2024 年 CFA 一级

——Portfolio Management 学习笔记

目录

Module 1 Portfolio Risk and Return: Part I(☆☆☆)

- 通常用 mean 作为收益，用标准差（方差）作为风险的衡量

1. 基本概念【关于 return 和 risk 的具体衡量在《数量》科目有更详细的涉及】

(1) Return

1) Holding Period Return 持有期收益率

- Single period returns 单期收益率，一般只有一种计算方法，即 HPR
- A holding period return is the return earned from **holding an asset for a single specified period of time**. The period may be 1 day, 1 week, 1 month, 5 years, or any specified period.

$$\text{HPR} = \frac{\text{End Value} - \text{Beginning Value}}{\text{Beginning Value}} = \frac{P_1 - P_0 + D_1}{P_0}$$

2) Arithmetic or Mean Return 算术平均收益率

- multiple holding periods 多期收益率的一种计算方法

$$\overline{R}_i = \frac{R_1 + R_2 + \ldots + R_{N-1} + R_N}{N}$$

3) Geometric Mean Return 几何平均收益率

- multiple holding periods 多期收益率的一种计算方法

$$\overline{R}_i = \sqrt[n]{(1+R_1)(1+R_2)\ldots(1+R_n)} - 1$$

- 考虑复利的影响

4) Money-weighted rates of return 货币加权收益率

- The internal rate of return is the discount rate at which the sum of present values of these cash flows will equal zero.
- 【关于 MWR 的计算，在《公司发行人》会详细学习，是考试的重点。其实 MWR 就是《公司发行人》里的 IRR】

$$CF_0 + \frac{CF_1}{1+\text{MWR}} + \ldots + \frac{CF_N}{(1+\text{MWR})^N} = 0$$

5) Time-weighted rates of return 时间加权收益率

- The **time-weighted rate of return** measures the compound rate of growth of $1 initially invested in the portfolio over a stated measurement period.

$$(1+\text{TWR})^N = (1+\text{HPR}_1)(1+\text{HPR}_2)(1+\text{HPR}_3)\ldots(1+\text{HPR}_n)$$

$$\rightarrow \text{TWR} = [(1+\text{HPR}_1)\times(1+\text{HPR}_2)\times\ldots\times(1+\text{HPR}_n)]^{\frac{1}{N}} - 1$$

(2) Risk

- Variance 方差

$$\text{总体方差}\sigma^2 = \frac{\sum_{i=1}^{N}(x_i-\mu)^2}{N}$$

$$\text{样本方差}s^2 = \frac{\sum_{i=1}^{N}(x_i-\bar{x})^2}{n\text{-}1}$$

- Standard deviation 标准差

$$\text{总体标准差}\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i-\mu)^2}{N}}$$

$$\text{样本标准差}s = \sqrt{\frac{\sum_{i=1}^{N}(x_i-\bar{x})^2}{n\text{-}1}}$$

- 在这个科目中，更多使用的是样本相关数据。

(3) Risk Aversion and Portfolio Selection

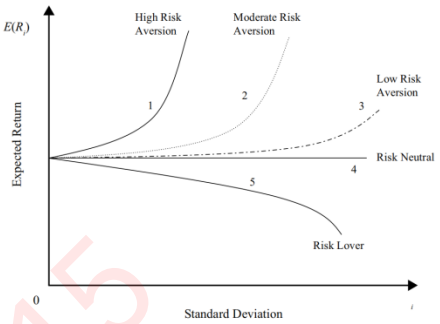
- Risk Averse（风险厌恶）【不愿意承担高风险】
  - Investors want to minimize risk for the same amount of return.
  - Investors want to maximize return for the same amount of risk.
  - 通常假设投资者是风险厌恶的
- Risk Neutral（风险中性）【对于风险无所谓】
  - Investors are indifferent about the gamble or the guaranteed outcome.
  - Investors care only about return and not about risk (prefer higher return).
- Risk Seeking （风险追逐）【更愿意承担高风险】
  - Investors get extra"utility"from the uncertainty associated with the gamble.
  - Investors love higher risk given certain expected return.

- **Risk Tolerance 风险容忍**
  - ✓ **Risk tolerance** refers to the amount of risk an investor can tolerate to achieve an investment goal. The higher the risk tolerance, the greater is the willingness to take risk. 【对于风险能够容忍的程度】
  - ✓ Risk tolerance is negatively related to risk aversion.【风险容忍度越高，则风险厌恶程度越低】

(4) Utility Function 效用函数

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

- U is the utility of an investment, E(r) is the expected return, and σ2 is the variance of the investment.
- A 表示风险厌恶程度；A 越大，表示越厌恶风险

	Characteristic		Indifference Curve 无差异曲线
Risk-averse	不愿意承担高风险	A>0	The more risk-averse the investor, the steeper the curve. 
Risk-neutral	对于风险无所谓	A=0	
Risk-seeking	更愿意承担高风险	A<0	

2. Modern Portfolio Theory 现代组合理论

1) Portfolio of Two Risky Assets 两资产组合

- 组合由资产 1 和资产 2 组成
- Portfolio Return

$$R_p = w_1R_1 + (1-w_1)R_2$$

- Portfolio Risk

$$\begin{aligned}\sigma_P^2 &= \mathrm{Var}(R_P) = \mathrm{Var}(w_1R_1 + w_2R_2)\\ &= w_1^2\mathrm{Var}(R_1) + w_2^2\mathrm{Var}(R_2) + 2w_1w_2\mathrm{Cov}(R_1,R_2)\\ &= w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\mathrm{Cov}(R_1,R_2)\end{aligned}$$

$$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2\rho_{1,2}}$$

$$\mathrm{cov} = \sigma_1\sigma_2\rho_{1,2}$$

- Covariance and Correlation 协方差和相关系数
  - ✧ Covariance: 衡量两个资产收益变化的同向性。

$$\mathrm{Cov}(x,y) = \frac{\sum_{i=1}^{N}(X_i - \overline{X})(Y_i - \overline{Y})}{N}$$

$$\mathrm{Cov}(x,y) \in (-\infty,+\infty)$$

  - ✧ Correlation(ρ): 衡量两个资产收益变化的线性关系

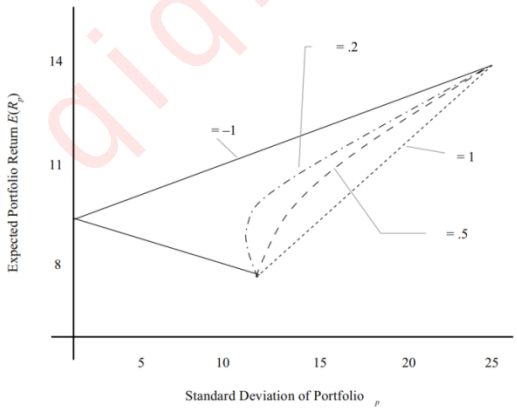
$$\rho_{x,y} = \frac{Cov(x,y)}{\sigma_x \sigma_y}$$

$$\rho_{x,y} \in [-1,+1]$$

ρ =1 perfectly correlated	完美正相关 无分散化效果	$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2}$ $= \sqrt{(w_1\sigma_1 + w_2\sigma_2)^2} = w_1\sigma_1 + w_2\sigma_2$
ρ =0	不线性相关	$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2}$
ρ = -1 perfectly correlated	完美负相关 分散化效果最好	$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 - 2w_1w_2\sigma_1\sigma_2}$ $= \sqrt{(w_1\sigma_1 - w_2\sigma_2)^2} = \lvert w_1\sigma_1 - w_2\sigma_2 \rvert$
只要两资产的相关系数 ρ 不等于 1（即 ρ＜1），组合就有 Diversification benefits 分散化好处。且 ρ 越小分散化好处越大。		

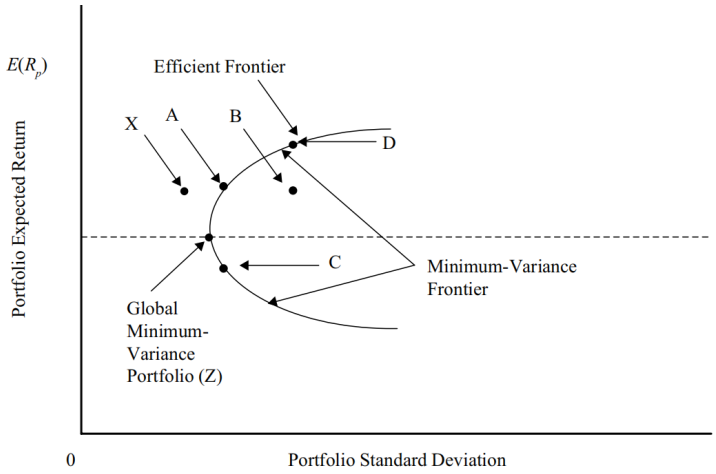
- ✧ Diversification benefits: reduce risk without affecting or compromising return.

- Relationship between Portfolio Risk and Return（两资产构成的组合）
  - ✓ The lower the correlation, the greater the diversification benefits. →组合的标准差越小



2) Efficient Frontier 有效前沿

- 也叫马科维茨有效前沿。
- 考虑多个资产可得组合的风险和收益之间的关系
- 【有效前沿里谈到的资产都是风险资产】

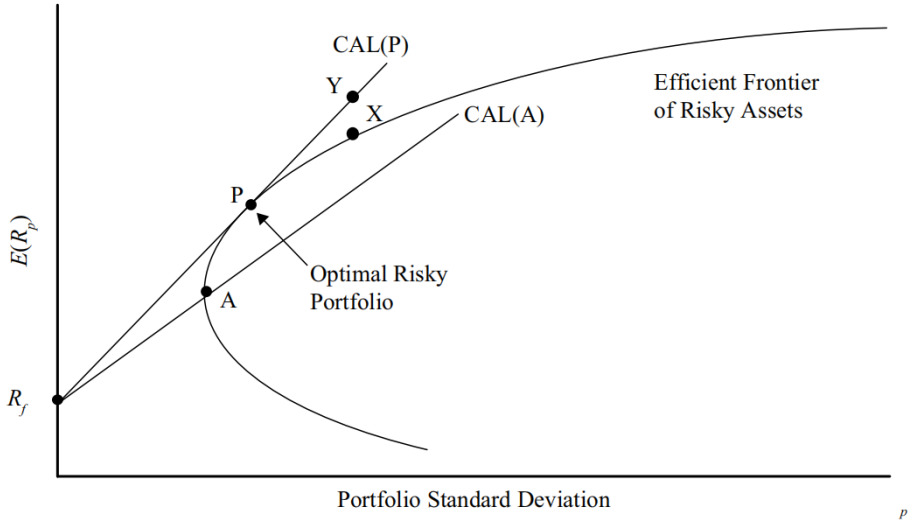


- Minimum-variance frontier of risky assets 风险资产的最小方差前沿
  - ✧ Portfolio that have the lowest risk of all portfolios given a certain level of return.但并不意味着这个曲线上的每一个投资组合都应当投资。
- Global minimum-variance portfolio 全球最小方差组合
  - ✧ The investment portfolio that has the lowest variance.
  - ✧ 以全球最小方差组合为界，其以上部分是有效前沿 Efficient frontier of risky assets。
- **Efficient frontier of risky assets (EF) (well-diversified) 风险资产的有效前沿**
  - ✧ Effective portfolio provides the lowest risk at a certain level of return and offers the highest return given certain level of risk.
  - ✧ **All risky assets are contained.**

- A 点和 D 点，都是有效前沿上的组合
- B 点，是不有效 inefficient 的组合，不会进行投资
- C 点，不在有效前沿上，不会进行投资【比较 A 和 C，在风险一定的情况下，A 的收益比 C 高，所以 C 点不会投资】
- X 点，是不可达世界 not achievable。

3) Capital Allocation Line 资本配置线

- The capital allocation line connects the optimal risky portfolio and the risk-free asset.
- All optimal investor portfolios must be on this line.
- 【理解：相当于在原来有效前沿的组合中，加入无风险资产，两者描点连线，形成 CAL 线】
- **Risk-free asset 无风险资产，其标准差为零.**这点作为隐含条件，必须要知道



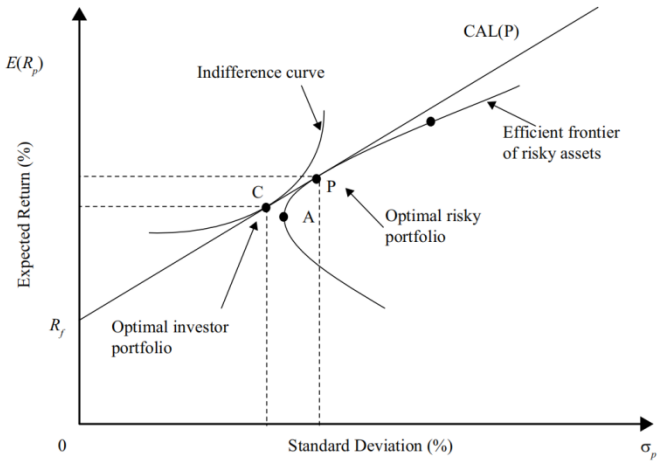
$$CAL:\ E(R_p) = R_f + \frac{(R_i - R_f)}{\sigma_i}\sigma_p$$

- ✧ **Intercept Coefficient 截距: Rf**
- ✧ **Slope Coefficient 斜率: Sharpe ratio**
- ✧ 注意横坐标和纵坐标。

- **Sharpe ratio（夏普比率）: A measure of excess return per unit of risk (The higher the better)**

$$夏普比率 = \frac{(R_i - R_f)}{\sigma_i}$$

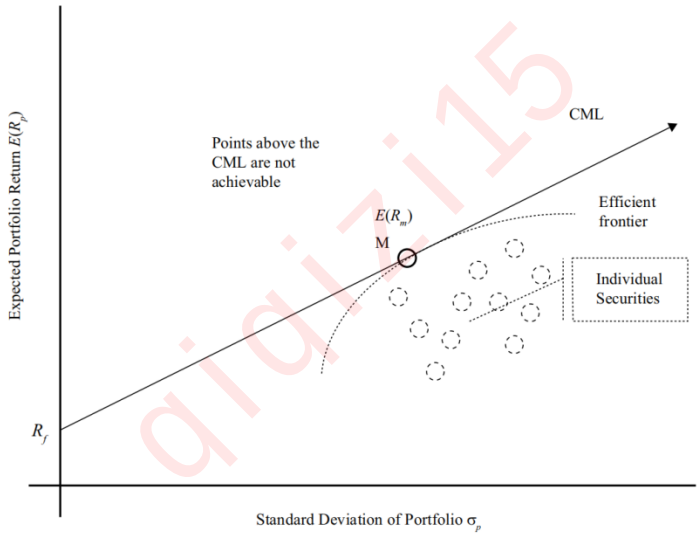
- Investor should choose "P" to invest as the combined portfolio.
  - ✧ P 点：Optimal risky portfolio 最优风险资产组合
  - ✧ CAL(P) is the optimal CAL, which is tangent to efficient frontier of risky assets.
- 找到了 CAL（P），再结合投资者的风险厌恶情况（无差异曲线 Indifference curve），就得到了具体到每一个投资者的最优投资组合，即 Optimal investor portfolio。



Module 2 Portfolio Risk and Return: Part II(☆☆☆)

1. Capital market line (CML) 资本市场线

- **Homogeneity of expectations 一致性预期**
  - ✓ 一致性预期指的是假设所有投资者有相同的预期，因此对价格、现金流及其他投资特征预期是相同的。
  - ✓ 【因为不同的投资者会有不同的预期，也就是无差异曲线，这样就会导致有不同的有效前沿，不同的最有风险组合。增加了研究难题，所以在这里假设，一致性预期】
  - ✓ 在一致性预期的假设下, only one optimal portfolio exists。这个最优组合就是市场组合 market portfolio。
  - ✓ **Capital market line (CML)** is **a special CAL** that includes all possible combinations of risk-free asset and market portfolio.



- CML is the tangent of the effective frontier, and the tangential point is the market portfolio.
  - ✓ CML 公式:

$$E(R_P) = R_f + \left[\frac{E(R_M) - R_f}{\sigma_M}\right]\sigma_P$$

$E(R_P)$ is expected portfolio return,

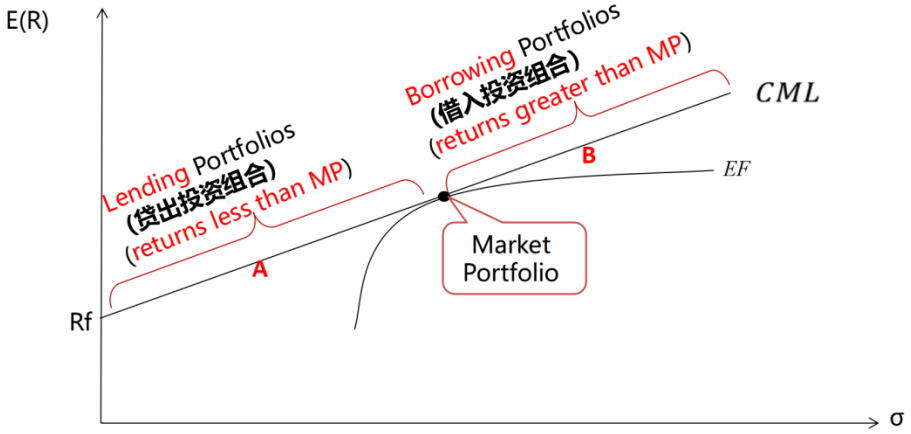
R_f is risk-free rate,

$E(R_M)$ is expected market return,

σ_M is standard deviation of market returns, and

σ_P is standard deviation of the portfolio returns

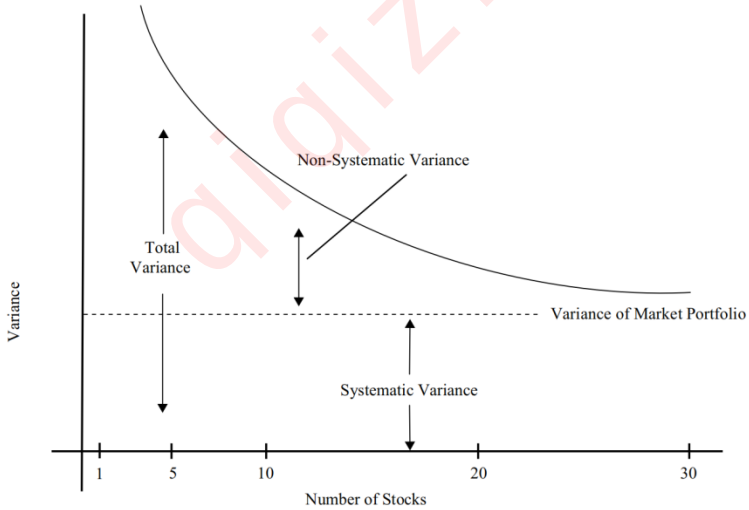
  - ✓ 解读 CML:



- ✧ A 组合：代表一部分资金投资无风险资产，一部分资金投资市场组合
- ✧ B 组合：代表一部分以无风险利率借入一部分资金，借入资金加上原有资金一起于投资市场组合

2. Systematic Risk & Non-systematic Risk

总风险(σ) = Systematic risk + Non-systematic risk



- **Nonsystematic risk 非系统性风险:**
  - ✓ 也叫 unique risk,idiosyncratic risk, diversifiable risk
  - ✓ is unique to that asset. For example, this risk can include strikes, adverse consequences of regulatory change, or litigation in which the company is accused of some wrongdoing.
  - ✓ can be eliminated. 【可以被分散掉】
- **Systematic risk 系统性风险:**
  - ✓ 也叫 non-diversifiable risk

- ✓ Caused by Macro factors: interest rates, exchange risk, policy risk
- ✓ is proxied by the asset's beta.
- ✓ cannot be eliminated.【不可以被分散掉】

- Beta (β)
  - ✓ A measure of systematic risk of an asset, representing how sensitive an asset's return is to the market as a whole.

$$\beta_i = \frac{Cov(R_i, R_m)}{\sigma_m^2} = \rho_{i,m}\frac{\sigma_i}{\sigma_m}$$

$$\beta_{mkt} = \frac{Cov(R_m, R_m)}{\sigma_m^2} = 1$$

$$\beta_{portfolio} = \sum_{i=1}^{n} w_i\beta_i$$

3. Return Generating Model 收益率生成模型

【本小节内容考的概率较小】

- 构建市场投资组合所需的工作是艰巨的。
  - ✓ 比如，一个 1000 个资产构成的组合，需要估计估计 1000 个收益率 ，1000 标准差, 499500 (1,000 × 999 ÷ 2) 个相关系数。
- A return-generating model is a model that can provide an estimate of the expected return of a security given certain parameters. 组合的构建考虑的因素有限。
- 预期收益率可能受到多个因素的影响，比如宏观因素、基本面因素、统计因素等，通过多个因素建立起的叫作多因子模型(multi-factor model),只包含一个因素的模型叫作单因子模型(single-index model)。
- Multi-factor model
  - ✓ 考虑多个因素：macroeconomic, fundamental, and statistical factors.

$$E(R_i) - R_f = \sum_{j=1}^{k}\beta_{ij}E(F_j) = \beta_{i1}\left[E(R_m) - R_f\right] + \sum_{j=2}^{k}\beta_{ij}E(F_j)$$

- The Single-Index Model
  - ✓ 最简单的收益率生成模型

$$E(R_i) - R_f = \beta_i[E(R_m) - R_f]$$

- The Market Model

$$R_i = \alpha_i + \beta_i R_m + e_i$$

4. Capital Asset Pricing Model 资本资产定价模型

1) Assumptions of CAPM
   - ✓ Access to information for all market participants, meaning that all

information is freely available and instantly absorbed;

- ✓ All market participants have **homogeneous expectations** 【相同预期】;
- ✓ All market participants make their investment decisions based on the mean and variance of returns;
- ✓ No transaction costs, taxes, or other frictions;
- ✓ Allocations can be made in an investment of any partial amount (i.e., perfect divisibility);【所有投资产品都可无限分割】
- ✓ All participants can borrow and lend at a common risk-free interest rate;
- ✓ Any individual investor's allocation decision cannot change the market prices.

2) CAPM 公式：

$$\mathbf{E(R_i) = R_f + \beta_i[E(R_m) - R_f]}$$

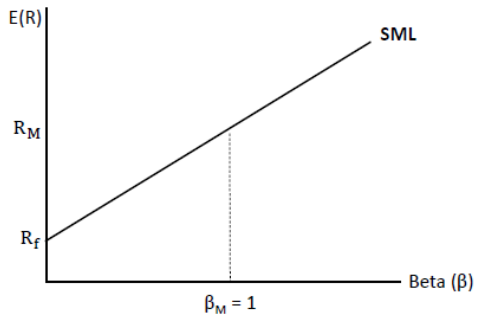
- ✓ $E(R_i)$ ：expected return on risky asset i.【纵坐标】
- ✓ **$E(R_m) - R_f$ ：market portfolio risk premium.** 【斜率】
- ✓ β_i ：systematical risk of asset i. 【横坐标】
- ✓ $\beta_i[E(R_m) - R_f]$ ：the expected return premium above the risk-free rate (as required by investors according to the CAPM)

$$\beta_i = \frac{Cov\,(R_i, R_m)}{\sigma_m^2} = \frac{\rho_{im}\sigma_i\sigma_m}{\sigma_m^2} = \rho_{im}\frac{\sigma_i}{\sigma_m}$$

- ✓ Beta 表示资产总风险中无法分散的部分，即系统性风险。
- ✓ 贝塔系数越高，系统性风险越高（因此预期回报率越高）。

3) The Security Market Line（SML）

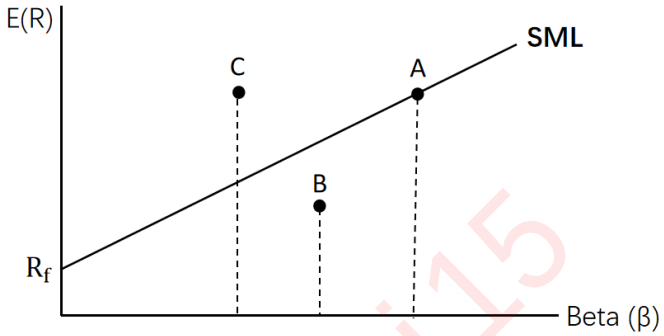
- 证券市场线
- SML：单个资产（非投资组合）的预期回报与风险之间的关系。
- 在 SML 中，风险度量是由 β 表示的系统性风险，而不是标准差。



4) 判断某个资产是否定价合理

【1.通过 CAPM 模型得出的 return 是合理收益率。做题时我们通常认为通过模型的出来的值是一个正确的、合理的。
2.比较高估和低估，比的是价格，而不是收益率 return。收益率和价格负相关】

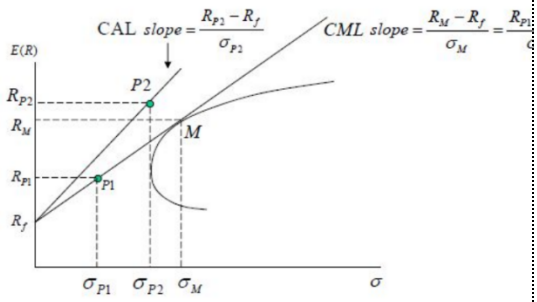
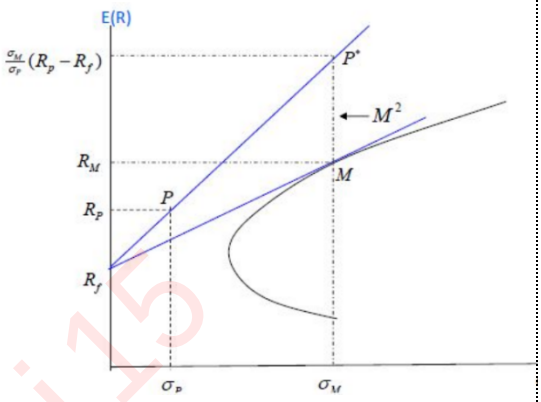
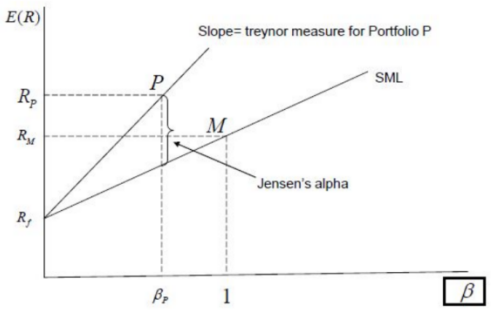
- Any asset that are properly priced plots on SML (A).
  - ✓ A 定价合理
- Any asset that are overpriced plots below SML (B).
  - ✓ B 的 return 小于通过 CAPM 计算出的，因此 B 资产的价格高估了。
- Any asset that are underpriced plots above SML (C).
  - ✓ C 的 return 大于通过 CAPM 计算出的，因此 B 资产的价格低估了。



5) Summary：CML 和 SML

	Capital Market Line 资本市场线	**Security Market Line 证券市场线**
Definition	All efficient portfolios	All properly priced assets or portfolios
Application	Used for asset allocation	Used for security selection
Formula	$E(R_P) = R_f + \left[\frac{E(R_M) - R_f}{\sigma_M}\right]\sigma_P$	$E(R_i) = R_f + \beta_i[E(R_m) - R_f]$
X-axis	Total risk (σ)	Systematic risk (β)
Slope	Market portfolio’s Sharpe ratio	Market risk premium

5. Application of CAPM

Sharpe ratio 夏普比率 也叫 **reward-to-variability ratio**	$$SR = \frac{R_p - R_f}{\sigma_p}$$	
M-Squared **M 平方** ：产生与夏普比率相同的排序	$$M^2 = [E(R_p) - R_f]\frac{\sigma_m}{\sigma_p} + R_f$$ $$= SR_p \times \sigma_m + R_f$$ $$M^2 alpha = M^2 - R_m$$	
注意：夏普比率与 M 方适用于没有充分分散化的组合 M2 越大越好，排序结果与夏普比率一致（identical）		
Treynor ratio 特雷诺比率	$$TR = \frac{R_p - R_f}{\beta_p}$$	**特雷诺比率越大越好，但不适用于贝塔为负的资产（negative-betaassets）**
Jensen's Alpha 詹森阿尔法	$$\alpha_p = R_p - \{R_f + \beta_p * [E(R_m) - R_f]$$ $$= R_p - CAPM$$	
注意：特雷诺指数和詹森阿尔法适用于充分分散化的组合		
根据衡量的风险不同分类：	**根据是否需要 benchmark 判断：**	
衡量总风险：夏普比率、M 方 衡量系统性风险：特雷诺指数、詹森阿尔法。	直接判断：詹森阿尔法和 M 方，只要>0 就好。绝对法。 比较判断：夏普比率和特雷诺指数需要再和其它的组合指数进行比较。相对法。	

Module 3 Portfolio Management: An Overview(☆☆)

An overview of portfolio management and the asset management industry, including types of investors and investment plans and products.

1. Steps in Portfolio Management Process

- The Planning Step 计划阶段
  - ✓ Understanding the client's needs
  - ✓ Preparation of an investment policy statement (IPS)
- The Execution Step 执行阶段
  - ✓ Asset allocation
  - ✓ Security analysis
  - ✓ Portfolio construction
- The Feedback Step 反馈阶段
  - ✓ Portfolio monitoring and rebalancing
  - ✓ Performance measurement and reporting

2. 投资者类型

1) Individual Investors

- 个人
- Defined contribution（DC）pension plan 缴费确定型养老金计划
  - ✓ Individuals make specified contributions to pension plan;
  - ✓ The benefits are not guaranteed;
  - ✓ the employee accepts the investment and inflation risk.【雇员个人承担风险】

2) Institutional Investor

- **Defined benefit pension plans** (DB plans) 收益确定型养老金计划
  - ✓ are company-sponsored plans that offer employees a predefined benefit on retirement.
  - ✓ The future benefit is defined【未来收益确定】
  - ✓ employers are responsible for the contributions made to a DB plan and bear the risk. 【雇主承担风险】

【Pension plans are typically categorized as either defined contribution (DC) or defined benefit (DB). 】

- Endowments and Foundations 捐赠和慈善基金
  - ✓ objective :to maintain the real (inflation-adjusted) capital value of the fund while generating income to fund the objectives of the institution.
  - ✓ 大多数基金会和捐赠基金的设立都是为了拥有永恒的生命 perpetual lives.
- Banks 银行
  - ✓ accept deposits and lend money
- Insurance Companies 保险公司
  - ✓ Life insurers 人寿保险公司
  - ✓ property and casualty (P&C) insurers 财产保险公司

Summary

Institutional Investor	Time horizon 投资期	Liquidity needs 流动性需求	Risk tolerance 风险承受
DB pension plan	long	low	high
Endowments & Foundations	long	low	high
Banks	short	high	low
Insurance companies	long for life;short for P&C	high	low

3. Asset management industry

- The portfolio management process and investor types are broad components of the asset management industry.

1) Active vs. Passive Management 主动管理 vs. 被动管理
   - Active management:
     - ✓ “业绩”打败 benchmarks, such as the S&P 500
     - ✓ smart beta strategies.
   - Passive management: replicate the returns of a market index.
2) Traditional vs. Alternative Asset Managers（传统投资 vs. 另类投资）
   - Traditional management:
     - ✓ long-only equity, fixed-income.

- ✓ asset-based management fees
- Alternative management:
  - ✓ hedge fund, private equity, venture capital strategies.
  - ✓ both management and performance fees

- Key trends in the asset management industry
  - ✓ Growth of passive investing;
  - ✓ "Big data" in the investment process;
  - ✓ Robo-advisers in the wealth management industry.

4. Pooled investment products 集合投资工具

1) **Mutual Funds 共同基金**

A. Open-end mutual funds（开放式基金）

- it will accept new investment money and issue additional shares at a value equal to the net asset value of the fund at the time of investment.
- Not fully invested as some cash kept for redemption.

B. Closed-end mutual funds（封闭式基金）

- no new investment money is accepted into the fund
- Traded at a premium or discount to net asset value.
- Could be fully invested.

Open-end mutual funds（开放式基金）	**Closed-end mutual funds（封闭式基金）**
可申购和赎回（份额可变）	成立后不可申购和赎回（份额不变）
以 NAV 在一级市场申购和赎回	交易价格通常不等于 NAV
保留一定的现金资产（赎回准备）	长期投资和全额投资

- 共同基金根据投资的资产，共同基金还可以分为：money market funds, bond mutual funds, stock mutual funds, and hybrid or balanced funds（即投资债券也投资股票）

2) Exchange-Traded Funds (ETFs)（交易所交易型指数基金）

- Exchange-traded funds (ETFs) are investment funds that **trade on exchanges (similar to individual stocks)** and are generally structured **as open-end funds**.
- ETFs are often having tax advantages over index mutual funds;

- Hedge funds are private investment vehicles that typically use leverage, derivatives, and long and short investment strategies.

- ETFs 与 mutual funds 区别
  - ✓ Transaction costs are lower compared to mutual funds【ETF 交易成本低】
  - ✓ Dividends on ETFs are paid out to the shareholders whereas mutual funds usually reinvest the dividends.
  - ✓ The minimum required investment in ETFs is usually smaller than that of mutual funds.

3) **Private equity funds** and **venture capital funds**

- are alternative funds that seek to buy, optimize, and ultimately sell portfolio companies to generate profits.

Buyout Funds (收购基金)	**Venture Capital Funds (风险投资基金)**
buys all the shares of a public company, the company becomes private.	provides financing for companies in their start-up phase
through an initial public offering (IPO) or a sale to another company	providing money; provide close oversight and advice
do not intend to hold the company for the long run because their goal is to exit the investment in three to five years	finite investment horizon; exit in three to five years
a private equity firm makes a few very large investments	make a large number of small investments with the expectation that only a small number will pay off

Module 4 Basics of Portfolio Planning and Construction(☆)

1) Investment Policy Statement IPS 投资策略书

- 记录客户投资目标和限制条件的书面文件

Major Components of an IPS

- Introduction.
  - ✓ This section describes the client. （客户详情）
- Statement of Purpose.
  - ✓ 写 IPS 目的，为之后的投资有一个书面根据。
- Statement of Duties and Responsibilities.
  - ✓ This section details the duties and responsibilities of the client, the custodian of the client's assets, and the investment managers. 【三方责任】
- Procedures 程序
  - ✓ This section explains the steps to take to keep the IPS current and the procedures to follow to respond to various contingencies. 【更新 IPS】
- Investment Objectives 主要关注客户收益要求和风险要求
  - ✓ 即 IPS 中的 RR（return、risk。风险更重要）
  - ✓ Absolute objective
    - ■ 绝对收益目标：比如客户要求 10%的收益率
    - ■ 绝对风险目标：比如客户要求本金损失不能超过 100 万
  - ✓ Relative objective
    - ■ 相对收益目标：比如客户要求投资收益是比 S&P500 指数收益率高 5%。
    - ■ 相对风险目标：是指相对于某个基准的风险目标
      - ◆ 跟踪风险(tracking risk)也叫跟踪误差(tracking error),是度量相对风险目标的手段。
      - ◆ 跟踪误差是指组合的收益率和基准收益率之差的标准差。
  - ✓ 关于客户风险承受能力的意愿（willingness）和能力（ability）
    - ■ Willingness：主观意愿。比如客户的个性、心理状态
    - ■ Ability：客观的，比如投资期限、收入水平、财务状况等。
    - ■ 当 willingness＞ability，选择以 ability 为主，以两者之间的较低者为主

- 当 willingness＜ability，可以先“教育”，若教育不行，还是选择以 willingness 为主，以两者之间的较低者为主

- Investment Constraints.
  - ✓ This section presents the factors that constrain the client in seeking to achieve the investment objectives.【投资限制】
  - ✓ 即 **IPS** 中的 **TTLLU**
    - Time horizon 时间区间
    - Tax concerns 税收
    - Liquidity 流动性
    - Legal and regulatory factors 法律和监管条款
    - unique circumstances 独特的需求和喜好（不属于其它 4 类的都放在这一类中）
- Investment Guidelines.
  - ✓ This section provides information about how policy should be executed (e.g., on the permissible use of leverage and derivatives) and on specific types of assets excluded from investment, if any. 投资策略的具体说明
- Evaluation and Review.
  - ✓ This section provides guidance on obtaining feed back on investment results. 【如何进行反馈】
- Appendices 附录: (A) Strategic Asset Allocation and (B) Re-balancing Policy.
  - ✓ **战略性的资产配置（Strategic asset allocation）**：确定大的资产类别，属于长期策略，必须与 IPS 相一致
  - ✓ **战术性的资产配置（Tactical asset allocation）**：在一个资产类别中进行具体的选择，属于短期策略，可以偶尔偏离 SAA
  - ✓ **注意**：资产类别间的相关系数<资产类别内的相关系数

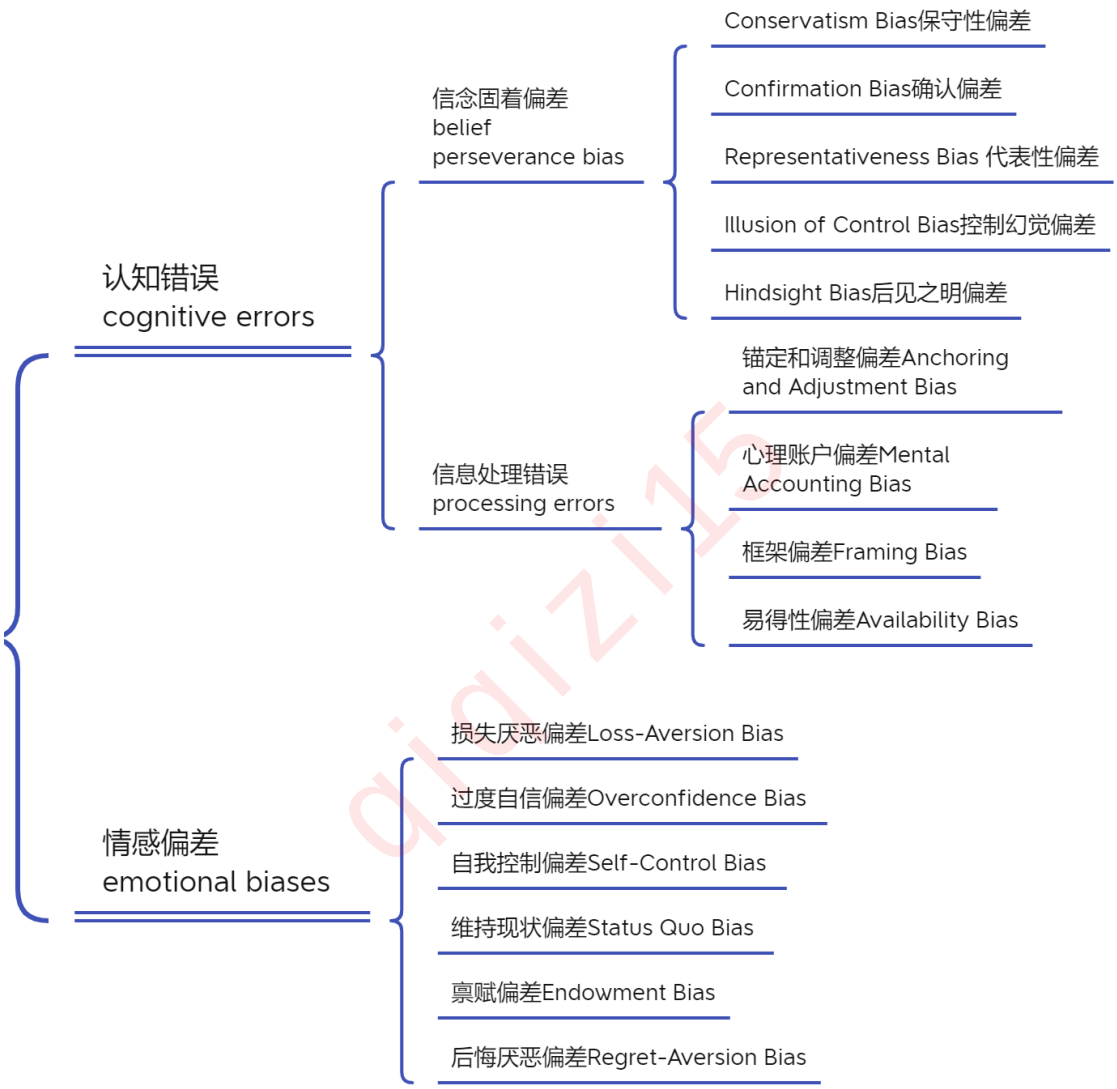
2) ESG considerations

- 在组合的构建管理中，也要关注 ESG(environmental, social, and governance)因素
- 这个内容在《公司发行人》有更详细介绍

Module 5 The Behavioral Biases of Individuals(☆☆)

经典的投资理论假设：个人是完全理性。但实际上，个人的行为会偏离这种假设，即个人行为偏差。
行为金融的相关知识的会在 CFA 三级中详细学习。本节需要重点掌握行为偏差的分类。

1. Behavioral Biases 行为偏差



有两种形式：

- 错误的认知推理，即认知错误(cognitive errors)
  - ✓ Cognitive errors can often be corrected or eliminated through better information, education, and advice.【认知错误通常可以通过更好的信息、教育和建议来纠正或消除】
- 基于感觉或情绪的偏差，即情感偏差(emotional biases)
  - ✓ Emotional biases are harder to correct because they stem from impulses and intuitions.【情感偏差很难纠正，因为它们源于冲动和直觉。】

1) Cognitive errors

- 认知错误分为两类：信念固着偏差(belief perseverance bias)和信息处理错误(processing errors)

- **信念固着偏差(belief perseverance bias)【固执己见】**
  - ✓ Belief perseverance is the tendency to cling to one's previously held beliefs by committing statistical, information-processing, or memory errors.【坚持自己以前持有的信念】

A. Conservatism Bias 保守性偏差

- Conservatism bias is a belief perseverance bias in which people maintain their prior views or forecasts by inadequately incorporating new, conflicting information. 【不充分地纳入新的、相互矛盾的信息来维持他们以前的观点或预测。】
- 后果
  - ✓ Maintain or be slow to update a view or a forecast, even when presented with new information; 【即使出现新信息，也保持或缓慢更新预测】
  - ✓ 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.【保持先前的 belief，即使有复杂数据的新信息。这种情况通常与新信息处理困难有关。】

B. Confirmation Bias 确认偏差

- Confirmation bias refers to the tendency to look for and notice what confirms prior beliefs and to ignore or undervalue whatever contradicts them.【倾向于寻找和关注能证实自己已有观点的信息，忽视与之相矛盾的信息。】

- 后果
  - ✓ Consider only the positive information about an existing investment while ignoring any negative information about the investment.【只考虑正面信息，不考虑负面信息】
  - ✓ Develop screening criteria(筛选标准) while ignoring information that either refutes the validity of the criteria or supports other criteria.【指定筛选标准】
  - ✓ Under-diversify portfolios. 【看好一家公司股票的价值，会忽视负面新闻，只看好新闻】
  - ✓ Hold a disproportionate amount of their investment assets in their employing company's stock, because they believe in their company and are convinced of its favorable prospects.

C. Representativeness Bias 代表性偏差

- Representativeness bias refers to the tendency to classify new information based on past experiences and classifications. 【根据过去的经验和分类对新信息进行分类】

- 后果
  - ✓ Adopt a view or a forecast based almost exclusively on individual, specific information or a small sample; 【完全基于个人、具体信息或小样本的观点或预测】
  - ✓ Update beliefs using simple classifications rather than deal with the mental stress of updating beliefs given the high cognitive costs of complex data.【复杂的数据，简单的处理】

D. Illusion of Control Bias 控制幻觉偏差

- people tend to believe that they can control or influence outcomes when, in fact, they cannot.【倾向于相信他们能够控制或影响事情的结果，而事实上却无法做到。】
- 后果
  - ✓ Inadequately diversify portfolios.
  - ✓ Trade more than is prudent.
  - ✓ Construct financial models and forecasts that are overly detailed. 【模型建立时考虑太细致，比如可能出现过拟合】

E. **Hindsight Bias 后见之明偏差**

- Hindsight bias refers to believing past events as having been predictable and reasonable to expect.【事后诸葛亮。上帝视角】
- 后果
  - ✓ Overestimate the degree to which they correctly predicted an investment outcome, or the predictability of an outcome generally. This bias is closely related to overconfidence bias.【与后面的 overconfidence bias 过度自信偏差有关】
  - ✓ Unfairly assess money manager or security performance. 【不公平地评估资金经理或安全绩效】

- **信息处理错误(processing errors)**
  - ✓ Processing errors refer to information being processed and used illogically or irrationally.【不合逻辑或不合理地处理和使用信息】

A. 锚定和调整偏差(Anchoring and Adjustment Bias)

- Anchoring and adjustment bias refers to relying on an initial piece of information to make subsequent estimates, judgments, and decisions.【行为人依赖于最初的信息并做出随后的决定】
- 后果
  - ✓ As a result of anchoring and adjustment bias, FMPs may stick too closely to their original estimates when learning new information. This mindset is not limited to downside adjustments; the same phenomenon occurs with upside adjustments as well.【做决策，在‘锚’的上下调整】

B. **心理账户偏差(Mental Accounting Bias)**

- Mental accounting bias refers to mentally dividing money into “accounts” that influence decisions, even though money is fungible . 【在心理上建立多个“账户”,并将钱划分在不同的心理账户中进行管理。
  比如本金不愿意承担风险，对于 gain 就可以承担更大的风险】
- 后果
  - ✓ 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 bifurcate wealth or a portfolio into investment principal and investment returns.

C. **框架偏差(Framing Bias)**

- Framing bias is an information-processing bias in which a person answers a question differently based on the way in which it is asked or framed. 【根据提问方式(框架)不同，对本质一样的问题作出不同的回答】
- 后果
  - ✓ 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. 【这种错误可能导致投资组合不理想。】
  - ✓ Focus on short-term price fluctuations, which may result in long-run considerations being ignored in the decision-making process.

D. **易得性偏差(Availability Bias)**

- Availability bias is an information-processing bias in which people estimate the probability of an outcome or the importance of a phenomenon based on how easily information is recalled.【根据回忆信息的难易程度来估计一个结果的可能性或一个现象的重要性。】
- 后果
  - ✓ 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.

2) 情感偏差 Emotional biases

- 情感偏差比认知错误更难纠正，因为它们源于冲动或直觉，而不是有意识的计算。通常只有认识到偏差并适应它才有可能。

A. 损失厌恶偏差(Loss-Aversion Bias)

- Loss-aversion bias refers to the tendency to strongly prefer avoiding losses to achieving gains. 【避免损失的强烈倾向】
- 注意：这里指的是厌恶损失，而不是厌恶风险。
- 亏$1 带来的痛苦大于赚$1 带来的快乐

- 后果
  - ✓ Hold investments in a loss position longer than justified by fundamental analysis, in the hope that they will return to breakeven. 【亏了，就一直让资产放在自己的账户里，等待资产升值】
  - ✓ Sell investments in a gain position earlier than justified by fundamental analysis, out of fear that the gains will erode.【赚钱，就卖出，落袋为安】

B. 过度自信偏差(Overconfidence Bias)

- Overconfidence bias is a bias in which people demonstrate unwarranted faith in their own abilities.【对自己能力毫无根据的有信心】
- 后果
  - ✓ Underestimate risks and overestimate expected returns.
  - ✓ Hold poorly diversified portfolios, which may result in significant downside risk.

C. 自我控制偏差(Self-Control Bias)

- Self-control bias is a bias in which people fail to act in pursuit of their long-term, overarching goals in favor of short-term satisfaction. 【由于缺乏自律，只追求短期的满足】
- 后果
  - ✓ 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.

D. 维持现状偏差(Status Quo Bias)

- Status quo bias is an emotional bias in which people choose to do nothing (i.e., maintain the "status quo") instead of making a change, even when change is warranted. 【选择什么都不做(do nothing),保持"现状",而不是做出改变，即使改变是必要的】
- 后果
  - ✓ Unknowingly maintain portfolios with risk characteristics that are inappropriate for their circumstances.
  - ✓ Fail to explore other opportunities.

E. **禀赋偏差(Endowment Bias)**

- Endowment bias is an emotional bias in which people value an asset more when they own it than when they do not. 【在拥有某项资产时，会比不拥有这项资产时高估它的价值。】
- 后果
  - ✓ 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.

F. **后悔厌恶偏差(Regret-Aversion Bias)**

- Regret-aversion bias is an emotional bias in which people tend to avoid making decisions out of fear that the decision will turn out poorly. 【由于担心自己做的决定会有糟糕的结果，从而避免做任何决定】
- 后果
  - ✓ Be too conservative in their investment choices as a result of poor outcomes on risky investments in the past. 【由于过去风险投资的结果不佳，他们的投资选择过于保守】
  - ✓ Engage in herding behavior. 【羊群行为】

2. 行为偏差对金融市场的影响

- 由于金融市场参与人自身存在的行为偏差，使得金融市场也存在很多与传统金融学理论相悖的现象。
- 市场异象(Market Anomalies)
  - ✓ Anomalies are apparent deviations from the efficient market hypothesis, identified by persistent abnormal returns that differ from zero and are predictable in direction. 【长期持续的跑赢市场，说明市场非有效】
  - ✓ 也不是所有的异象都是有效市场假说的偏离

1) 动量(Momentum)

- momentum or trending effects:future price behavior correlates with that of the recent past.
- The positive correlation typically lasts for up to two years before showing a reversal or reversion to the mean, evident in two- to five-year return periods. 【这种正相关性通常会持续两年之久，然后才会出现均值的反转或回归，在2～5 年的回报周期中非常明显。】
- Momentum can be partly explained by availability 易得性偏差, hindsight 后见之明偏差, and loss aversion 损失厌恶偏差.

2) 泡沫和崩盘(Bubbles and Crashes)

- 泡沫-崩盘-泡沫，对市场效率的概念提出了挑战，比如 1999—2000 年的科技泡沫、 2007 年左右由于次贷问题引起的全球性金融海啸。
- 可以由 confirmation bias 、self-attribution bias 和 hindsight bias 解释

3) 价值(Value)

- Value stocks 价值股 are typically characterized by low price-to-earnings ratios, high book-to-market equity, and low price-to-dividend ratios. 【低市盈率、高账面市值比、低股价股息比】
- Growth stock 成长股 characteristics are generally the opposite of value stock characteristics.【与价值型股票的特征相反】
- Fama and French (1998) found that value stocks outperformed growth stocks
- 可以由 **halo effect(光环效应)和** Overconfidence 解释。

Module 6 Introduction to Risk Management(☆)

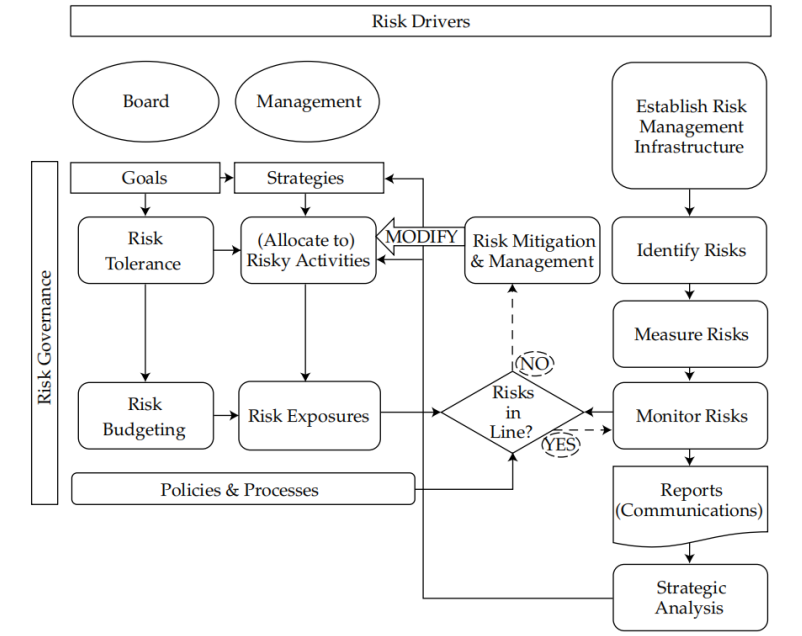
- 本节介绍了风险管理相关的内容，可重点掌握风险的分类。

1. 基本概念

- Risk（风险）
  - ✓ Exposure to **uncertainty**.
  - ✓ 损失是风险的一种状态，收益也是风险的一种状态。
- Risk exposure（风险敞口）
  - ✓ Risk exposure is the extent to which the underlying environmental or market risks result in actual risk borne by a business or investor who has assets or liabilities that are sensitive to those risks. 【简单理解为面临风险的资产价值】
- Risk management（风险管理）
  - ✓ 是一个过程
  - ✓ ① Defines the level of risk to be taken（**能够承受多少风险：Risk tolerance**);
  - ✓ ② Measures the level of risk being taken（**现在承受了多少风险：Risk exposure**);
  - ✓ ③ Adjusts the latter toward the former, with the goal of maximizing utility.
- Risk management is **not to minimize risk**, but to balance risk and return in the context of understanding risk. 【风险管理不是消除风险，而是权衡风险和收益】

2. Risk Management Framework 风险管理框架

Exhibit 1: The Risk Management Framework in an Enterprise Context



- key factors:

1) Risk governance 风险治理

- The top-down process and guidance that directs risk management activities to align with and support the overall enterprise.
- 有效风险治理，包含：
  - ✓ Enterprise risk management （全面风险管理）
    - ■ Provides an enterprise-view of risk management.
    - ■ 强调全面
  - ✓ Risk tolerance (风险容忍)
    - ■ Serve as the high-level guidance for management in its strategic selection of risks.
    - ■ Focus on what is and is not acceptable. (risk tolerance vs. risk appetite 风险偏好)
  - ✓ Risk budgeting（风险预算）
  - ✓ Risk tolerance focuses on the appetite for risk and what is and is not acceptable, risk budgeting has a more specific focus on how that risk is taken.【风险承受能力侧重于对风险的偏好以及什么是可接受的和什么是不可接受的，风险预算更具体地侧重于如何承担风险。】
  - ✓ Risk budgeting quantifies and allocates the tolerable risk by specific metrics【风险预算通过具体指标量化和分配可容忍的风险】

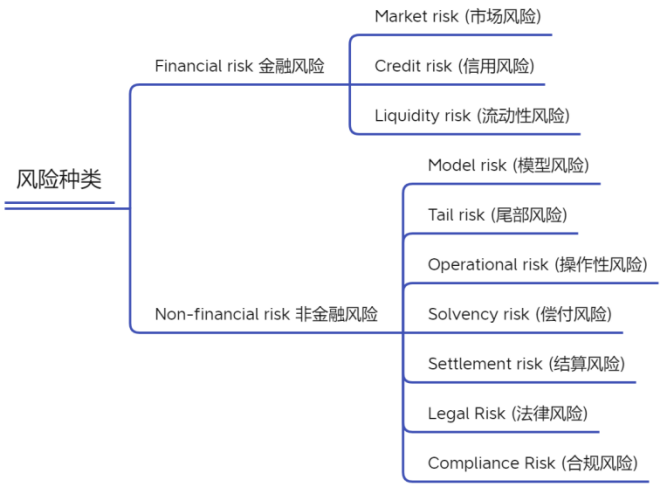
2) Risk identification and measurement 风险识别与度量
3) Risk infrastructure 风险基础设施
4) Defined policies and processes 定义政策与流程
5) Risk monitoring, mitigation, and management 风险监控、缓解与管理
6) Communications 交流沟通
7) Strategic analysis or integration 策略分析与整合

3. 风险管理过程

- 大致分为 Identification of Risks 风险识别、Measurement of Risks 风险度量和 Modification of Risks 风险修正。

1) Identification of Risks 风险识别

- 识别出具体的风险种类



- Financial risk 金融风险
  - ✓ Market risk (市场风险)——“天灾”
    - ■ Risks that arise from movements in interest rates, stock prices, exchange rates, and commodity prices.
    - ■ 由利率、股价、汇率和商品价格变动带来的不利影响。
  - ✓ Credit risk (信用风险)——“人祸”他人造成的
    - ■ Risk of loss if one party fails to pay an amount owed on an obligation (e.g., bond, loan, derivative) to another party.
    - ■ “欠钱不还”的风险
  - ✓ Liquidity risk (流动性风险)
    - ■ Risk that cannot be quickly liquidated at fair value.
    - ■ Measured by bid-ask spread(买卖价差)
- Non-financial risk 非金融风险
  - ✓ Model risk (模型风险): The risk of a valuation error from improperly using a model.【使用模型带来的风险】
  - ✓ Tail risk (尾部风险): The probability of extreme losses is higher than predicted by probability models.
  - ✓ Operational risk (操作性风险): Risk that arises from the people and processes.
  - ✓ Solvency risk (偿付风险): The entity does not survive or succeed because it runs out of cash.
  - ✓ Settlement risk (结算风险): The risk related to settling of payments that occur just before a default.
  - ✓ Legal Risk (法律风险)
  - ✓ Compliance Risk (合规风险)
- 风险之间的关系：风险类型之间并不是独立的，而是相互作用，相互转化、传染。

2) Measurement of Risks 风险度量

- 风险度量工具有很多，常见：
  - ✓ Standard deviation (σ, sharpe ratio, CV)
  - ✓ Sensitivity (Beta, Delta, Gamma, Vega, Rho, Duration)
  - ✓ Value at Risk (VaR) and Conditional VaR (CVaR) (尾部风险)

3) Modification of Risks 风险修正

- ✓ Risk prevention and avoidance 风险防范与规避
- ✓ Risk acceptance: self-insurance and diversification 风险接受
- ✓ Risk transfer 风险转嫁，例如使用保险合同
- ✓ Risk shifting 风险转移，例如使用衍生品

- 具体采用哪一种风险修正方式，要 Tradeoff between costs and benefits.