

# Portfolio Management

## CFA一级培训项目

讲师：Irene



## 师资介绍

### 1. 基本介绍

金程教育资深培训师、上海财经大学经济学学士、美国约翰霍普金斯大学金融学硕士、CFA持证人、通过证券从业资格考试。

### 2. 工作背景

多家知名机构内训项目授课，参与出版CFA相关系列丛书教材。本科毕业于上海财经大学，研究生毕业于约翰霍普金斯大学，一次性通过CFA一二三级考试，对于考试重点和应试技巧有自己的心得。

### 3. 服务客户

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## Topic Weightings in CFA Level I

Topics	Weights (%)
Quantitative Methods	8-12
Economics	8-12
Financial Statement Analysis	13-17
Corporate Issuers	8-12
Equity	10-12
Fixed Income	10-12
Derivatives	5-8
Alternative Investments	5-8
Portfolio Management	5-8
Ethical and Professional Standards	15-20

# Portfolio Management

1. Portfolio Risk and Return: Part I
2. Portfolio Risk and Return: Part II
3. Portfolio Management: An Overview
4. Basics of Portfolio Planning and Construction
5. The Behavioral Biases of Individuals
6. Introduction to Risk Management

## 中文精读

1. 现代投资组合理论
2. 资本市场理论
3. 投资组合管理总览
4. 投资组合的构建
5. 个人行为偏差
6. 风险管理介绍

## Framework

# Module



## Portfolio Risk and Return: Part I

1. Modern Portfolio Theory

## Modern Portfolio Theory

- The Markowitz Assumptions
- Modern Portfolio Theory
- Types of Investors
- Utility Theory



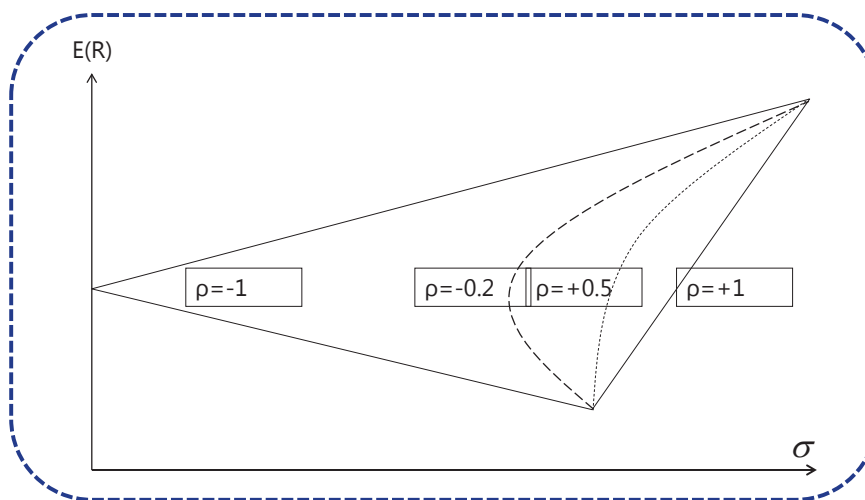
## The Markowitz Assumptions

### • The Markowitz assumptions

- Returns distribution: Each investment can be measured by a probability distribution of expected returns over a given horizon;
- Utility maximization: Investor intends to maximize their expected utility over time horizon;
- Risk is variability: Risk is measured in terms of variance (standard deviation) of expected returns;
- Risk/return: Investors make their decision based on expected return and the risk;
- Risk aversion: Investors prefer less risk and given the same risks by given the same returns.

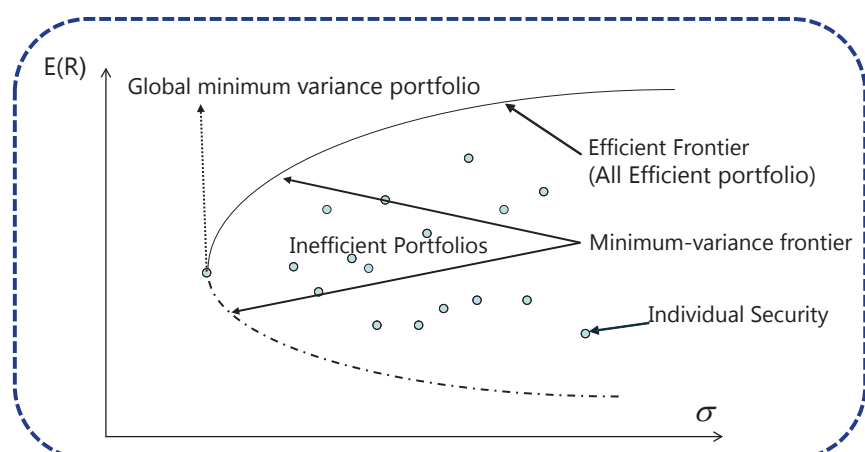
## Modern Portfolio Theory

### • Risk and return for different values of correlation



## Modern Portfolio Theory

### • Markowitz efficient frontier



## Modern Portfolio Theory

- **Minimum variance frontier**
  - **Minimum-variance portfolio** is the portfolio available that has the lowest standard deviation with a given expected return.
  - **Minimum-variance frontier** is the entire collection of minimum-variance portfolios.
- **Global minimum-variance portfolio:** The portfolio with the *minimum variance* among all portfolios of risky assets, which is the *left-most* point on the minimum-variance frontier.
- **Efficient frontier**
  - The curve that *lies above and to the right* of the global minimum-variance portfolio is referred to as the **Markowitz efficient frontier**.
  - Those portfolios that have the greatest expected return with a given level of risk make up the efficient frontier.
  - All portfolios of risky assets that rational, risk-averse investors will choose.
  - **Efficient portfolio:** well-diversified or fully-diversified.

### Example

## Modern Portfolio Theory

- Which of the following statements is least accurate? The efficient frontier is the set of all attainable risky assets with the:
  - A. Highest expected return for a given level of risk.
  - B. Lowest amount of risk for a given level of return.
  - C. Highest expected return relative to the risk-free rate.
- **Solution: C.**
- The portfolio on the minimum-variance frontier with the lowest standard deviation is:
  - A. Unattainable.
  - B. The optimal risky portfolio.
  - C. The global minimum-variance portfolio.
- **Solution: C.**

## Types of Investors

- **Risk seeking**
  - Prefer higher risk to lower risk for a given level of expected returns.
  - Will accept less expected return because of the extra utility from the risk.
  - The gamble has an uncertain outcome, but with the same expected value as the guaranteed outcome. Thus, an investor choosing the gamble means that the investor gets extra "utility" from the uncertainty associated with the gamble.
- **Risk neutral**
  - An investor is indifferent about the gamble or the guaranteed outcome.
  - Risk neutrality investor cares only about return and not about risk, so higher return investments are more desirable even if they come with higher risk.
- **Risk averse**
  - 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.

## Utility Theory

- **Utility theory**

- Assumptions

- ✓ Investors are risk averse;
    - ✓ They always prefer more to less (greater return to lesser return);
    - ✓ They are able to rank different portfolios in the order of their preference.

## Utility Theory

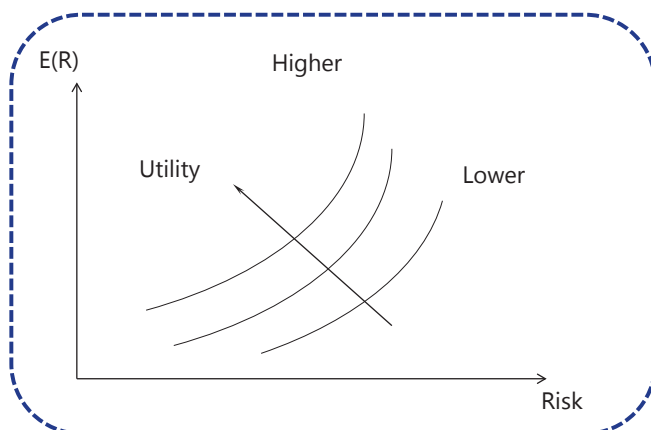
- **Utility function:**

$$U = E(r) - \frac{1}{2} A \sigma^2$$

- U: the utility of an investment
  - E(r): the expected return
  - $\sigma^2$ : the variance of the investment
  - A: a measure of risk aversion, which is measured as the marginal reward that an investor requires to accept additional risk.
    - ✓ A is higher for more risk-averse individuals.
    - ✓ Risk-aversion:  $A > 0$
    - ✓ Risk-neutral:  $A = 0$
    - ✓ Risk-seeking:  $A < 0$

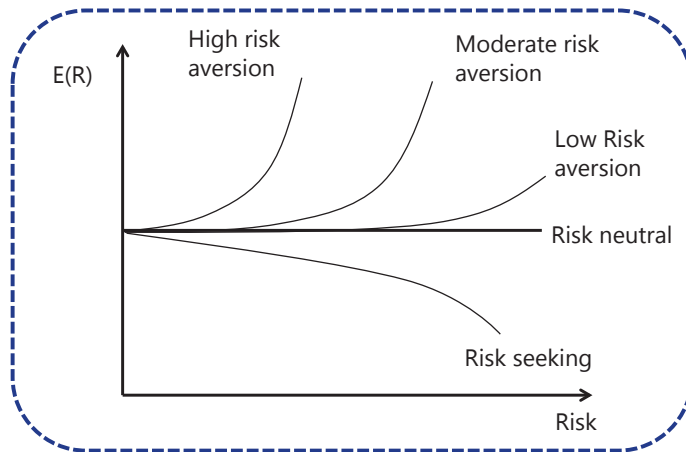
## Utility Theory

- **Indifference curve:** plots combinations of risk (standard deviation) and expected return among which an investor is indifferent.



## Utility Theory

- Indifference Curve for various types of investors



## Summary

### Portfolio Risk and Return: Part I

Modern Portfolio Theory

The Markowitz Assumptions

Modern Portfolio Theory

Types of Investors

Utility Theory

## Summary

### Module: Portfolio Risk and Return: Part I

Modern Portfolio Theory

# Module

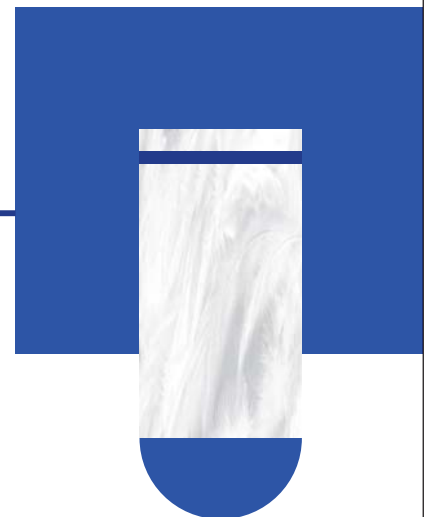


## Portfolio Risk and Return: Part II

1. CAL, CML
2. Systematic Risk and Non-Systematic Risk
3. CAPM and SML
4. Other Return Generating Model
5. Performance Evaluation Indicators

### CAL & CML

- CAL: Capital Allocation Line
- Optimal CAL
- Portfolio Selection
- Capital Market Theory
- CML: Capital Market Line

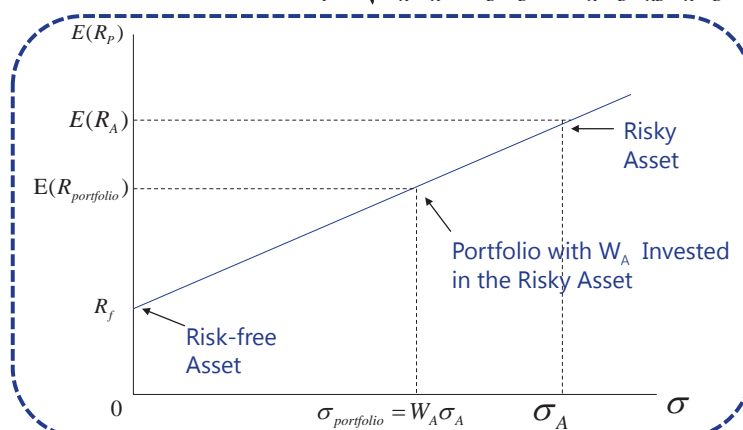


### CAL: Capital Allocation Line

- If a risky asset is combined with a risk free asset, the relationship between the portfolio risk and return **is linear**.

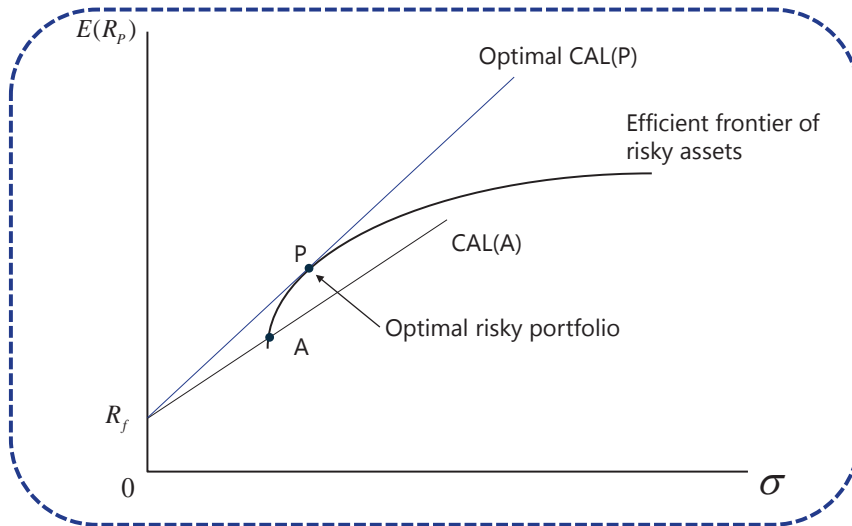
$$E(R_p) = W_A E(R_A) + W_B E(R_B)$$

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



## Optimal CAL

### Optimal risky portfolio



## Optimal CAL

### Optimal CAL

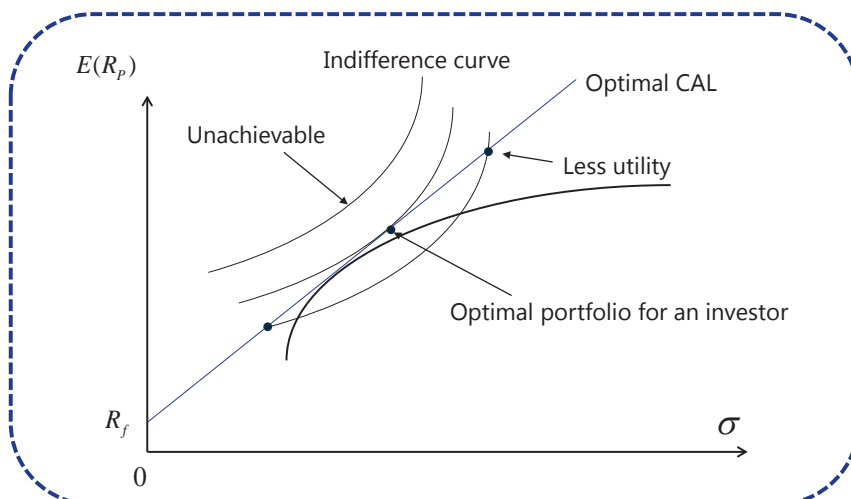
- The optimal capital allocation line connects the risk-free assets and **the optimal risky asset portfolio**.
- The optimal risky portfolio is at the tangent of CAL and the efficient frontier of risky assets.

### Two-fund separation theorem

- All investors will hold a combination of two portfolios or funds: **a risk-free asset** and **an optimal portfolio of risky assets**.

## Portfolio Selection

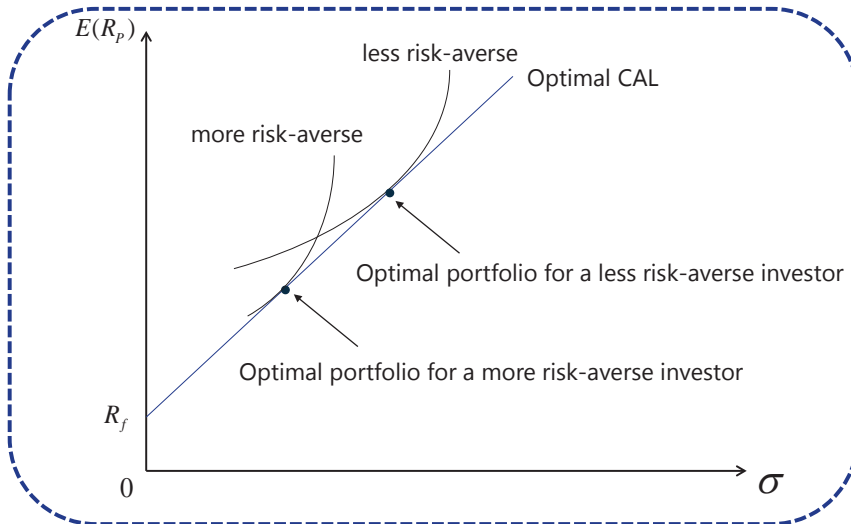
### Optimal portfolio for an investor





## Portfolio Selection

### Optimal portfolio for different types of investors



### Example

## Portfolio Selection

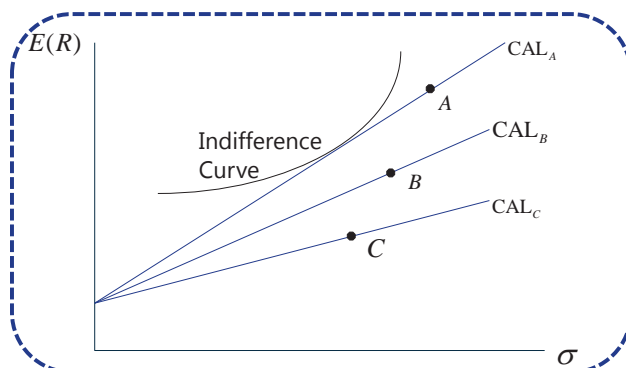
- With respect to the mean-variance theory, the optimal portfolio for an investor is determined by each individual investor's:
  - Risk-free rate.
  - Borrowing rate.
  - Risk preference.

### Solution: C.

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## Capital Market Theory

- 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.

## CML: Capital Market Line

- **Capital market line (CML): homogeneity of expectations**

- Difference between the CML and the CAL.

- **Market Portfolio**

- ✓ Is the **tangent point** where the CML & 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.

- Formula

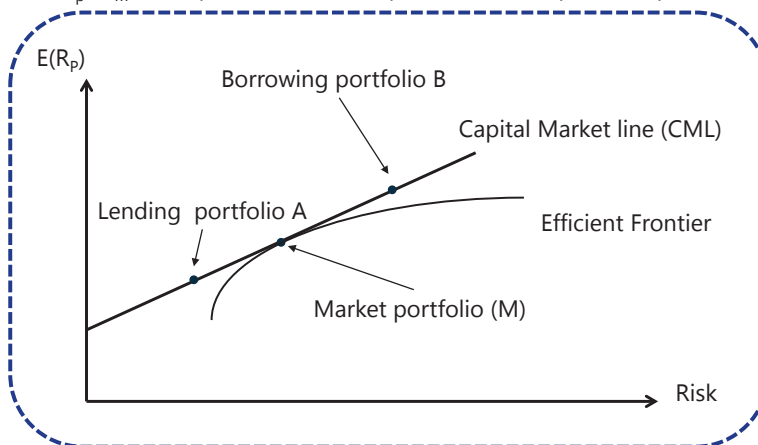
$$E(R_p) = R_F + \frac{E(R_M) - R_F}{\sigma_M} \sigma_p$$

- Passive investment strategy

## CML: Capital Market Line

- **Borrowing portfolio and lending portfolio**

- If  $\sigma_p > \sigma_{mv}$  borrow money at risk free rate and invest the proceed in market portfolio.
- If  $\sigma_p < \sigma_{mv}$  sell a portion of market portfolio and deposit the proceed in bank.



### Example

## CML: Capital Market Line

- The capital market line, CML, is the graph of the risk and return of portfolio combinations consisting of the risk-free asset and:
  - Any risky portfolio.
  - The market portfolio.
  - The leveraged portfolio.
- **Solution: B.**

# Summary

## Portfolio Risk and Return: Part II

### CAL, CML

CAL: Capital Allocation Line

Optimal CAL

Portfolio Selection

Capital Market Theory

CML: Capital Market Line

## Systematic and Nonsystematic Risk

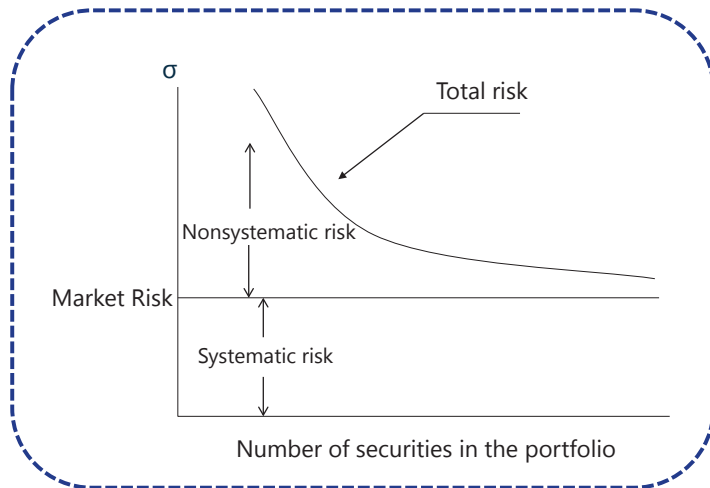
- ❑ Nonsystematic risk
- ❑ Systematic risk
- ❑ Risk vs. Number of Portfolio Assets
- ❑ Security Characteristic Line

## Systematic and Nonsystematic Risk

- **Nonsystematic risk (or idiosyncratic, diversifiable, company-specific risk):**
  - Nonsystematic risk is local or limited to a particular asset or industry.
  - The risk that disappears in the portfolio construction process.
- **Systematic risk (or non-diversifiable, market risk):**
  - The risk that cannot be diversified away.
  - Total variance = systematic variance + nonsystematic variance, or
  - Total risk = systematic risk + nonsystematic risk
- **Since nonsystematic risk can be eliminated through diversification, only systematic risk is compensated.**

## Risk vs. Number of Portfolio Assets

### ● Risk vs. Number of Portfolio Assets

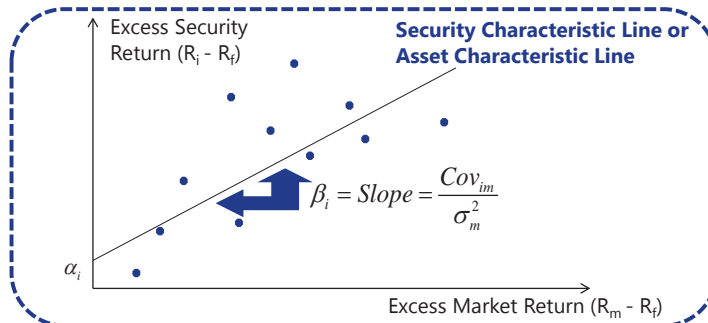


## Security Characteristic Line

- **Beta:** a measure of how sensitive an asset's return is to the market as a whole. A standardized measure of systematic risk.

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

- **Estimation of Beta with Security Characteristic Line** (regression of excess security returns with excess market returns).



## Summary

### Portfolio Risk and Return: Part II

#### Systematic Risk and Non-Systematic Risk

Nonsystematic risk

Systematic risk

Risk vs. Number of Portfolio Assets

Security Characteristic Line

## CAPM and SML

- ❑ Assumptions of the CAPM
- ❑ SML: Security Market Line
- ❑ Application of CAPM
- ❑ SML vs. CML

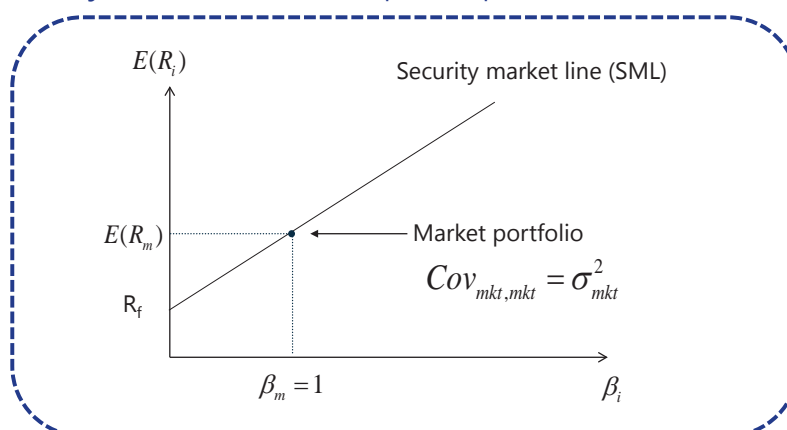
### Assumptions of the CAPM

- **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*.

### SML: Security Market Line

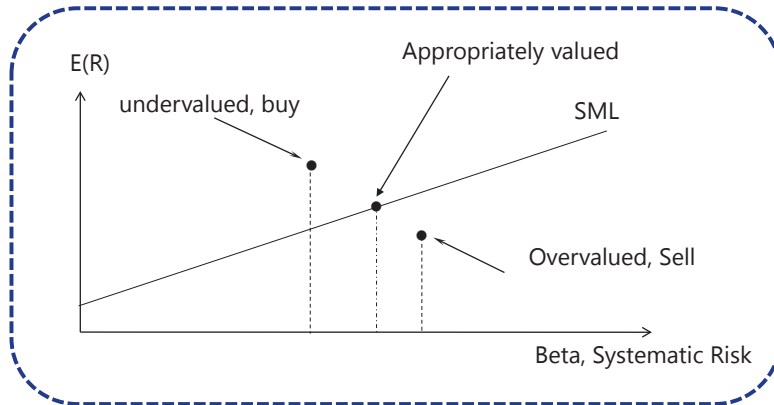
- **Security market line (SML):** Graphical representation of CAPM.



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

## Application of CAPM

### How to judge if a stock is properly valued



## Application of CAPM

### How to judge if a stock is properly valued

- Undervalued
  - ✓ Estimated return > Required return from the SML
  - ✓ Investors should buy.
- Overestimated
  - ✓ Estimated return < Required return from the SML
  - ✓ Investors should sell.
- Properly valued
  - ✓ Estimated return = Required return from the SML
  - ✓ Investors are indifferent between buying or selling.

## SML vs. CML

### 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 all the combinations of the risk-free asset and the market portfolio
Slope	Market risk premium	Market portfolio Sharpe ratio

### Application of CAPM

- With respect to the capital asset pricing model, the primary determinant of expected return of an individual asset is the:
  - A. asset's beta.
  - B. market risk premium.
  - C. asset's standard deviation.
- **Solution: A.**
- Analysts who have estimated returns of an asset to be greater than the expected returns generated by the capital asset pricing model should consider the asset to be:
  - A. Overvalued.
  - B. Undervalued.
  - C. Properly valued.
- **Solution: B.**

## Summary

### Portfolio Risk and Return: Part II

#### CAPM and SML

Assumptions of the CAPM

SML: Security Market Line

Application of CAPM

SML vs. CML

## Other Return Generating Models

- ❑ Single Factor Model
- ❑ Return Generating Models



## Other Return Generating Models

- **Single factor model**

- **Market model:**  $R_i = a_i + \beta_i R_m + e_i \quad \sigma_p^2 = \beta^2 \sigma_m^2 + \sigma_e^2$

- ✓ Total variance = systematic variance + nonsystematic variance, or

- ✓ Total risk = systematic risk + nonsystematic risk

- **Single-index model:**

- ✓  $R_i - R_f = a_i + \beta_i (R_m - R_f) + e_i$

- ✓  $E(R_i) - R_f = a_i + \beta_i (E(R_m) - R_f)$

- **Return generating models: multifactor models**

$$E(R_i) - R_f = \sum_{j=1}^k \beta_{i,j} \times E(\text{Factor}_j) = \beta_{i,1} [E(R_m) - R_f] + \sum_{j=2}^k \beta_{i,j} \times E(\text{Factor}_j)$$

- **Macroeconomic factors:** GDP growth, interest rate, inflation rate, productivity, employment or consumer confidence.

- **Fundamental factors:** earnings, earnings growth, firm size, and research expenditures.

- **Statistical factors:** no obvious economic interpretations with asset returns.

## — Extensions to the CAPM: Fama-French Model —

- Based on an analysis of the relationship between past returns and a variety of different factors, Fama and French (1992) proposed that three factors seem to explain asset returns better than just systematic risk. Those three factors are **relative size, relative book-to-market value, and beta of the asset**.

$$\text{Required Return} = RF + \beta_i^{mkt} \times (R_{mkt} - RF)$$

$$\begin{aligned} &\text{Small/large cap} && + \beta_i^{size} \times (R_{small} - R_{big}) && \beta_i^{size} > 0, \text{ small cap} \\ &\text{High/low book-to-market} && + \beta_i^{value} \times (R_{HBM} - R_{LBM}) && \beta_i^{value} > 0, \text{ value-oriented} \end{aligned}$$

- The FFM views the size and value factors as representing ("proxying for") a set of underlying risk factors.
- Small market-cap companies may be subject to risk factors such as less ready access to private and public **credit markets** and **competitive disadvantages**.
- High book-to-market may represent shares with depressed prices because of exposure to **financial distress**.

## Summary

### Portfolio Risk and Return: Part II

#### Other Return Generating Model

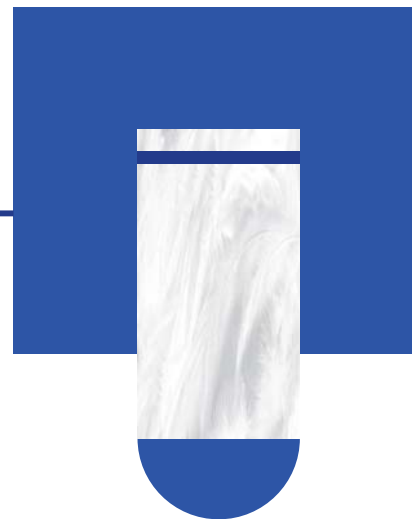
#### Return Generating Models

#### Single Factor Model



## Performance Evaluation Indicators

- ❑ Sharpe ratio
- ❑ M<sup>2</sup> alpha
- ❑ Treynor Ratio
- ❑ Jensen's Alpha



### Sharpe ratio

- **Sharpe ratio**
  - **Definition:** the portfolio's excess return for each unit of total risk.
  - **Sharpe ratio** =  $\frac{E(R_p) - R_f}{\sigma_p}$ 
    - ✓ The greater the Sharpe ratio, the better the portfolio.
    - ✓ CML & Sharpe ratio
      - ❑ The *slope for CML is the Sharpe ratio of the market portfolio*;
      - ❑ The *Sharpe ratio for all the portfolio plotted on the CML is the same*.
  - **Limitation**
    - ✓ The numerator  $[E(R_p) - R_f]$  should not be negative;
    - ✓ It measures total risk while only systematic risk is taken into account;
    - ✓ The ratio itself is not informative, and it should be compared with one another.
      - ❑ E.g. Portfolio A with Sharpe ratio of 0.7 is superior to Portfolio B with a Sharpe ratio of 0.5.

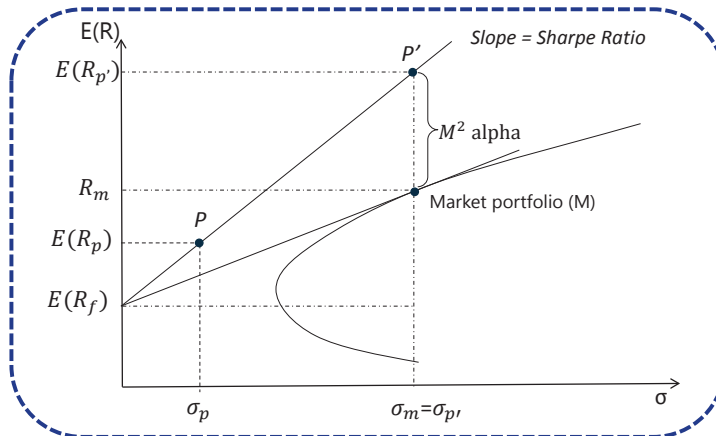
### M<sup>2</sup> alpha

- **M<sup>2</sup> alpha** is the difference between  $R_{p'}$  and the market return  $R_m$ .
  - Mimic portfolio(P'): alter the weights in Portfolio P and the risk-free asset so that the portfolio's risk equals market risk.
    - ✓ The return of P':  $M^2 = E(R_{p'}) = R_f + [E(R_p) - R_f] \sigma_m / \sigma_p$
  - Formula 1: **M<sup>2</sup> alpha** =  $E(R_{p'}) - R_m = [E(R_p) - R_f] \sigma_m / \sigma_p - (E(R_m) - R_f)$ 
    - ✓ The difference between the excess return of P' and that of market return.
  - Formula 2: **M<sup>2</sup> alpha** =  $\{[E(R_p) - R_f] / \sigma_p - [E(R_m) - R_f] / \sigma_m\} * \sigma_m = (SR_p - SR_m) * \sigma_m$ 
    - ✓  $M^2 > 0$ , the portfolio outperforms the market;
    - ✓  $M^2 = 0$ , the portfolio matches the market;
    - ✓  $M^2 < 0$ , the portfolio underperforms the market.
  - M<sup>2</sup> borrows from capital market theory by assuming a portfolio is **leveraged or de-leveraged** until its volatility (as measured by standard deviation) matches that of the market. This adjustment produces a portfolio-specific leverage ratio that equates the portfolio's risk to that of the market. The portfolio's excess return times the leverage ratio plus the risk-free rate is then compared with the markets actual return to determine whether the portfolio has outperformed or underperformed the market on a risk-adjusted basis.

## Sharpe Ratio & M<sup>2</sup> Alpha

### Sharpe ratio & M<sup>2</sup> alpha (total risk)

$$\text{Sharpe Ratio} = \frac{E(R_p) - R_f}{\sigma_p} \quad M^2 \text{ alpha} = [E(R_p) - R_f] \frac{\sigma_m}{\sigma_p} - (R_m - R_f)$$



## Treynor Ratio

### Treynor ratio

- Definition: the portfolio's excess return for each unit of systematic risk.

- Treynor ratio =  $\frac{E(R_p) - R_f}{\beta_p}$

- ✓ The greater the Sharpe,
- ✓ The greater the Treynor ratio, the better the portfolio.
- ✓ Treynor ratio & SML
  - Treynor ratio for portfolios on SML is  $(E(R_M) - R_f)$ .

- Substitutes beta risk for total risk.

#### Limitations

- ✓ The numerator  $[E(R_p) - R_f]$  should not be negative;
- ✓  $\beta_p$  should be positive;
- ✓ The ratio itself is not informative, and it should be compared with one another.

## Jensen's Alpha

### Jensen's alpha ( $\alpha_p$ )

- Definition: the difference between the *portfolio return* and the calculated risk-adjusted return with the same systematic risk by **CAPM**.

- Ex post version:  $\alpha_p = R_p - \{R_f + \beta_p[R_m - R_f]\}$

- ✓ Determine the rank of a portfolio and whether it beats the market.
  - $\alpha_p > 0$ , the portfolio outperforms the market;
  - $\alpha_p = 0$ , the portfolio matches the market;
  - $\alpha_p < 0$ , the portfolio underperforms the market.
- ✓ Calculate the magnitude of underperformance or overperformance.
  - If A and B has same systematic risk. Portfolio A's  $\alpha_p$  is 5%, B's  $\alpha_p$  is 2%, we can say A has outperformed B by 3 percentage points.

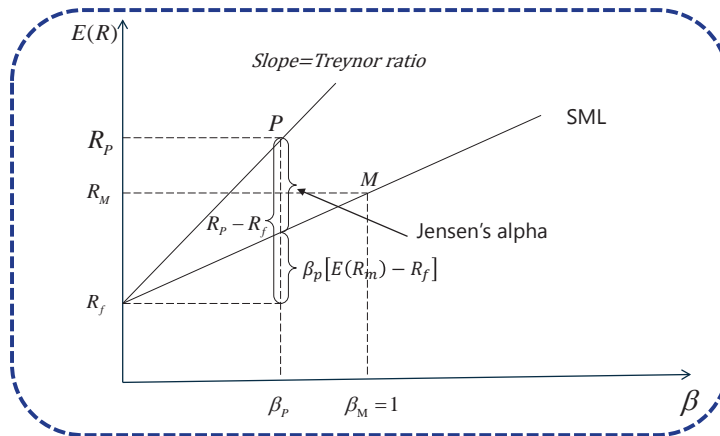
- Ex ante version:  $\widehat{\alpha}_p = E(R_p) - \{R_f + \widehat{\beta}_p[E(R_m) - R_f]\}$

- ✓ Used for portfolio selection

## Treynor Measure & Jensen's Alpha

### Treynor measure & Jensen's alpha (systematic risk)

$$\text{Treynor ratio} = \frac{E(R_p) - R_f}{\beta_p} \quad \hat{\alpha}_p = E(R_p) - \{R_f + \hat{\beta}_p[E(R_m) - R_f]\}$$



### Example

#### Performance Evaluation Indicators

- Assume an equity mutual fund has three portfolios: A, B, C, managed by three fund managers, according to the information provided below, calculate the A, B, C's expected returns, Sharpe ratio, Treynor ratio, M<sup>2</sup> alpha and Jensen's alpha respectively, and rank the performance of A, B, C.

	Return	$\sigma$	$\beta$
A	10%	20%	1.1
B	11%	10%	0.7
C	12%	25%	0.6
Market (M)	9%	19%	1
Risk-free rate ( $R_f$ )	3%	0	0

### Example

#### Performance Evaluation Indicators

#### Solution:

- $E(R_A) = R_f + \beta[E(R_m) - R_f] = 3\% + 1.1(9\% - 3\%) = 9.6\%$
- Sharpe ratio:  $[E(R_p) - R_f]/\sigma_p = (10\% - 3\%)/20\% = 0.35$
- M<sup>2</sup> alpha:  $[E(R_p) - R_f] \frac{\sigma_m}{\sigma_p} - [E(R_m) - R_f] = 0.35 \times 0.19 - [0.09 - 0.03] = 0.65\%$
- Treynor ratio:  $[E(R_p) - R_f]/\beta_p = (10\% - 3\%)/1.1 = 0.064$
- $\alpha_p: \hat{\alpha}_p = E(R_p) - \{R_f + \hat{\beta}_p[E(R_m) - R_f]\} = 10\% - [3\% + 1.1 \times (9\% - 3\%)] = 0.4\%$

Portfolio A

	$\sigma$		$\beta$	
	Sharpe ratio	M <sup>2</sup> alpha	Treynor ratio	$\alpha_p$
A	0.35	0.65%	0.064	0.40%
B	0.8	9.20%	0.114	3.80%
C	0.36	0.84%	0.15	5.40%
Market (M)	0.32	0	0.06	0
$R_f$	/	/	/	0

## Example

### Performance Evaluation Indicators

- Rank the portfolios based on each ratio:

	$\sigma$		$\beta$	
Rank	Sharpe ratio	M <sup>2</sup> alpha	Treynor ratio	$\alpha_p$
1	B	B	C	C
2	C	C	B	B
3	A	A	A	A
4	M	M	M	M
5	/	/	/	Rf

- Solution:**

- Based on total risk,  $B > C > A$ ;
- Based on systematic risk,  $C > B > A$ ;
- A, B, C all outperform the market.

### Performance Evaluation Indicators

- Comparisons**

Ratio	Sharpe Ratio	Treynor Ratio	M <sup>2</sup> alpha	Jensen's Alpha
Definition	The excess return for each unit of total risk.	The excess return for each unit of systematic risk	The difference between $E(R_p)$ and the market return $R_m$ under same total risk	The difference between the actual portfolio return and the calculated risk-adjusted return
Risk	Total risk	Systematic risk( $\beta$ )	Total risk	Systematic risk( $\beta$ )
Formula	$[E(R_p) - R_f] / \sigma_p$	$[E(R_p) - R_f] / \beta_p$	$[E(R_p) - R_f] \sigma_m / \sigma_p - (R_m - R_f)$	$\alpha_p [ex\text{-}ante]$ $= E(R_p)$ $- \{R_f$ $+ \beta_p [E(R_m)$ $- R_f]\}$
Application	Not fully diversified	Well-diversified	Not fully diversified	Well-diversified
Evaluation	Indirect (compared with another)	Indirect (compared with another)	Direct ( $>0, =0, <0$ )	Direct ( $>0, =0, <0$ )

## Example

### Performance Evaluation Indicators

- Which of these return metrics is defined as excess return per unit of systematic risk?
  - Sharpe ratio.
  - Jensen's alpha.
  - Treynor measure.

- Solution: C.**

The Treynor measure is excess return (return in excess of the risk-free rate) per unit of systematic risk (beta). The Sharpe ratio is excess return per unit of total risk (portfolio standard deviation). Jensen's alpha is the difference between a portfolio's actual rate of return and the equilibrium rate of return for a portfolio with the same level of beta (systematic) risk.

## Summary

### Module: Portfolio Risk and Return: Part II

#### Performance Evaluation Indicators

Sharpe ratio  
M<sup>2</sup> alpha  
Sharpe Ratio & M2 Alpha  
Treynor Ratio  
Jensen's Alpha  
Treynor Measure & Jensen's Alpha

## Summary

### Module: Portfolio Risk and Return: Part II

#### CAL, CML

#### Systematic Risk and Non-Systematic Risk

#### CAPM and SML

#### Other Return Generating Model

#### Performance Evaluation Indicators

# Module



## Portfolio Management: An Overview

1. Portfolio Perspective
2. Portfolio Management Process
3. Types of Investors and Pooled Investment Products

# Portfolio Perspective

- Portfolio Approach to Investing

## Portfolio Approach to Investing

- **Portfolio approach**

- Definition

- ✓ **From the perspective of risk and returns**, evaluate individual securities in relation to their contribution to the investment characteristics of the whole portfolio.

- **Diversification** provides an investor with a way to *reduce the risk* without necessarily decreasing their expected rate of return.

- ✓ During times of severe market turmoil, correlations among assets tend to **increase**, which makes the **diversification less effective**.

## Summary

### Portfolio Management: An Overview

#### Portfolio Perspective

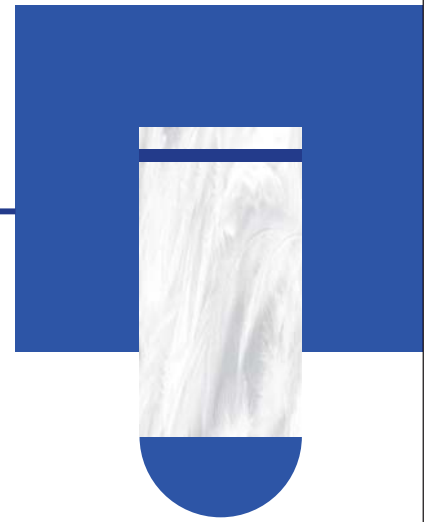
Portfolio Approach to Investing

Definition

Diversification

## Portfolio Management Process

- Planning Step
- Execution Step
- Feedback Step



## Portfolio Management Process

- **Planning step**
  - Analyse the investor's needs: investment objectives and constraints;
  - Develop an IPS: describes the investor's investment objectives and constraints; state an objective benchmark; reviewed and updated regularly.
- **Execution step**
  - Asset allocation: top-down & bottom-up analysis;
  - Security analysis;
  - Portfolio construction.
- **Feedback step**
  - Monitor and rebalance the portfolio;
  - Measure portfolio performance and report.

## Summary

### Portfolio Management: An Overview

#### Portfolio Management Process

Planning step  
Execution step  
Feedback step

# Types of Investors and Pooled Investment Products

- ❑ Types of Investment Management Clients
- ❑ Characteristics of Different Types of Investors
- ❑ Forms of Pooled Investments
- ❑ ETFs and Mutual Funds
- ❑ Mutual Funds and Hedge Funds
- ❑ The Asset Management Industry



## — Types of Investment Management Clients —

### ● The types of investment management clients

#### ○ Individual investors

- ✓ **DC plan:** a defined contribution pension plan is a retirement plan in which the firm contributes a sum each period to the employee's retirement account.

#### ○ Institutional investors

- ✓ **DB plan:** in a defined benefit pension plan, the firm promises to make periodic payments to employees after retirement.

## — Types of Investment Management Clients —

### ● The types of investment management clients

#### ○ Institutional investors (cont.)

- ✓ **Endowments:** a fund that is dedicated to providing financial support on an ongoing basis for a specific purpose.
- ✓ **Foundations:** a fund established for charitable purposes to support specific types of activities or to fund research related to a particular disease.
- ✓ **Banks:** the investment objective is to earn more on the bank's loans and investments than the bank pays for deposits of various types.
- ✓ **Insurance companies:** invest customer premiums with the objective of funding customer claims as they occur.
- ✓ **Sovereign wealth funds (SWFs):** refer to pools of assets owned by a government.



## — Characteristics of Different Types of Investors —

### ● Characteristics of different types of investors

Investor	Time Horizon	Risk Tolerance	Liquidity Needs	Income Needs
Individuals	Varies by individual	Varies by individual	Varies by individual	Varies by individual
<b>DB plan</b>	Long	High	Quite low	High for mature funds; Low for growing funds
<b>Banks</b>	Short	Quite low	High	Pay interest and operational expenses
<b>Endowments and Foundations</b>	Very long	High	Quite low	Meet spending commitments
<b>Insurance</b>	Long - life Short - P&C	Quite low	High	Low
Mutual funds	Varies by fund	Varies by fund	High	Varies by fund
Sovereign wealth funds	Varies by fund	Varies by fund	Varies by fund	Varies by fund

## — Forms of Pooled Investments —

### ● Mutual funds and other forms of pooled investments

- **Mutual funds:** Open-end fund and Closed-end funds; Money market funds, Bond funds, Stock funds, Hybrid or balanced funds.
  - ✓ Index fund: track the performance of a particular index.
- **Exchange traded funds (ETFs).**
- **Separately managed account.**
- **Hedge funds.**
- **Buyout funds.**
- **Venture capital funds.**

## — ETFs and Mutual Funds —

- **ETF:** investors buy the shares from other investors *just as if they were buying or selling shares of stock*.
- **Comparison between Mutual funds and ETFs**
  - *Expenses are lower for ETFs* , but, unlike mutual funds, investors do incur brokerage costs.
  - All purchases and redemptions in a mutual fund take place at the same price at the close of business. *However, ETFs are constantly traded throughout the business day*, and as such each purchase or sale takes place at the prevailing market price at that time.
  - *For ETF, dividends are paid out to the shareholders*, hence, there is a direct cash flow from the ETF. Index mutual funds usually reinvest the dividends that is not there with the index mutual fund.
  - The *minimum required investment in an ETF is usually smaller*. Investors can purchase as little as one share in an ETF, which is usually not the case with an index mutual fund.
  - ETFs are often cited as *having tax advantages over index mutual funds*.

## •———— Mutual Funds and Hedge Funds ———•

- **Comparison between Mutual funds and hedge funds**

- Hedge fund strategies generally involve a *significant amount of risk*, driven in large measure by the liberal *use of leverage and complexity*. More recently, it has also involved the extensive use of derivatives.
- A key difference between hedge funds and mutual funds is that the *vast majority of hedge funds are exempt from many of the reporting requirements for the typical public investment company*.

## •———— The Asset Management Industry ———•

- **The Asset Management Industry**

- **Definition**

- ✓ Asset management firms include both independent managers and divisions of larger financial service companies. They are referred to as **buy-side firms**, in contrast with **sell-side firms** such as broker-dealers and investment banks.
- ✓ **Full-service asset managers** are those that offer a variety of investment styles and asset classes; **Specialist asset managers** may focus on a particular investment style or a particular asset class; A **multi-boutique firm** is a holding company that includes a number of different specialist asset managers.

## •———— The Asset Management Industry ———•

- **Active versus Passive Management**

- **Active management** attempts to outperform a chosen benchmark through manager skill;
- **Passive managers** attempt to replicate the returns of a chosen market index. This may include traditional broad market index tracking or a **smart beta approach** that focuses on exposure to a particular market risk factor.

- **Traditional versus Alternative Asset Managers**

- **Traditional asset managers** focus on equities and fixed-income securities.
- **Alternative asset managers** focus on asset classes such as private equity, hedge funds, real estate, or commodities.
- Profit margins tend to be higher for the alternative asset classes. As a result, many traditional asset managers have been moving into this area, somewhat blurring the distinction between these types of firms.

## The Asset Management Industry

### ● Asset Management Industry Trends

- The market share for passive management has been growing over time;
  - ✓ Lower fees passive managers charge investors;
  - ✓ Questions about whether active managers are actually able to add value;
- The **amount of data available (big data)** to asset managers has grown exponentially in recent years;
- **Robo-Advisers** are a technology that can offer investors advice and recommendations based on their investment requirements and constraints, using a **computer algorithm**.

## Summary

### Portfolio Management: An Overview

#### Types of Investors and Pooled Investment Products

Types of Investment Management Clients  
Characteristics of Different Types of Investors  
Forms of Pooled Investments  
ETFs and Mutual Funds  
Mutual Funds and Hedge Funds  
The Asset Management Industry

## Summary

### Module: Portfolio Management: An Overview

Portfolio Perspective  
Portfolio Management Process  
Types of Investors and Pooled Investment Products

# Module

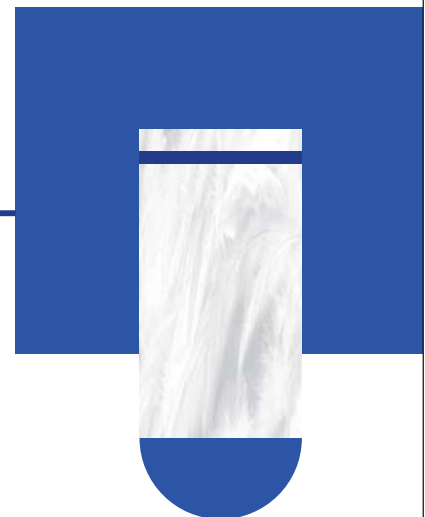


## Basics of Portfolio Planning and Construction

1. Components of IPS, Risk and Return
2. Investment Constrains, Asset Allocation, ESG

### Components of IPS, Risk and Return

- ❑ Investment Policy Statement
- ❑ Risk Objective
- ❑ Return Objective



### Investment Policy Statement

- **The need for a policy statement**
  - Understand and articulate realistic investor's goals, needs and risk tolerance;
  - Ensure that goals are realistic;
  - Provide an objective measure of portfolio performance.
- **Major components of IPS**
  - Introduction;
  - Statement of purpose;
  - Statement of duties and responsibilities;
  - Procedures: the steps taken to keep the IPS updated in a timely manner and respond to various situations;
  - Investment objectives;
  - Investment constraints;
  - Investment guidelines;
  - Evaluation and Review;
  - **Appendices:** (A) Strategic Asset Allocation, (B) Rebalancing Policy.

## Risk Objective

- **Investment objectives: risk and return**

- **Risk objective**

- The risk objective limits how high the investor can set the return objective
- Risk measurement:
  - ✓ Absolute: variance or standard deviation
  - ✓ Relative: relate risk relative to one or more benchmarks perceived to represent appropriate risk standards (tracking risk),
  - ✓ Downside risk: VaR
- Risk tolerance: willingness and ability

	Ability to bear risk	
Willingness to take risk	Below average	Above average
Below average	Below-average risk tolerance	Resolution needed
Above average	Resolution needed	Above-average risk tolerance

## Return Objective

- **Return objectives: absolute or relative basis**

- **Return measurement**

- ✓ **Absolute basis**

- percentage rate of return: total return(balance between capital gains and income), inflation-adjusted return(real).

- ✓ **Relative basis**

- Relative to a benchmark return: Some institutions also set their return objective relative to a peer group or universe of managers.

- Stated return desire vs. Required return

- Consistent with risk objective

## Example

### Example

- **The Case of Henri Gascon: Risk Tolerance**

Henri Gascon is an energy trader who works for a major French oil company based in Paris. He is 30 years old and married with one son, aged 5. Gascon has decided that it is time to review his financial situation and consults a financial adviser, who notes the following aspects of Gascon's situation:

- Gascon's annual salary of €250,000 is more than sufficient to cover the family's outgoings.
- Gascon owns his apartment outright and has €1,000,000 of savings.
- Gascon perceives that his job is reasonably secure.
- Gascon has a good knowledge of financial matters and is confident that equity markets will deliver positive returns over the long term.
- In the risk tolerance questionnaire, Gascon strongly disagrees with the statements that "making money in stocks and bonds is based on luck" and "in terms of investing, safety is more important than returns."
- Gascon expects that most of his savings will be used to fund his retirement, which he hopes to start at age 50.

## Example

### Example

- Based only on the information given, which of the following statements is most accurate?
  - A. Gascon has a low ability to take risk but a high willingness to take risk.
  - B. Gascon has a high ability to take risk but a low willingness to take risk.
  - C. Gascon has a high ability to take risk and a high willingness to take risk.
- **Solution: C.**
  - Gascon has a high income relative to outgoings, a high level of assets, a secure job, and a time horizon of 20 years. This information suggests a high ability to take risk. At the same time, Gascon is knowledgeable and confident about financial markets and responds to the questionnaire with answers that suggest risk tolerance. This result suggests he also has a high willingness to take risk.

## Example

### Example

- **The Case of Jacques Gascon: Risk Tolerance**

Marie Gascon is so pleased with the services provided by her financial adviser that she suggests to her brother Jacques that he should also consult the adviser. Jacques thinks it is a good idea. Jacques, a self-employed computer consultant also based in Paris, is 40 years old and divorced with four children, aged between 12 and 16. The financial adviser notes the following aspects of Jacques' situation:

  - Jacques' consultancy earnings average €40,000 per annum but are quite volatile.
  - Jacques is required to pay €10,000 per year to his ex-wife and children.
  - Jacques has a mortgage on his apartment of €100,000 and €10,000 of savings.

## Example

### Example

- **The Case of Jacques Gascon: Risk Tolerance (Continued)**
  - Jacques has a good knowledge of financial matters and expects that equity markets will deliver very high returns over the long term.
  - In the risk tolerance questionnaire, Jacques strongly disagrees with the statements "I am more comfortable putting my money in a bank account than in the stock market" and "When I think of the word 'risk', the term 'loss' comes to mind immediately."
  - Jacques expects that most of his savings will be required to support his children at university.

Based only on the information given, which statement is correct?

    - A. Jacques has a low ability to take risk but a high willingness to take risk.
    - B. Jacques has a high ability to take risk but a low willingness to take risk.
    - C. Jacques has a high ability to take risk and a high willingness to take risk.

- **Solution: A.**

- Jacques does not have a particularly high income, his income is unstable, and he has reasonably high outgoings for his mortgage and maintenance payments.
- His investment time horizon is approximately two to six years given the ages of his children and his desire to support them at university.
- This finely balanced financial situation and short time horizon suggests a low ability to take risk.
- In contrast, his expectations for financial market returns and risk tolerance questionnaire answers suggest a high willingness to take risk.
- The financial adviser may wish to explain to Jacques how finely balanced his financial situation is and suggest that, despite his desire to take more risk, a relatively cautious portfolio might be the most appropriate approach to take.

## Summary

### Basics of Portfolio Planning and Construction

#### Components of IPS, Risk and Return

Investment Policy Statement

Risk Objective

Return Objective

### Investment constraints, asset allocation, ESG

- ❑ Investment Constraints
- ❑ Strategic Asset Allocation
- ❑ Active Portfolio Management
- ❑ Environmental, social, and governance (ESG)
- ❑ ESG Considerations
- ❑ Positive and Negative Screening



## Investment Constraints

### ● 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 circumstances**—investor preferences or other factors which has not been considered before.
  - ✓ E.g. religions, ethical behavior, ESG consideration.

## Strategic Asset Allocation

Asset Class	Target
Cash	0%
U.S. large-cap equity	12%
U.S. small-/mid-cap equity	6%
International (developed) equity	12%
Emerging market equity	6%
U.S. bonds	18%
Global bonds	8%
High -yield bonds	5%
Emerging market debt	3%
Inflation-protected bonds	3%
Real estate	5%
Hedge funds	5%
Private equity	2%
Commodities	0%
Tactical asset allocation and other	15%
TOTAL	100%

### ● Strategic asset allocation:

- The set of exposures to IPS-permissible asset classes that is expected to achieve the client's **long-term objectives** given the client's investment constraints.
- Correlations within the class is **higher** than correlations between asset classes.

## Active Portfolio Management

### ● Active portfolio management

- **Tactical asset allocation** is the decision to **deliberately deviate** from the policy exposures to systematic risk factors with the intent to add value based on forecasts of the **near-term returns** of those asset classes.
  - ✓ The manager's ability to identify short-term opportunities in specific asset classes;
  - ✓ The existence of such short-term opportunities.
- **Security selection** is an attempt to generate higher returns than the asset class benchmark by **selecting securities with a higher expected return**.
  - ✓ The manager's skill;
  - ✓ The opportunities within a particular asset class.



## — Environmental, social, and governance (ESG) —

### ● Environmental, social, and governance (ESG) Considerations in Portfolio Planning and Construction

- Typical examples of ESG.

Environmental Issues	Social Issues	Governance Issues
Climate change and carbon emissions	Customer satisfaction	Board composition
Air and water pollution	Data protection and privacy	Audit committee structure
Biodiversity	Gender and diversity	Bribery and corruption
Deforestation	Employee engagement	Executive compensation
Energy efficiency	Community relations	Lobbying
Waste management	Human rights	Political contributions
Water scarcity	Labor standards	Whistleblower schemes

## ESG Considerations

### ● How ESG considerations may be integrated into portfolio planning and construction

- **ESG integration:** Systematic consideration of material ESG factors in asset allocation, security selection, and portfolio construction decisions.
- **Negative screening:** Excluding companies or sectors based on business activities or environmental or social concerns.
- **Positive screening** or **best-in-class:** Including sectors or companies based on specific ESG criteria typically ESG performance relative to industry peers.
- **Thematic investing:** Investing in themes or assets related to ESG factors.
- **Impact investing:** Investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return.
- **Engagement/active ownership:** Using shareholder power to influence corporate behavior to achieve targeted ESG objectives along with financial returns.

## Positive and Negative Screening

### ● The fund's managers apply both positive and negative screening criteria:

Product- Based Screening Criteria	Conduct- Based Screening Criteria	
Alcohol	Environmental	Environmental management
Arctic and oil sands		
Coal mining	Social	Animal welfare
Gambling		Health and safety
Nuclear power generation		Human rights and oppressive regimes
Pornography		Labor standards
Tobacco	Governance	Business ethics
Weapons		

## Summary

### Basics of Portfolio Planning and Construction

Investment Constrains, Asset Allocation, ESG

Investment Constraints

Strategic Asset Allocation

Active Portfolio Management

Environmental, social, and governance (ESG)

ESG Considerations

Positive and Negative Screening

## Summary

### Module: Basics of Portfolio Planning and Construction

Components of IPS, Risk and Return

Investment Constrains, Asset Allocation, ESG

# Module

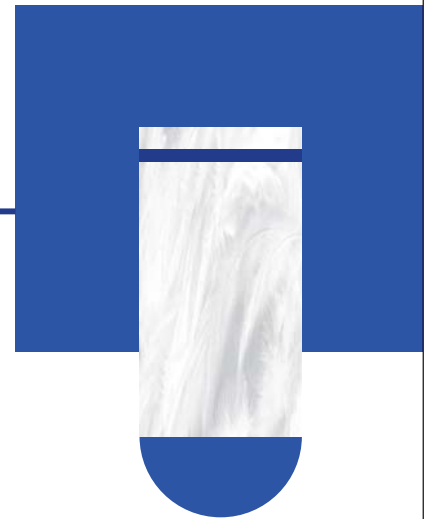


## The Behavioral Biases of Individuals

1. Basics of Behavioral Finance
2. Cognitive Errors
3. Emotional Biases
4. Anomalies

# Basics of Behavioral Finance

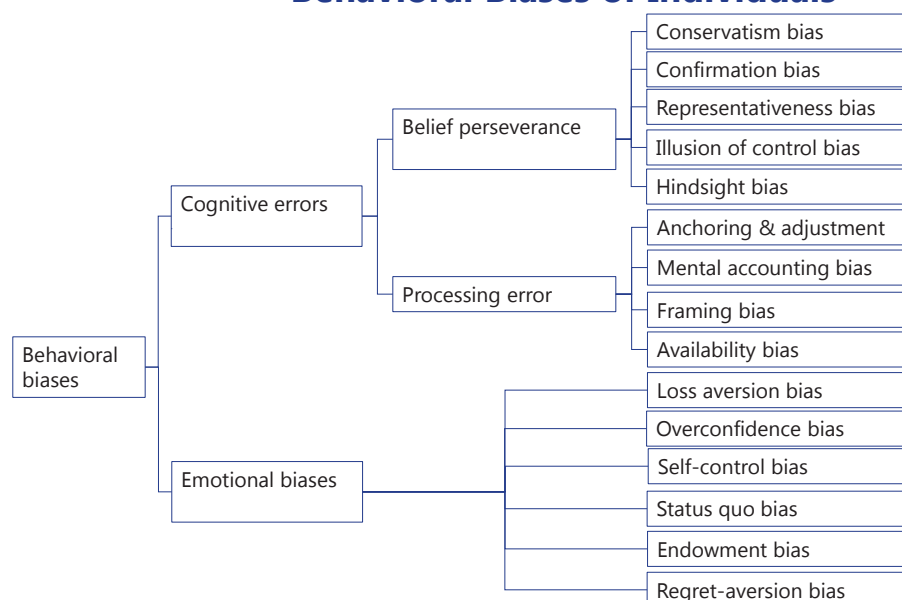
- Categories of Behavioral Biases
- Behavioral Biases of Individuals



## Categories of Behavioral Biases

- By incorporating research on how *financial market participants (FMPs)*, both individual investors and financial services professionals, actually behave when engaging in financial decision making, behavioral biases occurs and come in two forms:
  - **Cognitive errors** arise from processing information into rational decisions with *a lack of capacity or information*, e.g., proper statistical analysis techniques or sufficient data. It is **easily to correct**.
    - ✓ **Belief perseverance biases** is the tendency to cling to one's previously held beliefs.
    - ✓ **Information-processing biases** describe how information may be processed and used illogically or irrationally in financial decision making.
  - **Emotional biases** arise from *impulse or intuition* and affect how processing information and decision making. It is **harder to correct**.

## Behavioral Biases of Individuals



# Summary

## The Behavioral Biases of Individuals

Basics of Behavioral Finance

Categories of Behavioral Biases

Behavioral Biases of Individuals

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## Cognitive Errors

- ❑ Belief Perseverance Biases
- ❑ Processing Errors

## Belief Perseverance Biases

- **Conservatism bias** occurs when people maintain their *prior views* or forecasts by *inadequately incorporating new, conflicting information*.
  - **Consequences:**
    - ✓ Maintain or be slow to update a view or a forecast, even when presented with new information;
    - ✓ Maintain a prior belief rather than deal with the mental stress of updating beliefs given complex data. This behavior relates to an underlying difficulty in processing new information.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Properly analyzing and weighting new information.

## Belief Perseverance Biases

- **Confirmation bias** refers to the tendency to look for and notice what *confirms prior beliefs* and to *ignore or undervalue whatever contradicts* them.
  - **Consequences:**
    - ✓ Consider only the positive information while ignoring any negative information;
    - ✓ Develop screening criteria while ignoring information that either refutes the validity of the criteria or supports other criteria;
    - ✓ Inadequately diversify (under-diversified) portfolios;
    - ✓ Hold a disproportionate amount of their investment assets in investors' employing company's stock, with convinced favorable prospects;
  - **Detection of and Guidance for Overcoming:**
    - ✓ actively seeking out information that challenges existing beliefs;
    - ✓ Corroborate an investment decision with research from another perspective or source.

## Belief Perseverance Biases

- **Representativeness bias** refers to the tendency to *classify new information based on past experiences and classifications*, e.g., halo effect.
  - **Consequences:**
    - ✓ Base-rate neglect;
    - ✓ Sample-size neglect.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Adopt a view or a forecast based almost exclusively on individual, specific information or a small sample;
    - ✓ Update beliefs using simple classifications rather than deal with the mental stress of updating beliefs given the high cognitive costs of complex data.

## Belief Perseverance Biases

- **Illusion of control** refers when people tend to believe that they can control or influence outcomes when, in fact, they cannot.
  - **Consequences:**
    - ✓ Inadequately diversify (under-diversified) portfolios;
    - ✓ Trade more than is prudent;
    - ✓ Construct financial models and forecasts that are overly detailed.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Recognize an investment as a probabilistic activity;
    - ✓ Seek contrary viewpoints and keep record.

## Belief Perseverance Biases

- **Hindsight bias** refers to believing past events as having been predictable and reasonable to expect.
  - **Consequences:**
    - ✓ Overestimate the degree to which they correctly predicted an investment outcome, or the predictability of an outcome generally;
    - ✓ Unfairly assess money manager or security performance.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Carefully record their investment decisions and key reasons for making those decisions in writing at or around the time the decision is made.

## Processing Errors

- **Framing bias** occurs when person answers a question differently based on the way in which it is asked or framed.
  - **Consequences:**
    - ✓ Misidentify risk tolerances because of how questions about risk tolerance were framed, becoming more risk-averse when presented with a gain frame of reference and more risk-seeking when presented with a loss frame of reference.
    - ✓ Focus on short-term price fluctuations, which may result in long-run considerations being ignored in the decision-making process.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Asking such questions as, "Is the decision the result of focusing on a net gain or net loss position?"

## Processing Errors

- **Anchoring and adjustment bias** refers to relying on an initial piece of information to make subsequent estimates, judgments, and decisions.
  - **Consequences:**
    - ✓ FMPs may stick too closely to their original estimates when learning new information with both downside adjustments and upside adjustments.
  - **Detection of and Guidance for Overcoming:**
    - ✓ The primary action FMPs can take is consciously asking questions that may reveal an anchoring and adjustment bias, e.g., "Am I holding onto this stock based on rational analysis or am I trying to attain a price that I am anchored to, such as the purchase price or a high-water mark?"

## Processing Errors

- **Mental accounting bias** refers to mentally dividing money into “accounts” that influence decisions, even though money is fungible.
  - **Consequences:**
    - ✓ Neglect opportunities to reduce risk by combining assets with low correlations;
    - ✓ Irrationally distinguish between returns derived from income and those derived from capital appreciation;
    - ✓ Irrationally divide wealth or a portfolio into investment principal and investment returns.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Recognize its drawbacks and focus on total returns. For example, FMPs should go through the exercise of *combining all* of their assets *onto one spreadsheet* (without headings or account labels) to see the holistic asset allocation.

## Processing Errors

- **Availability bias** occurs when people estimate the probability of an outcome or the importance of a phenomenon based on how easily information is recalled.
  - **Consequences:**
    - ✓ Limit their investment opportunity set;
    - ✓ Choose an investment, investment adviser, or mutual fund based on advertising or the quantity of news coverage;
    - ✓ Fail to diversify.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Develop an appropriate investment policy strategy, e.g., carefully research and analyze investment decisions before making them, and focus on long-term historical data.

## Summary

### The Behavioral Biases of Individuals

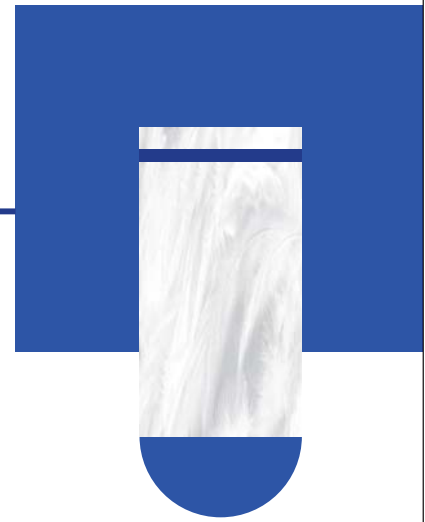
#### Cognitive Errors

Belief Perseverance Biases

Processing Errors

## Emotional Biases

- ❑ Loss Aversion
- ❑ Overconfidence Bias
- ❑ Self-control Bias
- ❑ Status Quo Bias
- ❑ Endowment Bias
- ❑ Regret-Aversion Bias



## Emotional Biases

- **Loss aversion** refers to the tendency to strongly prefer avoiding losses to achieving gains;
  - **Consequences:**
    - ✓ Hold investments in a loss position longer than justified by fundamental analysis, in the hope that they will return to breakeven.
    - ✓ Sell investments in a gain position earlier than justified by fundamental analysis, out of fear that the gains will erode.
  - **Detection of and Guidance for Overcoming:**
    - ✓ A disciplined approach of analyzing investments and realistically considering the probabilities of future losses and gains may help guide the FMP to a rational decision.

## Emotional Biases

- **Overconfidence bias** refers to people demonstrate unwarranted faith in their own abilities.
  - **Illusion of knowledge bias:** *overestimating knowledge levels, abilities and access to information.*
    - ✓ *Prediction overconfidence* occurs when the confidence intervals that FMPs assign to their investment predictions are too narrow.
    - ✓ *Certainty overconfidence* occurs when the probabilities that FMPs assign to outcomes are too high. This certainty is often an emotional response rather than a cognitive evaluation.
  - **Self-attribution bias:** describe people's propensity to take credit for successes and assign responsibility for failures.
    - ✓ *Self-enhancing:* people take too much credit for successes.
    - ✓ *Self-protecting:* people assign responsibility to others for failures.
  - **Consequences:**
    - ✓ Underestimate risks and overestimate expected returns;
    - ✓ Hold poorly diversified portfolios, which may result in significant downside risk.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Review their trading records, identify both the winners and losers, and calculate portfolio performance over at least two years.



## Emotional Biases

- **Self-control bias** occurs when people fail to act in pursuit of their long-term, overarching goals in favor of short-term satisfaction.
  - **Consequences:**
    - ✓ Save insufficiently for the future, which may, in turn, result in accepting too much risk in portfolios in an attempt to generate higher returns;
    - ✓ Borrow excessively to finance present consumption.
  - **Detection of and Guidance for Overcoming:**
    - ✓ ensure that a proper investment plan is in place
    - ✓ have a personal budget.

## Emotional Biases

- **Status quo bias** occurs when people choose to do nothing (i.e., maintain the “status quo”) instead of making a change, even when change is warranted.
  - **Consequences:**
    - ✓ Unknowingly maintain portfolios with risk characteristics that are inappropriate for their circumstances;
    - ✓ Fail to explore other opportunities;
    - ✓ Indecision or inertia in which people prefer to not make changes even when changes are warranted (similar to endowment and regret aversion).
  - **Detection of and Guidance for Overcoming:**
    - ✓ Quantify the risk-reducing and return-enhancing advantages of diversification and proper asset allocation.

## Emotional Biases

- **Endowment bias** refers to people value an asset more when they own it than when they do not or people attributing additional, unwarranted value to things they possess versus things they do not.
  - **Consequences:**
    - ✓ Fail to sell certain assets and replace them with other assets;
    - ✓ Continue to hold classes of assets with which they are familiar;
    - ✓ maintain an inappropriate asset allocation.
  - **Detection of and Guidance for Overcoming:**
    - ✓ When an estimated “sell price” is far higher than any reasonable FMP’s estimate of a “buy price” is to ask, “Would you buy this security today at the current price?”.

## Emotional Biases

- **Regret-aversion bias** refers to people tend to avoid making decisions out of fear that the decision will turn out poorly.
  - **Two dimensions:**
    - ✓ Regret of commission: actions that people take:
    - ✓ Regret of omission: actions that people could have taken.
  - **Consequences:**
    - ✓ Be too conservative in their investment choices as a result of poor outcomes on risky investments in the past;
    - ✓ Engage in herding behavior.
  - **Detection of and Guidance for Overcoming:**
    - ✓ Quantify the risk-reducing and return-enhancing advantages of diversification and proper asset allocation.

## Summary

### The Behavioral Biases of Individuals

#### Emotional Biases

Loss Aversion  
Overconfidence Bias  
Self-control Bias  
Status Quo Bias  
Endowment Bias  
Regret-Aversion Bias

## Anomalies

- ❑ Momentum
- ❑ Bubbles and Crashes
- ❑ Value and Growth



## Anomalies

- Market **anomalies** are *apparent deviations* from the *efficient market hypothesis*, identified by persistent *abnormal returns* that differ from zero and are predictable in direction.
- **Favor of anomalies: momentum, bubbles and crashes, value and growth.**
- **Object to anomalies** (not every deviation is anomalous):
  - **Asset pricing model**
    - ✓ Defining *abnormal & normal returns* depends on a model used. An anomaly is an illusion, if a reasonable change in model causes an anomaly to disappear due to factors compensations for excess risk.
  - **Statistical issues**
    - ✓ E.g., Small samples involved; selection or survivorship; data mining ; choices of benchmarks.
  - **Temporary disequilibria behavior**
    - ✓ Unusual features may survive for a period of years but ultimately disappear.

## Anomalies: Momentum

- Future price behaviors that are **correlated with the recent past** would be classified as a **momentum (trending) effect**.
  - **Availability bias** (*recency effect*) is the tendency to recall recent events more vividly and give them undue weight.
  - **Regret** is the feeling that an opportunity has been missed, and is typically an expression of *hindsight bias*, which reflects the human tendency to *see past events as having been predictable*. Faced with regret from not owning a mutual fund or stock when it performed well in the previous year, investors may be driven emotionally to remedy this regret.

## Anomalies: Bubbles and Crashes

- **Bubbles and crashes** are periods of *unusual positive or negative returns caused by panic buying and selling* with excess trading, not based on economic fundamentals.
  - Investment managers incentivized on, or accountable for, short-term performance *in past technology and real estate bubbles* may even rationalize their participation in the bubble in terms of *commercial or career risk*.
- **Symptoms during bubbles:**
  - Overconfidence (self-attribution bias);
  - Underestimation of risks;
  - Failure to diversify;
  - Confirmation bias: rejection of contradictory information;
  - Regret aversion & hindsight bias;
  - Overtrading.

## Anomalies: Value and Growth

- **Classification of stocks :**
  - **Value stocks** are typically characterized by low price-to-earnings ratios, high book-to-market equity, and low price-to-dividend ratios.
  - **Growth stocks** are generally the *opposite* characteristics.
- **Favor of value stock anomalies** (outperformance of value stocks relative to growth stocks for long terms):
  - The **halo effect** (*representativeness*) extends a favorable evaluation of some characteristics to other characteristics.
    - ✓ A firm, with a *good record of growth* and *share price performance*, is seen as a *good investment* with continued high expected returns.
  - The **home bias** (*emotional attraction*) means that portfolios exhibit a strong bias in favor of *domestic securities* in the context of global portfolios, e.g., favoring companies headquartered nearer the investor.
- **Object to value stock anomalies:**
  - Value stock anomaly disappears in Fama & French three-factor asset pricing model. Factors (size & BV/MV) represent compensation for *risk exposures* rather than mispricing.

## Summary

### The Behavioral Biases of Individuals

Anomalies

Momentum

Bubbles and Crashes

Value and Growth

## Summary

### Module: The Behavioral Biases of Individuals

Basics of Behavioral Finance

Cognitive Errors

Emotional Biases

Anomalies

## Example

### Example

- Tiffany Jordan is a hedge fund manager with a history of outstanding performance. For the past 10 years, Jordan's fund has used an equity market-neutral strategy (a long-short strategy that strives to eliminate market risk—i.e., beta should be zero), which has proved effective as a result of Jordan's hard work. An equity market-neutral strategy normally generates large daily trading volume and shifts in individual security positions. Jordan's reputation has grown over the years as her fund has consistently beaten its benchmark. Employee turnover on her team has been high; Jordan tends to be quick to blame and rarely gives credit to team members for success. During the past 12 months, her fund has been significantly underperforming its benchmark. One of Jordan's junior analysts, Jeremy Tang, is concerned about the underperformance and notes the following:
  - Observation 1: Certain positions are significantly underwater, have very high risk profiles, and have been held for much longer than normal.
  - Observation 2: The fund's trading volume has decreased by more than 40% during the past year.
  - Observation 3: The portfolio is more concentrated in a few sectors than in the past.

## Example

### Example

- Worried that the portfolio may be in violation of the fund's investment policy statement (IPS), Tang brings this concern to Jordan's attention during a regular weekly team meeting. Jordan dismisses Tang's analysis and tells the team not to worry because she knows what she is doing. Jordan indicates that because she believes the pricing misalignment will correct itself, the portfolio would be unable to take advantage of the reversion to the mean if she were to sell certain losing positions. She reassures the team that this strategy has performed well in the past and that the markets will revert, bringing the fund's returns back to normal levels.
- Tang tactfully suggests that the team review the fund's IPS together, and Jordan interrupts him and reminds the team that she has memorized the IPS by heart. Tang contemplates his next step. He is concerned that Jordan is displaying behavioral biases that are affecting the fund's performance.

## Example

### Example

1. By taking credit for successes but assigning blame for failures, Jordan is most likely demonstrating:
  - A. loss-aversion bias.
  - B. self-attribution bias.
  - C. illusion of control bias.
- **Solution: B.**
  - In self-attribution bias, people take credit for successes and assign responsibilities for failure. Jordan claims successful decisions for herself while attributing poor decisions to the team. Her self-esteem affects how she looks at success and failure. Self-attribution and illusion of knowledge biases contribute to overconfidence bias, which Jordan clearly demonstrates later when she tells the team that she knows what she is doing.

## Example

### Example

2. Which of Tang's observations is least likely to be the consequence of Jordan demonstrating loss-aversion bias?
- A. Observation 1
  - B. Observation 2
  - C. Observation 3

● **Solution: C.**

- Loss aversion by itself may cause a sector concentration; however, a market-neutral strategy tends to focus on individual stocks without regard to sector. The sector exposure would be mitigated with the balancing of the individual long and short positions.

## Example

### Example

3. Which of Jordan's actions least supports that she may be affected by the illusion of control bias?
- A. Her dismissal of Tang's analysis
  - B. Her routine of holding weekly team meetings
  - C. Her comment on market turnaround and current holdings

● **Solution: B.**

- Holding weekly team meetings, which indicates a willingness to listen to feedback from others, is not representative of the illusion of control bias.
- In the illusion of control bias, people believe they can control outcomes to a greater extent than is possible. Individuals exhibiting this bias display great certainty in their predictions of outcomes of chance events and ignore others' viewpoints.
- Jordan is sure that the market will turn around even though it is out of her control. She chooses not to listen to Tang, who is questioning her viewpoint.

## Example

### Example

4. How does Jordan most likely demonstrate loss-aversion bias?
- A. Telling the team not to worry
  - B. Reducing the portfolio turnover this year
  - C. Deciding to hold the losing positions until they turn around

● **Solution: C.**

- Jordan's behavior is a classic example of loss aversion: When a loss occurs, she holds on to these positions longer than warranted. By doing so, Jordan has accepted more risk in the portfolio. In loss-aversion bias, people exhibit a strong preference to avoid losses versus achieving gains.
- One of the consequences of loss aversion bias is that the financial management professional (in this case, Jordan) may hold losing investments in the hope that they will return to breakeven or better.

## Example

### Example

5. Which of the following emotional biases has Jordan most likely exhibited?

- A. Endowment
- B. Regret aversion
- C. Overconfidence

● **Solution: C.**

- Jordan exhibits overconfidence in several ways. She ignores the analysis done by Tang. This may be because Jordan believes she is smarter and more informed than her team members, which is typical of an individual with an illusion of knowledge bias.
- The certainty she demonstrates that the market will revert is evidence of overconfidence. Her overconfidence is intensified by her self-attribution bias, which is demonstrated through her dealings with her team when she blames them for losses while taking credit for gains.
- Finally, her portfolio's underperformance against the benchmark is a consequence of overconfidence bias.

## Example

### Example

6. Which of the following biases did Jordan not demonstrate?

- A. Self-attribution
- B. Representativeness
- C. Illusion of knowledge

● **Solution: B.**

- Nowhere in the scenario did it mention that Jordan classified certain information into a personalized category. Representativeness bias is a cognitive bias in which people tend to classify new information based on past experiences and classifications. Jordan is not relating her certainty about the future or her decision to hold losing positions back to anything she has done or experienced in the past.

## Example

### Example

7. Which of Tang's findings is not a typical consequence of self-control bias?

- A. Failure to explore other portfolio opportunities.
- B. Asset allocation imbalance problems in the portfolio.
- C. A higher risk profile in the portfolio resulting from pursuit of higher returns.

● **Solution: A.**

- Failing to explore other opportunities is a demonstration of status quo bias, not self-control. Self-control bias occurs when individuals deviate from their long-term goals—in this case, the IPS—because of a lack of self-discipline.
- Jordan is not adhering to the strategy that has succeeded in the past. The consequences of self-control bias include accepting too much risk in the portfolio (C) and asset allocation imbalance problems (B) as Jordan attempts to generate higher returns.

# Module

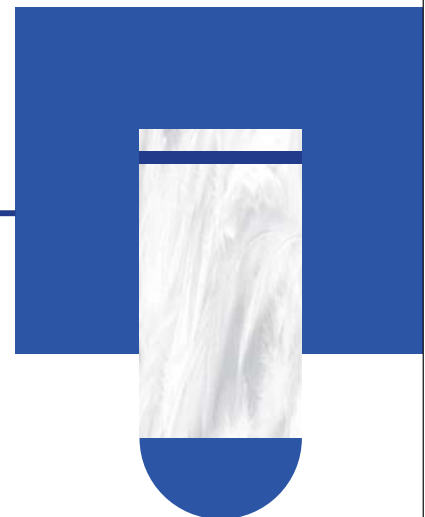


## Introduction to Risk Management

1. Define Risk Management
2. Types of Risks, Measure and Modify Risks

### Define Risk Management

- ❑ Risk Management: An Introduction
- ❑ Risk Management Framework
- ❑ Risk Governance
- ❑ Risk Tolerance
- ❑ Risk Budgeting



### — 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 Framework

### ● Risk management framework

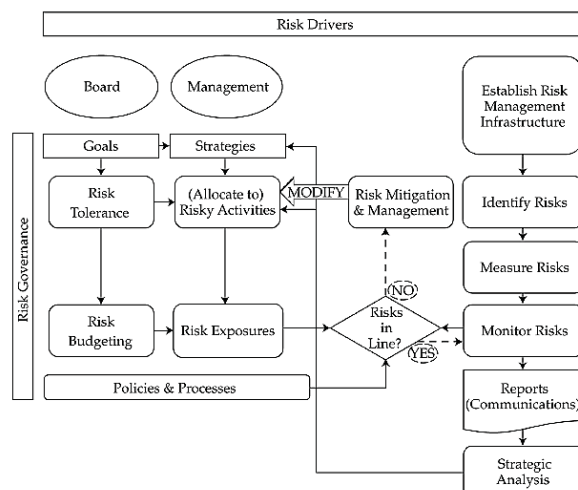
- Risk governance.
- Risk identification and measurement.
- Risk infrastructure.
- Defined policies and processes.
- Risk monitoring, mitigation, and management.
- Communications.
- Strategic analysis or integration.

## Risk Management Framework

- **Risk governance** is the top-level foundation for risk management, including risk oversight and setting risk tolerance for the organization.
- **Risk identification and measurement** is the quantitative and qualitative assessment of all potential sources of risk and the organization's risk exposures.
- **Risk infrastructure** comprises the resources and systems required to track and assess the organization's risk profile.
- **Risk policies and processes** are management's complement to risk governance at the operating level.
- **Risk mitigation and management** is the active monitoring and adjusting of risk exposures, integrating all the other factors of the risk management framework.
- **Communication** includes risk reporting and active feedback loops so that the risk process improves decision making.
- **Strategic risk analysis** and integration involves using these risk tools to rigorously sort out the factors that are and are not adding value as well as incorporating this analysis into the management decision process, with the intent of improving outcomes.

## Risk Management Framework

Exhibit 1. The Risk Management Framework in an Enterprise Context



### Risk Management Framework

- Which element of risk management makes up the quantitative part of the process?
  - A. Communication.
  - B. Risk governance.
  - C. Risk identification and measurement.
- **Solution: C.**

### Risk Governance

- **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 Tolerance

- **Risk tolerance**
  - *At the governance level*, the duty is 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.
    - ✓ 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 Budgeting

- **Risk budgeting** is any means of allocating investments or assets by their risk characteristics.
- A risk budget can be complex and multi-dimensional or it can be a simple, one-dimensional risk measure.
  - **Single dimension:** standard deviation, beta, VaR, and scenario loss
  - **Multiple dimensions**
    - ✓ **Identify risk classes:** equity, fixed income, commodity risk;
    - ✓ **Analysis risk factor:** exposure to various factors is used to attempt to capture associated risk premiums.
- **Benefits:** It forces risk trade-offs and supports a culture in which risk is considered as a part of all key decisions.
  - The budgeting of risk should result in an approach of choosing to invest where *the return per unit of risk is the highest*.
  - It should also result in *a market-benchmarked choice of risk intensity*, between possibly doing less of each risky investment or doing more, but with a risk-mitigating hedge.

### Example

#### Example

- Which of the following is not a goal of risk management?
  - A. Measuring risk exposures.
  - B. Minimizing exposure to risk.
  - C. Defining the level of risk appetite.
- **Solution: B.**
  - The definition of risk management includes both defining the level of risk desired and measuring the level of risk taken. Risk management means taking risks actively and in the best, most value-added way possible and is not about minimizing risks.

### Example

#### Example

- Which element of a risk management framework sets the overall context for risk management in an organization?
  - A. Governance
  - B. Risk infrastructure
  - C. Policies and processes
- **Solution: A.**
  - Governance is the element of the risk management framework that is the top-level foundation for risk management. Although policies, procedures, and infrastructure are necessary to implement a risk management framework, it is governance that provides the overall context for an organization's risk management.

## Example

### Example

- Which element of risk management makes up the analytical component of the process?
  - A. Communication
  - B. Risk governance
  - C. Risk identification and measurement
- **Solution: C.**
  - Risk identification and measurement is the quantitative part of the process. It involves identifying the risks and summarizing their potential quantitative impact. Communication and risk governance are largely qualitative.

## Example

### Example

- Which element of risk management involves action when risk exposures are found to be out of line with risk tolerance?
  - A. Risk governance
  - B. Risk identification and measurement
  - C. Risk monitoring, mitigation, and management
- **Solution: C.**
  - Risk monitoring, mitigation, and management require recognizing and taking action when these (risk exposure and risk tolerance) are not in line, as shown in the middle of Exhibit 1. Risk governance involves setting the risk tolerance. Risk identification and measurement involves identifying and measuring the risk exposures.

## Summary

### Introduction to Risk Management

#### Define Risk Management

Risk Management: An Introduction

Risk Management Framework

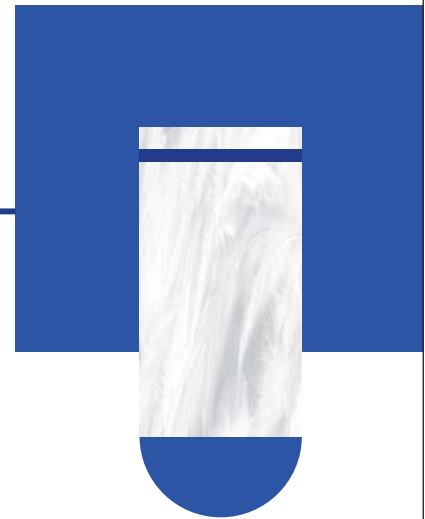
Risk Governance

Risk Tolerance

Risk Budgeting

# Types of Risks, Measure and Modify Risks

- ❑ Financial Risks
- ❑ Non-Financial Risks
- ❑ Risk Metrics
- ❑ Stress Testing and Scenario Analysis
- ❑ Methods of Risk Modification



## Financial Risks

- **Financial risks** refer to the risks that arise from events occurring in the financial markets. Examples are
  - **Market risk**
    - ✓ Arises from movements in stock prices, interest rates, exchange rates, and commodity prices.
  - **Credit risk**
    - ✓ The risk that a counterparty will not pay an amount owed.
  - **Liquidity risk**
    - ✓ The risk that, as a result of degradation in market conditions or the lack of market participants, one will be unable to sell an asset without lowering the price to less than the fundamental value.
    - ✓ Liquidity risk could also be called transaction cost risk and is most associated with *a widening bid-ask spread*.

## Non-Financial Risks

- **Non-financial risks** consist of a variety of risks, including *settlement risk, operational risk, legal risk, regulatory risk, accounting risk, tax risk, model risk, tail risk, and sovereign or political risk*.
  - **Operational risk** is the risk that *human error, faulty organizational processes, inadequate security, or business interruptions will result in losses*. An example of an operational risk is **cyber risk**, which refers to disruptions of an organization's information technology.
  - **Solvency risk** is the risk that an entity does not survive or succeed because it runs out of cash to meet its financial obligations.
- **Interaction between risks**
  - Risks are not necessarily independent because many risks arise as a result of other risks; risk interactions can be extremely non-linear and harmful.

### Interaction between Risks

- Which of the following best describes an example of interactions among risks?
  - A. A stock in Russia declines at the same time as a stock in Japan declines.
  - B. Political events cause a decline in economic conditions and an increase in credit spreads.
  - C. A market decline makes a derivative counterparty less creditworthy while causing it to owe more money on that derivative contract.
- **Solution: C.**

### Risk Metrics

- **Risk metrics**
  - Standard deviation or volatility;
  - Asset-specific measures, such as beta or duration;
  - Derivative measures, such as delta, gamma, vega, and rho;
  - Tail measures such as VaR, CVaR and expected loss given default.
    - ✓ **Value at risk (VaR)** is a measure of the size of the tail of the distribution of profits on a portfolio or for an entity, which
      - Three elements: *an amount stated in units of currency, a time period, and a probability.*
      - e.g. A VaR of \$100 at 1% for one day means it is expected to lose a *minimum* of \$100 in one day 1% of the time.
    - ✓ **Conditional VaR (CVaR)** is the *weighted average* of all loss outcomes in the statistical distribution that exceed the VaR loss.

### Stress Testing and Scenario Analysis

- **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.

## Methods of Risk Modification

- **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 weighted against the costs.

### Example

#### Example

- The best definition of value at risk is:
  - A. the expected loss if a counterparty defaults.
  - B. the maximum loss an organization would expect to incur over a holding period.
  - C. the minimum loss expected over a holding period a certain percentage of the time.
- **Correct Answer: C.**
  - VaR measures a minimum loss expected over a holding period a certain percentage of the time. It is not an expected loss nor does it reflect the maximum possible loss, which is the entire equity of the organization.

### Example

#### Example

- **Types of Risk Objectives**
  - A Japanese institutional investor has a portfolio valued at ¥10 billion. The investor expresses her first risk objective as a desire not to lose more than ¥1 billion in the coming 12-month period. She specifies a second risk objective of achieving returns within 4% of the return to the TOPIX stock market index, which is her benchmark. Based on this information, address the following:
    1. **A** Characterize the first risk objective as absolute or relative.
      - B** Give an example of how the risk objective could be restated in a practical manner.
    2. **A** Characterize the second risk objective as absolute or relative.
      - B** Identify a measure for quantifying the risk objective.

● **Solutions:**

1. **A** This is an absolute risk objective.

**B** This risk objective could be restated in a practical manner by specifying that the 12-month 95% value at risk of the portfolio must be no more than ¥1 billion.

2. **A** This is a relative risk objective.

**B** This risk objective could be quantified using the tracking risk as a measure. For example, assuming returns follow a normal distribution, an expected tracking risk of 2% would imply a return within 4% of the index return approximately 95% of the time. Remember that tracking risk is stated as a one standard deviation measure.

## Summary

### Introduction to Risk Management

Types of Risks, Measure and Modify Risks

Financial Risks

Non-Financial Risks

Risk Metrics

Stress Testing and Scenario Analysis

Methods of Risk Modification

## Summary

### Module: Introduction to Risk Management

Define Risk Management

Types of Risks, Measure and Modify Risks



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    - ✓ 您对问题的详细描述和您的见解
- **非常感谢您对金程教育的支持，您的每一次反馈都是我们成长的动力。**



心有猛虎，细嗅蔷薇

In me the tiger sniffs the rose