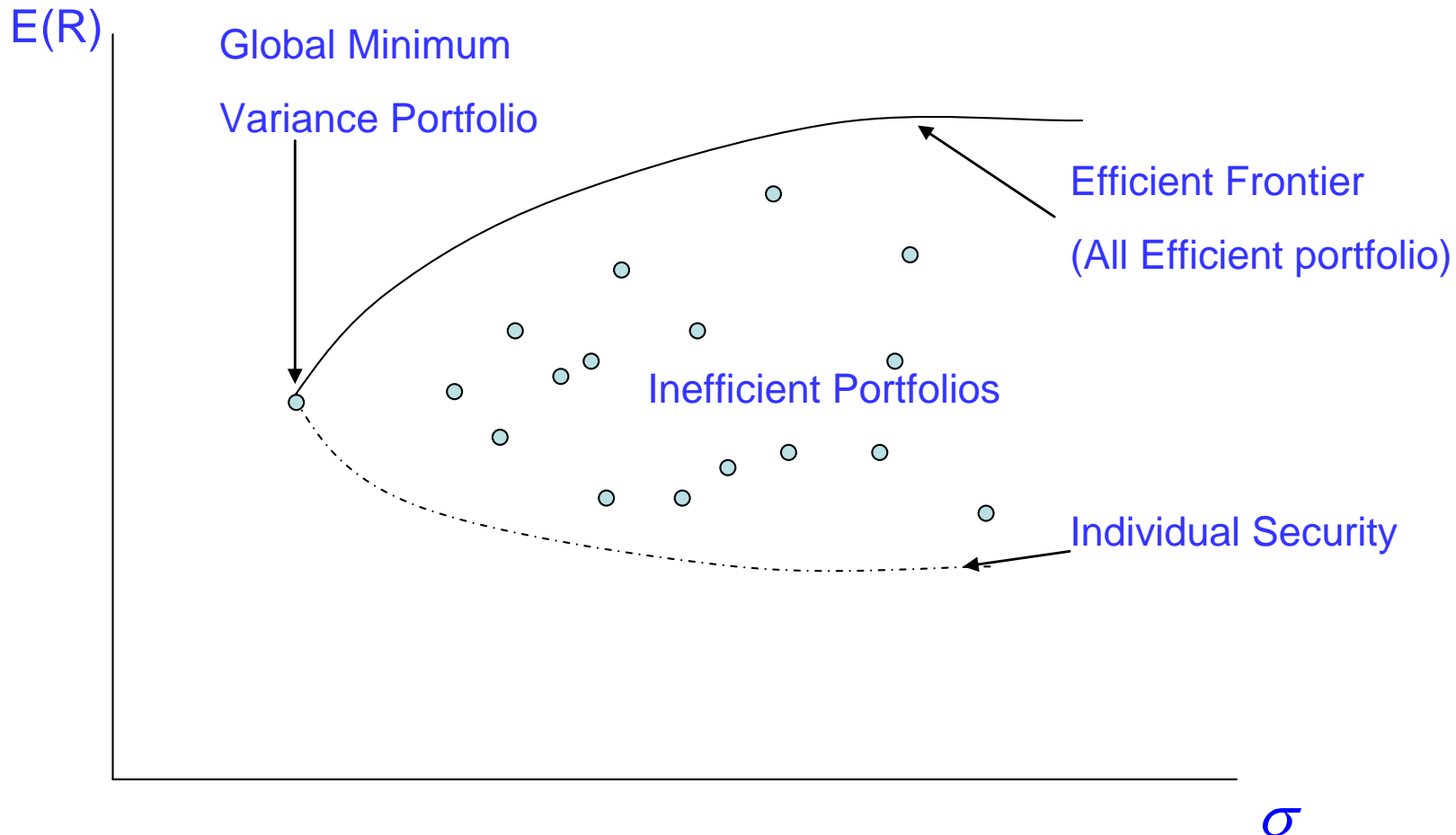


Portfolio Risk and Return: Part I

2015.06 (1)

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- The minimum-variance and efficient frontiers of risky assets and the global minimum variance portfolio.

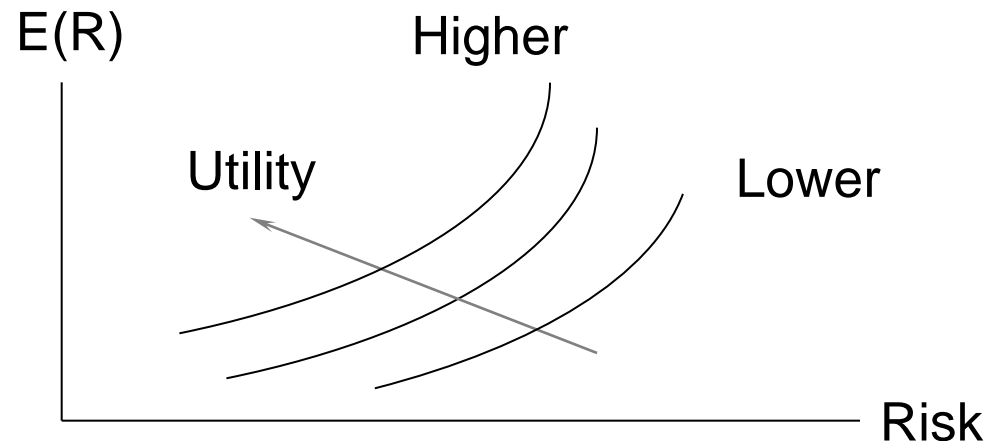


Portfolio Risk and Return: Part I

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➤ Risk aversion

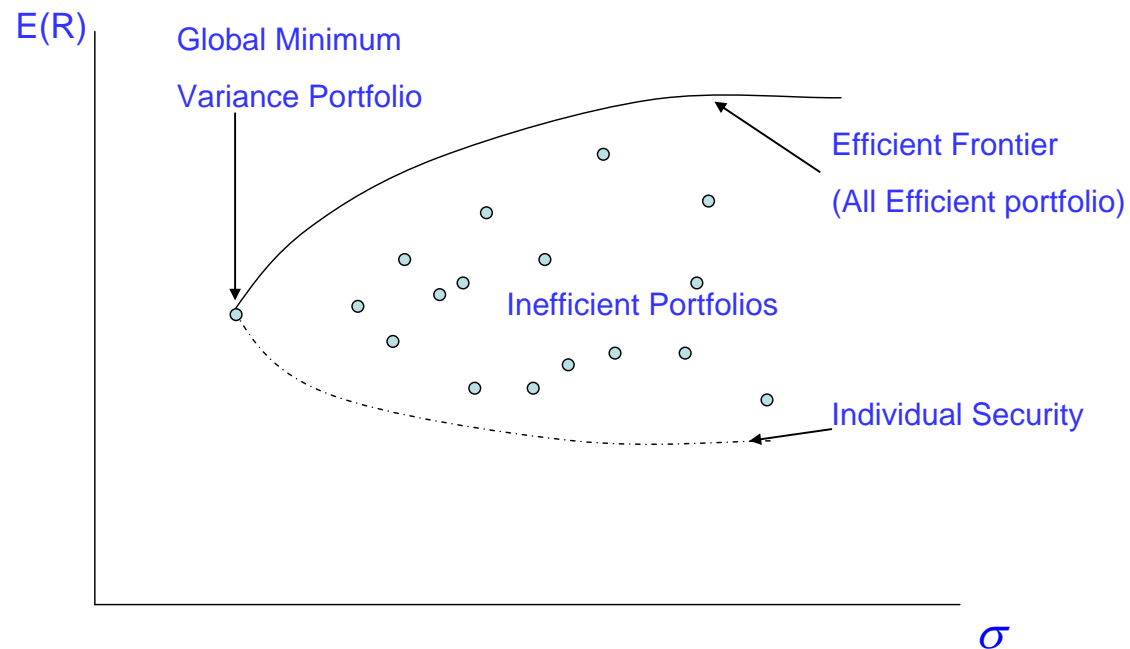
- Refers to the fact that individuals prefer less risk to more risk.
- Risk-averse investors:
 - ✓ Prefer lower to higher risk for a given level of expected returns
 - ✓ Will only accept a riskier investment if they are compensated in the form of greater expected return



Portfolio Risk and Return: Part I

➤ The optimal portfolio for an investor

- At the point of where an investor's (highest) risk-return indifference curve is tangent to the efficient frontier.

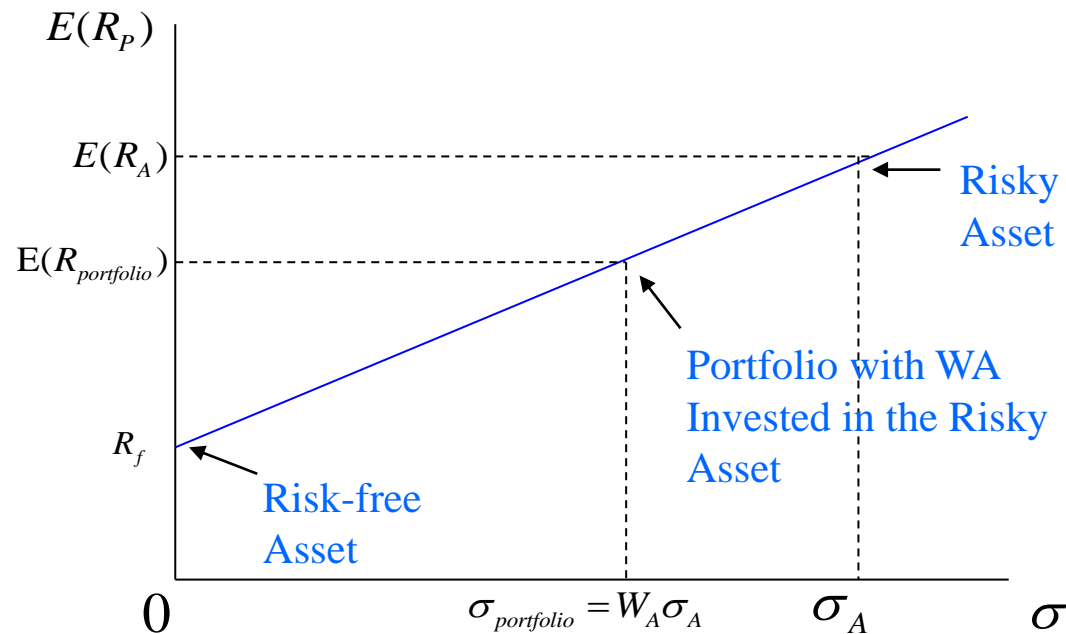


➤ Optimal portfolio

- The highest indifference curve that is tangent to the efficient frontier
- Different investors may have different optimal portfolios

Portfolio Risk and Return: Part II

- The implications of combining a risk-free asset with a portfolio of risky assets.



$$E(R_P) = W_A E(R_A) + W_B E(R_B)$$

$$\sigma_P = \sqrt{W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2W_A W_B \rho_{AB} \sigma_A \sigma_B}$$

$$\sigma_P = \sqrt{W_A^2 \sigma_A^2} = W_A \sigma_A$$

Portfolio Risk and Return: Part II

2014.06 (2)

The capital allocation line (CAL) and the capital market line (CML).

➤ Two-fund separation theorem:

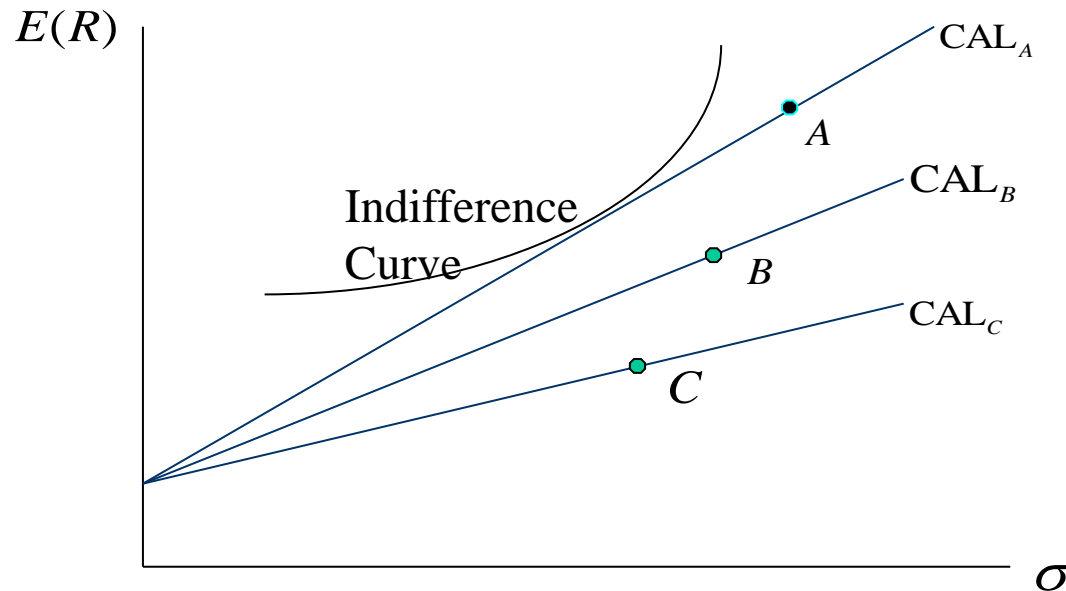
- Combining a risky portfolio with a risk-free asset
- All investors' optimum portfolios will be made up of some combination of an optimal portfolio of risky assets and the risk-free asset.

➤ CAL

- The line representing these possible combinations of risk-free assets and the optimal risky asset portfolio.

Portfolio Risk and Return: Part II

- Risky Portfolios and Their Associated Capital Allocation Lines for Different investors



- If each investor has different expectations about the expected returns of, standard deviations of, or correlations between risky asset returns, each investor will have a different optimal risky asset portfolio and a different CAL

Portfolio Risk and Return: Part II

➤ The Market Portfolio:

- Is the tangent point where the CML touches the Markowitz efficient frontier.
- Consists of every risky assets
- The weights on each asset are equal to the percentage of the market value of the asset to the market value of the entire market portfolio.

Portfolio Risk and Return: Part II

2015.12 (1)

2014.12 (3)

➤ Capital market line

- When investors share identical expectations about the mean returns, variance of returns, and correlations of risky assets, the CAL for all investors is the same and is known as the capital market line (CML):

$$E(R_P) = R_F + \frac{E(R_M) - R_F}{\sigma_M} \sigma_P$$

- Explanation of the CML

- Investment using CML follow a passive investment strategy (i.e., invest in an index of risky assets that serves as a proxy for the market portfolio and allocate a portion of their investable assets to a risk-free asset.)
- Borrowing portfolio and lending portfolio
- Difference between the CML and the CAL

Portfolio Risk and Return: Part II

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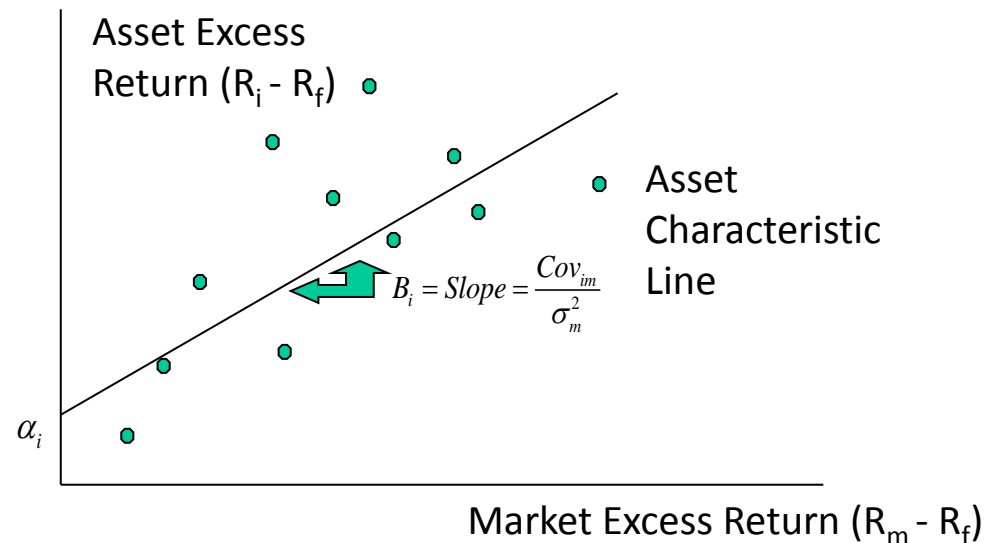
2014.06 (1)

- Unsystematic risk (or unique, diversifiable, firm-specific risk):
 - The risk that disappears in the portfolio construction process
- Systematic risk (or market risk):
 - The risk that is left cannot be diversified away.
 - Total risk = systematic risk + unsystematic risk
- Beta: the sensitivity of an asset's return to the return on the market index in the market model.

$$\beta_i = \frac{Cov_{i,mkt}}{\sigma_{mkt}^2} = \left(\frac{\sigma_i}{\sigma_{mkt}} \right) \times \rho_{i,mkt}$$

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Portfolio Risk and Return: Part II

2014.12 (1)

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➤ Assumptions of the CAPM

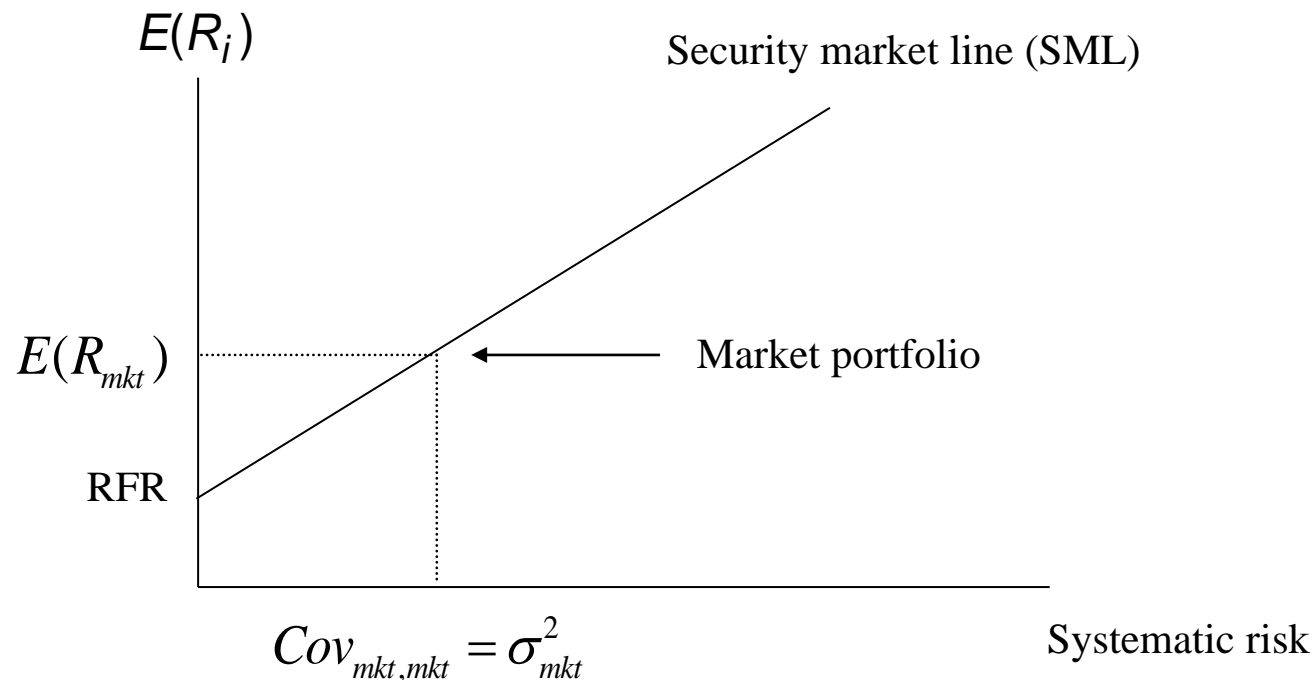
- Investors are risk-averse, utility-maximizing, rational individuals.
- Markets are frictionless, including no transaction costs and no taxes.
- Investors plan for the same single holding period.
- Investors have homogeneous expectations or beliefs.
- All investments are infinitely divisible.
- Investors are price takers.

Portfolio Risk and Return: Part II

2014.12 (1)

2014.06 (2)

➤ Capital Asset Pricing Model

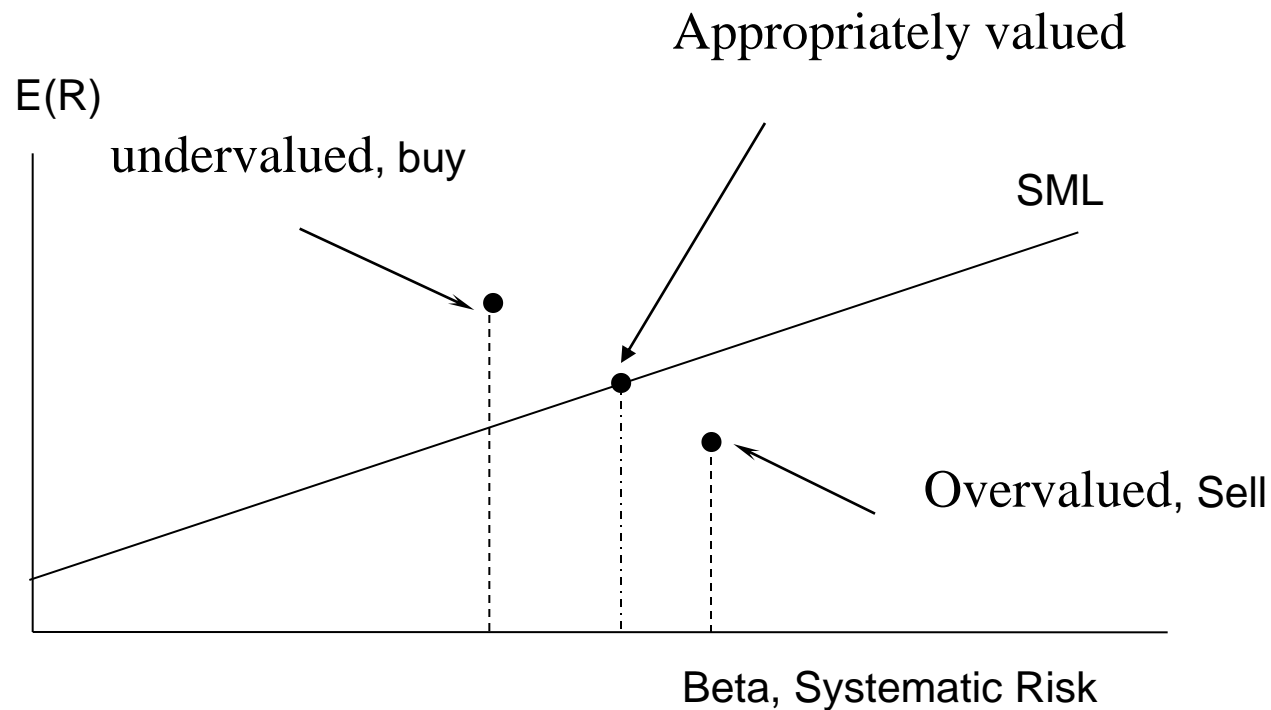


➤ The Equation of SML: $E(R_i) = R_f + \beta_i [E(R_M) - R_f]$

Portfolio Risk and Return: Part II

2015.06 (1)

➤ How to judge if a stock is properly valued



Portfolio Risk and Return: Part II

2015.12 (1) 2015.06 (1)

2014.12 (1)

➤ Differences between the SML and the CML

	SML	CML
Measure of risk	Uses systematic risk (non-diversifiable risk)	Uses standard deviation (total risk)
Application	Tool used to determine the appropriate expected (benchmark) returns for securities	Tool used to determine the appropriate asset allocation (percentages allocated to the risk-free asset and to the market portfolio) for the investor
Definition	Graph of the capital asset pricing model	Graph of the efficient frontier
Slope	Market risk premium	Market portfolio Sharpe ratio

Portfolio Risk and Return: Part II

2014.12 (1)

2014.06 (1)

➤ Sharpe Ratio

$$\text{Sharpe ratio} = \frac{R_P - R_f}{\sigma_P}$$

➤ M-squared (M^2)

$$M^2 = (R_P - R_f) \frac{\sigma_M}{\sigma_P} - (R_M - R_f)$$

➤ Treynor measure

$$\text{Treynor measure} = \frac{R_P - R_f}{\beta_P}$$

➤ Jensen's alpha

$$\alpha_P = (R_P - R_f) - \beta_P (R_M - R_f)$$

Portfolio Management: An Overview

2015.12 (1)

2015.06 (1)

➤ Characteristics of different types of investors

Investor	Risk Tolerance	Investment Horizon	Liquidity Needs	Income Needs
Individuals	Depends on individual	Depends on individual	Depends on individual	Depends on individual
DB pensions	High	Long	Low	Depends on age
Banks	Low	Short	High	Pay interest
Endowments	High	Long	Low	Spending level
Insurance	Low	Long—life Short—P&C	High	Low
Mutual funds	Depends on fund	Depends on fund	High	Depends on fund

Portfolio Management: An Overview

2015.06 (1)

2014.06 (1)

➤ Planning step:

- Analysis of the investor's risk tolerance, return objectives, time horizon, tax exposure, liquidity needs, income needs, unique circumstances;
- IPS: details the investor's investment objectives and constraints; specify an objective benchmark; updated at least every few years and anytime the investor's objectives or constraints change significantly.

➤ Execution step: asset allocation; top-down analysis & bottom-up

➤ Feedback step:

- monitor and rebalance the portfolio;
- Measure portfolio performance.

Basic of Portfolio Planning and Construction

➤ The need for a policy statement

- Understand and articulate realistic investor goals, needs and risk tolerance
- Ensure that goals are realistic
- Provide an objective measure of portfolio performance

➤ Major components of IPS

- Description of client
- Statement of the purpose
- Statement of duties and responsibilities
- Procedures to update IPS and to respond to various possible situations
- Investment objectives
- Investment constraints
- Investment guidelines
- Evaluation of performance
- Appendices: information on asset allocation

Basic of Portfolio Planning and Construction

➤ Investment objectives: risk and return

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2014.12 (1)

● Risk objective

Situation		Risk tolerance
willingness > ability		ability (education)
willingness < ability	return objective = willingness	willingness (reevaluation)
	return objective = ability	ability (education)

● Return objectives

- ✓ Return measurement: total return, inflation-adjusted return, after-tax return
- ✓ Total return perspective: balance between capital gains and income
- ✓ Stated return desire vs. Required return
- ✓ Consistent with risk objective

Basic of Portfolio Planning and Construction

2015.12 (1)

➤ Investment constraints

- Liquidity—for cash spending needs (anticipated or unexpected)
- Time horizon—the time between making an investment and needing the funds
- Tax concerns—the tax treatments of various accounts, and the investor's marginal tax bracket
- Legal and regulatory factors—restrictions on investments in retirement, personal, and trust accounts
- Unique needs and preferences—constraints because of investor preferences or other factors not already considered

Basic of Portfolio Planning and Construction

- Strategic asset allocation:
 - combine the IPS and capital market expectations to formulate weightings on acceptable asset classes
 - Specify the percentage allocations to the included asset classes
 - Correlations within the class & correlations between asset classes
- Tactical asset allocation: a manager who varies from strategic asset allocation weights in order to take advantage of perceived short-term opportunities. Depend on:
 - The manager's ability to identify short-term opportunities in specific asset classes;
 - The existence of such short-term opportunities.
- Security selection: deviation from index weights on individual securities within an asset class. Depend on:
 - The manager's skill
 - The opportunities within a particular asset class.

Risk Management: An Introduction

➤ Risk

- Exposure to uncertainty
- Many decision makers focus on return, which is not something that is easily controlled, as opposed to risk, or exposure to risk, which may actually be managed or controlled

➤ Risk exposure

- The extent to which an entity's value may be affected through sensitivity to underlying risks.

➤ Risk management

- Risk management is the process by which an organization or individual **defines** the level of risk to be taken, **measures** the level of risk being taken, and **adjusts** the latter toward the former; with the goal of **maximizing** the company's or portfolio's value or the individual's overall satisfaction, or utility.
- It is comprises all the decisions and actions needed to best achieve organizational or personal objectives while **bearing a tolerable level of risk**.
- **Not about minimizing risk.**

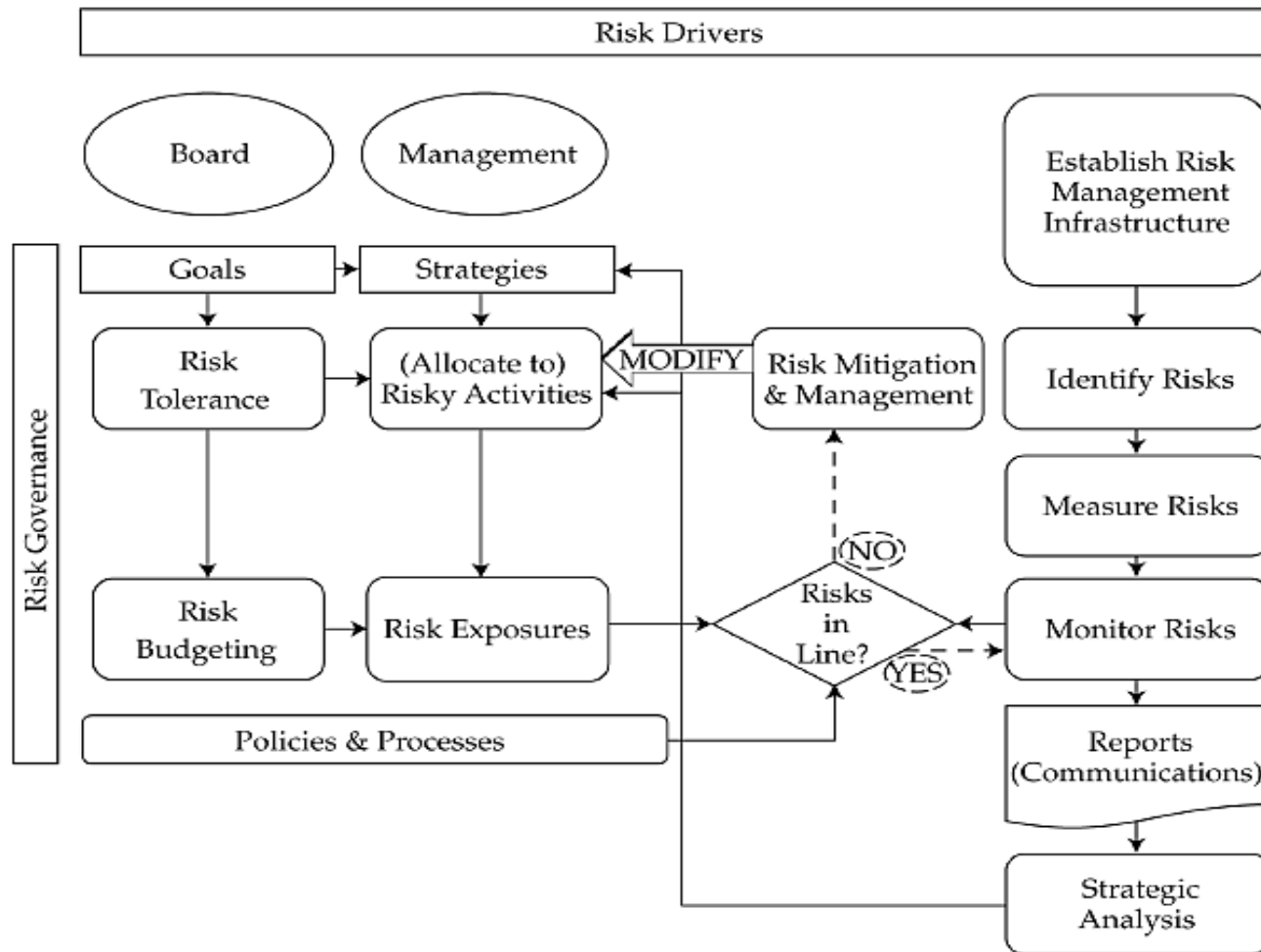
Risk Management: An Introduction

➤ Risk management framework

- Risk governance
- Risk identification and measurement
- Risk infrastructure
- Defined policies and processes
- Risk monitoring, mitigation, and management
- Communications
- Strategic analysis or integration

Risk Management: An Introduction

Exhibit 1. The Risk Management Framework in an Enterprise Context



Risk Management: An Introduction

➤ Risk governance

- Risk governance is the foundation for risk management.
- **Risk governance** refers to senior management's determination of the **risk tolerance** of the organization, the elements of its optimal **risk exposure strategy**, and the framework for oversight of the risk management function.
- Employing a risk management committee, along with a chief risk officer (CRO), are hallmarks of a strong risk governance framework.
 - ✓ **Risk management committee** provides top decision makers with a forum for regularly considering risk management issues.

Risk Management: An Introduction

➤ Risk tolerance

- *At the governance level*, the duty is generally not to select these activities—a job that usually falls to management—but to **establish the organization's risk appetite**.
 - ✓ Certain risks or levels of risks may be deemed acceptable, other risks deemed unacceptable, and in the middle are risks that may be pursued in a risk-limited fashion.
 - ✓ Said differently, risk tolerance identifies the extent to which the entity is willing to experience losses or opportunity costs and to fail in meeting its objectives
- When analyzing risk tolerance, management should examine risks that may exist within the organization as well as those that may arise from outside. (**“inside” view and “outside” view**)
- The risk tolerance should be chosen and communicated **before** a crisis, and will serve as the high-level guidance for management in its strategic selection of risks.
- If a company has the **ability to adapt quickly to adverse events** may allow for a higher risk tolerance.

Risk Management: An Introduction

- **Risk budgeting** is the process of allocating firm resources to assets (or investments) by considering their various risk characteristics and how they combine to meet the organization's risk tolerance.
 - The process of risk budgeting forces the firm to consider **risk tradeoffs**.
 - The **goal** is to allocate the overall amount of acceptable risk to the mix of assets or investments that have the greatest expected returns over time. (**The return per unit of risk is the highest.**)
- The risk budget may be **a single metric**, such as portfolio beta, value at risk (VaR), portfolio duration, or returns variance.
- A risk budget may be constructed based on **categories of investments**, such as domestic equities, domestic debt securities, international equities, and international debt securities.
- Another way to allocate a risk budget is to identify **specific risk factors**, such as interest rate risk, equity market risk, and foreign exchange rate risk.

Risk Management: An Introduction

- **Financial risks** refer to the risks that arise from events occurring in the financial markets. Examples are:
 - **Market risk**
 - **Credit risk**
 - **Liquidity risk:** Liquidity risk could also be called transaction cost risk and is most associated with **a widening bid-ask spread.**
- **Non-financial risks** arise from actions within an entity or from external origins, such as the environment, the community, regulators, politicians, suppliers, and customers. Examples are:
 - **Operational risk**
 - **Solvency risk**
 - **Regulatory risk**
 - **Governmental or political risk (including tax risk)**
 - **Legal risk**
 - **Model risk**
 - **Tail risk**
 - **Accounting risk**
- **Individuals** face many of the same organizational risks outlined here but also face **health risk, mortality or longevity risk, and property and casualty risk.**

R42 Risk Management: An Introduction

- **Risk drivers** are the fundamental global and domestic **macroeconomic and industry factors** that create risk.
- **Metrics**
 - **Standard deviation** is a measure of the volatility of asset prices and interest rates. Standard deviation may not be the appropriate measure of risk for non-normal probability distributions, especially those with negative skew or positive excess kurtosis (fat tails).
 - **Beta** measures the market risk of equity securities and portfolios of equity securities. This measure considers the risk reduction benefits of diversification and is appropriate for securities held in a well-diversified portfolio.
 - **Duration** is measure of the price sensitivity of debt securities to changes in interest rates.
 - **Derivative measures**, such as delta, gamma, vega, and rho.

R42 Risk Management: An Introduction

- **Tail measures** such as value at risk (VaR), CVaR and expected loss given default (LGD).
 - ✓ **VaR** is the **minimum loss** over a period that will occur with a specific probability.
 - ✓ **CVaR** is the expected value of loss, given that the loss exceeds a minimum amount. (calculated as the probability-weighted average loss for all losses expected to exceed a minimum amount)
- Subjective and market-based estimates of risk
 - Two methods of risk assessment that are used to supplement measures such as VaR and CVaR are **stress testing** and **scenario analysis**.
 - ✓ **Stress testing** examines the effects of a specific (usually extreme) change in a key variable such as an interest rate or exchange rate.
 - ✓ **Scenario analysis** refers to a similar what-if analysis of expected loss but incorporates changes in multiple inputs.

R42 Risk Management: An Introduction

➤ Modifying risk exposures

- Risk management does not seek to eliminate all risks. The goal is to retain the optimal mix of risks for the organization.

➤ Methods of risk modification:

- **Risk prevention and avoidance**

- ✓ Not engage in the activity with the uncertain outcome.

- **Risk acceptance:** self-insurance and diversification

- ✓ **Self-insurance** is obtained by setting aside sufficient capital to cover losses.

- ✓ Another form of accepting risk, but doing so in the most efficient manner possible, is **diversification**.

- **Risk transfer** (insurance)

- ✓ Risk transfer is the process of passing on a risk to another party, often, but not always, in the form of an **insurance policy**.

- **Risk shifting** (derivatives)

- ✓ Whereas risk transfer refers to actions taken that pass the risk on to other parties, risk shifting refers to actions that change the distribution of risk outcomes. Risk shifting generally involves **derivatives** as the risk modification vehicle.

➤ The determinants of which method is best for modifying risk are the benefits weighed against the costs.

It's not the end but just the beginning.

If you have people you love, allow them to be free beings. Give and don't expect. Advise, but don't order. Ask, but never demand. It might sound simple, but it is a lesson that may take a lifetime to truly practice. It is the secret to true Love. To truly practice it, you must sincerely feel no expectations from those who you love, and yet an unconditional caring.

如果你有爱的人，允许他们自由随意的存在。给予而不指望；建议而不命令；请求而不要求；可能听起来简单，但这需要一辈子去实践。这就是真爱的秘诀。真正去实践它，你必须对那些你爱的人没有期望，并给予无条件的关爱。