Quantitative Methods

(!)货币的时间价值

(!!)利率 interest rate, r
利率的解释

- 要求回报率 Required rate of return：是投资者接受一项投资的最低收益率
- 折现率 Discount rate：未来现金流折现到现值的利率
- 机会成本Opportunity cost：选择某一行动而放弃的其他行动的价值

利率的决定因素
利率可以分解为实际无风险利率和补偿投资者承担不同风险的溢价：

- Nominal interest rate = Nominal risk-free interest rate + Risk premium
  - Nominal risk-free interest rate = Real risk-free + Inflation rate
    - 跑赢通货膨胀的利率才是真实的无风险利率
    - Real risk-free interest rate衡量一个经济体的发展情况，当通胀高于国债(名义无风险利率)时，经济体的发展是倒退的
  - Risk premium包括违约风险溢价+流动性溢价+期限溢价
    - Default risk premium: 违约风险，借的钱还不上
    - Maturity premium: 利率变动导致资产价格变动
    - Liquidity premium: 无法快速变现的资产，为获得流动性而变动价格
  - 许多国家的短期政府债务的利率可以代表名义无风险利率

(!!)不同计算方式的利率

- (!!)单利与复利
  - 100元存银行，利率5%，存10年
  - 单利 Simple interest
    - $5 \times 10 + 100 = 150$
    - HPR(Holding Period Return) = $\frac{(P_1 - P_0) + I_1}{P_0}$
    - 用于计算独立的单期收益、短期预测
  - 复利 Compounding
    - $100 \times 1.05^{10} = 163$
    - 当前一年的收益加入下一年的投资时，这些收益将被复利

        - 这时要用几何平均来计算，乘积开根
        - 适用于长期投资分析、投资组合表现、波动性较大的数据
        - 更准确地反映投资的实际年均增长率
- 货币加权VS时间加权
    - 货币加权收益率
        - 实际投资金额的年化回报率，既考虑时间，又考虑投资金额
        - 计算：列出每个时间点的现金流，利用IRR公式计算使所有现金流现值之和等于0的折现率
        - 例题：CF0=-85, CF1=2, CF2=2.25, CF3=102.75, IRR->CPT
        - 在现金流较大时波动更大，受到大额现金流影响
    - 时间加权收益率
        - 不受现金流影响，衡量初始投资在整个测量期间的复合增长率
        - 计算：每次现金流变化时对投资组合进行估值，计算每个子期的持有期收益率，几何平均计算复利
        - 消除了现金流的影响，更稳定，反映投资组合本身的增长能力
- (!!)报价利率与有效年利率
    - 有效年利率 Effective Annual Rate
        - EAR = $(1+\frac{r}{m})^m-1$
            - r是银行给的利率，m是计息次数（一年给多少次利息）
            - 一年计息两次：m=2
            - 一年计息四次：m=4
            - 连续复利 Continuous compounding: EAR = e^r-1
    - 持有期回报率 Holding Period Return
        - 计算持有的回报率，例如两星期，没必要复利，与时间无关
        - $HPR=\frac{P_1-P_0+CF1}{P_0}$或者$HPR=\frac{FV-PV}{PV}$
            - CF1有可能是dividend或者coupon
    - 年化收益率

- 证券A：过去100天收益率为6.2%。
  $R_{\text{annual}} = (1 + 0.062)^{\frac{365}{100}} - 1 \approx 24.07\%$
- 证券B：过去4周收益率为2%。
  $R_{\text{annual}} = (1 + 0.02)^{52/4} - 1 \approx 28.52\%$
- 证券C：过去3个月收益率为5%。
  $R_{\text{annual}} = (1 + 0.05)^{12/3} - 1 \approx 21.55\%$

- 连续复利收益率Continuous Compounding
  - 如果一周持有期收益率为4%：
    $r_{1\text{周}} = \ln(1.04) = 0.039221$
  - 如果一资产从t=0时的30美元涨到t=1时的34.50美元：
    $r_{0,1} = \ln\left(\frac{34.50}{30}\right) = \ln(1.15) = 0.139762$
    因此，连续复利收益率为13.98%。

- 其他收益
  - 总收益率和净收益率
  - 总收益率 Gross Return：扣除交易费用和佣金之后的收益率，不包括管理费、托管费和税费
  - 净收益率 Net Return：扣除所有管理和行政费用后的收益率，即投资者实际获得的收益
  - 净收益率 = 总收益率 - 管理和其它费用
  - 税前和税后名义收益率
  - 税前名义收益率 Pre-tax nominal return：未考虑税收影响的收益率
  - 税后名义收益率 After-tax nominal return：扣除税收后的收益率
  - 税后名义收益率 = 税前名义收益率 $\times$ (1 - 税率)
  - 实际收益率
  - 实际收益率 Real Return：考虑通货膨胀后的收益率，消除通膨对购买力的影响
  - (1 + 名义收益率) = (1 + 实际收益率) $\times$ (1 + 通货膨胀率)
  - 特殊考虑
  - 费用的影响： 管理费用会影响净收益率，小型基金的管理费较高，可能使收益率低于大型基金
  - 通货膨胀的影响：减少货币购买力，实际收益率更能反映投资的真实回报，更应关注实际而非名义收益率
  - 杠杆的影响：杠杆可以放大利益，也可以放大损失

- R_L = Portfolio Return / Portfolio Equity = $R_P + \frac{V_B}{V_E}(R_P - r_D)$
- Borrowed Capital:
- R_P is net return rate, net return = gross return - 管理费用
- r_D is the borrowing cost exceeds on debt 借钱的利率
- V_E is the equity of the portfolio 自己的钱数额
- V_B is the debt or borrowed funds 借钱数额
(!!)现值与终值

年金 Annuities

- 一连串等间隔、等量、等方向的现金流，例如养老金
- 计算器计算：知道4个，求最后一个
  - N = Number of periods（现金流的间隔，不一定是年份）
  - I/Y = Interest rate per period（利率要和间隔N匹配，季度要除以4）
  - PV = Present Value（0时间节点的价值，没给就默认是0）
  - PMT = Amount of Periodic Payment（一般是负的）
  - FV = Future Value（一般是正的）
  - PV、PMT、FV是现金流，有方向，流入是(+)，流出是(-)
- (!!) 永续年金 Perpetuity
  - $PV = \frac{A}{r}$
  - PV是永续年金的估值

(!!)统计基础

中心趋势

- Quantile：这个位次以及所有比它小的值
- Quartile: 除以4
- Quintile: 除以5
- Decile: 除以10
离散程度

(!!)概率论基础

概率的计算
随机变量

(!)常见概率分布

数理统计

抽样与估计

假设验证

Economics

Demand and Supply Analysis

供求关系

- Demand
  - 价格越高，需求越少
  - 计算：先求需求函数，再代入当前价格，得到当前市场需求
- Supply
  - 价格越高，供给越多
  - 计算：先求供给函数，再代入当前价格，得到供给量
- 价格变动 - Move along the curve (change in quantity)
- 除价格以外的因素变动 - Shift curves (A increase/decrease in demand/supply)
- 平衡点：供需曲线的交点E
  - E左边的三角形：Total surplus 总剩余
    - =消费者剩余+生产者剩余
    - 上面的是消费者剩余，下面的是生产者剩余
    - 如果生产的超过/不足平衡点：Deadweight loss
      - 超过：减少生产
      - 不足：加大生产

弹性

- 自身价格弹性
  - E = 需求Q变动的百分比÷价格P变动的百分比 = $\frac{\Delta Q_x/Q_x}{\Delta P_x/P_x}$ = $\frac{\Delta Q_x}{\Delta P_x} \times \frac{P_x}{Q_x}$
  - 变动百分比 = 变动量/平均量 = (期末价格-期初价格)/(期初期末价格平均值)
  - 解读
    - 高弹性 - 价格微变导致需求量大变(E>1)；
    - 低弹性 - 价格大幅变动对需求无影响 (E<1)；

        - 单位弹性 - Revenue最大化(E=-1)
    - 图像
        - 完全弹性 - 水平线(E)
        - 完全非弹性 - 垂直线(I)
    - 影响因素：替代品、收入、时间越久弹性越强(有更多时间找替代品)、产品销量(弹性将趋近于-1)
- 交叉弹性
    - E = 需求Q_x变动的百分比div商品Y价格P_y变动的百分比 = $\frac{\Delta Q_x/Q_x}{\Delta P_y/P_y}$ = $\frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x}$
    - Y的属性
        - 互补品 Complementary - 油价上涨导致汽车需求下降，负向弹性
        - 替代品 Substitute - 羊肉价格上涨导致牛肉需求上升，正向弹性
- 收入弹性
    - E = 需求Q_x变动的百分比÷收入I变动的百分比 = $\frac{\Delta Q_x/Q_x}{\Delta I/I}$ = $\frac{\Delta Q_x}{\Delta I} \times \frac{I}{Q_x}$
    - **正常商品** Normal Goods：工资上涨导致需求上升，正向弹性
        - 奢侈品 Luxuries：弹性大于1
        - 生活必需品 Necessities：弹性在0到1之间
    - 低档商品 Inferior Goods：工资上涨导致需求下降，负向弹性
- 计算
    - 先把所有给的数字代入，求出Q_x
    - 然后求出各个弹性E

影响价格的因素

- 替代品效应 - 价格下降➡️ 商品更有竞争力➡️ 需求上涨
- 收入效应 - 价格下降➡️ 更有购买力➡️ 对需求的影响不确定(取决于是Normal还是Inferior)
- Giffen Goods - 收入效应占主导，价格越高需求越大(往往是生活必需品、低收入群体疯抢、非奢侈品)
- Veblen Goods - 消费者效应占主导，价格越高需求越大(顶级奢侈品)

Cost, Revenue, Profit

Economic Profit and Accounting Profit

- 也叫abnormal profit，指Accounting profit减去Implicit opportunity cost
- Accounting profit = Economic Profit + Normal Profit

- Revenue既可以分成Accounting profit + Accounting cost，又可以分成Economic profit + Implicit cost + Explicit cost。其中Accounting cost等于Explicit cost。Implicit cost就是机会成本，Implicit和Explicit cost合在一起是Economic cost。
- Economic profit指的是超额收益，Implicit cost才是普通正常收益

产能 Product

- Total Product 总产能: Q，只考虑Labor(L)的影响
- Average Product 平均产能：Q/L
- Marginal Product 边际产能：$\Delta Q/\Delta L$

边际递减效应 Law of Diminishing Returns

- MP是TP的斜率
  - MP=0时TP最大，此时总产能最大
- MP=AP时AP最大

营业额 Revenue

- Total Revenue：sum(P*Q)
- Average Revenue：TR/Q
- Marginal Revenue：increase in TR when selling one more product (Price will change)
- 遵循边际效应递减

Firm and Market Structures

完全竞争市场 Perfect Competition

- 每个公司都是market taker
- MR = AR = Price：无论卖多少，价格都是一样的，且都不由自己决定

不完全竞争市场 Imperfect Competition

- Price searchers：商家寻找使利润最大化的价格
- 随着销量增加，demand和MR都减小
- TR在MR=0时最大
- $MR = P(1 - 1/E_p)$
  - MR, Price, Elasticity之间的关系

成本 Cost

- 长期VS短期成本
  - 短期可变成本：labor, raw materials
  - 固定成本：buildings, technology, equipment
  - 所有“固定成本”在长期角度都可变
- 不同的成本
  - Total Cost = Total Fixed Cost + Total Variable Cost
  - Marginal Cost = Change in Total Cost / Change in Output
  - Average Fixed Cost = Total Fixed Cost / Output
  - Average Variable Cost = Total Variable Cost / Output
  - Average Cost = Total Cost / Output = AFC + AVC
  - ATC与MC相交的点是ATC的最低点，AVC与MC相交的点是AVC的最低点
  - Cost最低不意味着profit最大，还要考虑revenue的多少
- 利润最大化 Profit Maximization
  - TR - TC的值(也就是profit)最大
  - MR = MC
    - 当MR大于MC时，多生产就能赚更多的钱
    - 当MR小于MC时，多生产会减小利润

盈亏平衡点 Breakeven Point 和 关门大吉点 Shutdown Point

- 完全竞争市场
  - 当Price = ATC时，不亏不赚，revenue正好cover掉AVC和AFC
  - 当ATC > Price > AVC时，亏钱，但好歹能cover部分AFC，短期继续营业
    - Anyway房租还是要交的，赔的钱小于AFC
  - 当Price < AVC时，赔的钱大于AFC，不如不开工，直接付房租
- 不完全竞争市场
  - 一样，把average换成total

规模效应Economies of Scale和非规模效应Diseconomies of Scale

- LRAC曲线随着产量增加而先减后增
  - 规模效应 - 减的那部分
    - 随着产量增加，LRAC下降 - 人招的多了，生产每件商品的成本变得很小
  - 非规模效应 - 增的那部分
    - 随着产量继续增加，LRAC反而上升 - 人招的太多了，人的管理成本增加

        - 所以变成了用机器人lol

市场结构

- 完全竞争市场 Perfect Competition
    - 市场特点
        - 所有商品同质化，价格完全弹性，出入壁垒低，卖方没有定价权
        - 例子：白菜、玉米、土豆、牛奶……
    - 需求曲线
        - Demand是一条横线，无法改变价格
        - Price = Demand = Marginal Revenue = Average Revenue
    - 短期策略
        - MR=MC时Profit最大，此时MC和ATC之间的差值是每件商品的超额收益 Economic Profit - 当没有那么多卖家时，我可以卖高一些
    - 长期策略
        - 当进入的商家越来越多，Economic Profit消失，MR = AR = P = MC
        - 所有人都获得普通收益，不再有超额收益，每家公司都efficient
- 垄断竞争 Monopolistic Competition
    - 市场特点
        - 有很多商家，但各有自己的市场份额，有自己忠实的客户群体，Price searcher
        - 产品有差异，有区分度
        - 比如化妆品
    - 需求曲线
        - 斜率为负，且弹性很大 - 因为替代品太多
    - 公司之间竞争策略：
        - 营销策略、价格
        - 产品创新 - 短期内弹性下降，获得Economic Profit，长期会被同行模仿
        - 品牌 - 知名度带来溢价
        - 广告 - 加强差异化，但广告费用导致ATC上涨，但销量也会增加
    - 短期策略
        - MR = MC时Profit最大，此时Price和ATC之间的价差是每件商品的超额收益
    - 长期策略
        - MR = MC时利润最大，但此时已经没有超额收益了（因为都在模仿）
- 寡头市场 Oligopoly
    - 市场特点

        - 玩家较少、相互依存、规模经济
        - 行业准入壁垒高（比如造车、汽油）、提供相似或有差异的产品
        - 定价能力高，弹性较小
    - 四种模型
        - 拐折模型 Kinked demand curve
            - 一家涨价时，其他人都不涨价；一家降价时，其他人都不降价
        - 纳什均衡
            - 囚徒困境 - 每个人都选择使自己的利益最大化
            - 合谋 - 避免被背叛的条件
                - 商家比较少、相似的产品
                - 交易小而且比较频繁
                - 背叛有严格的惩罚
                - 在领域外没有潜在竞争对手
        - 一家独大
            - 巨大的规模，有规模效应，通过压价能打压竞争对手，通过涨价能挤压对手利润空间
    - 短期有Economic Profit
    - 长期可能有Economic Profit, 前提是合谋
- 垄断市场 Monopoly
    - 市场特点
        - 只有一个卖家，超强壁垒，超强议价权、非价格的策略(但同样需要打广告)
    - 壁垒
        - 法律壁垒 - 政府执照、版权 - 例如：网络供应商
        - 自然资源壁垒 - 规模经济 - 例如：水电、矿产
    - 需求曲线
        - 下降趋势 downward-sloped
        - MR = MC时利润最大化
        - 不会追求价格最大化
        - Economic Profit = (P - ATC)*Q, 可以获得超额收益
    - 市场监管
        - 定价在ATC - 通过限制定价来限制超额收益
        - 定价在MC - 其实亏损了，因为ATC小于MC，需要政府补贴

价格歧视 Price Discrimination

- First-degree: 每个人都征不同的价格，取每个人愿意出的最高价(杀熟)
- Second-degree: 通过商品的差异来分配价格(大杯、中杯、小杯)
- Third-degree: 根据不同人口特征来分配价格(双十一优惠价、学生价)

如何衡量市场集中度

- N-Firm Concentration Ratio
  - 看最大的N家公司所占的市场份额总和
  - 缺点：无法直接量化市场竞争力Market power、对大公司并购不敏感
- Herfindahl-Hirschman Index (HHI)
  - 最大几家公司各自市场份额的平方和

Aggregate Demand and Supply

GDP基础
定义：final goods and services
Nominal GDP = Real GDP + Inflation
GDP Deflator = Nominal GDP / Real GDP, 衡量通胀

- GDP
  - (!!)支出法 GDP = C + I + G + (X - M)
  - (!!)收入法 GDP = C + S + T
  - 两种方式的GDP相等，连立得到 S = I + (G - T) + (X - M)
    - G-T是政府支出，X-M是政府收入
    - 如果S上升，I不变，它必须被G-T财政赤字增加和Net Export增加所抵消
    - Saving多了或被政府花了，或者流出国外
  - (G-T) = (S-I) - (X-M)
    - 政府财政赤字(G-T>0)必须被净进口(X-M<0)或者净储蓄(S-I>0)所弥补
- 总需求曲线 Aggregate Demand Curve
  - 价格变动将影响C, I, EX - 价格越低，GDP越高
  - C由Wealth effect决定
    - 物价上涨时，购买力降低，需求下降，C下降
    - 物价下降将导致需求上涨，C增加，GDP增加
  - I由Interest rate effect决定
    - 价格增加时，对钱的需求增加，货币变贵，利率增加，投资减少
  - EX由Real exchange rate决定

        - 价格增加时，利率增加，本币升值，本币汇率上涨，进口增加，出口受到打击，净出口变小
    - 受到价格影响的变动，平衡点将沿着需求曲线移动
- 非价格因素导致总需求曲线shift(C, I, G, EX直接受到影响)
    - 经济变好时曲线向右移动
    - 消费者财富增加 - C增加
    - 商业预期增加 - I增加
    - 消费者收入预期增加 - C增加
    - 资本利用率增加 - I增加
    - 宽松的**货币政策**(印钱) - 短期C和I增加，长期没用
    - 宽松的**财政政策**(政府多支出，少收税) - 增加C和G
    - 本国货币贬值(汇率下跌) - 增加NX
    - 其它国家经济发展(拉动本国出口) - 增加NX
- 总供给曲线 Aggregate Supply Curve
    - 非常短的时间VSRAS
        - 完全弹性，Elastic
        - 固定，产出量不影响价格
    - 短时间SRAS
        - 有工资粘性和菜单粘性
        - 价格上涨，名义工资不变，实际工资变少，成本降低(Labor)，多雇佣 扩大生产，提高就业水平，GDP增加
    - 长时间LRAS
        - 没有弹性，Inelastic
        - Input按价格比例影响价格，价格水平不影响AS
- 非价格因素导致总供求曲线shift
    - 劳动力(脑力、体力)增加 - SRAS、LRAS都右移
    - 自然资源增加 - SRAS、LRAS都右移
    - 资本增加 - SRAS、LRAS都右移
    - 技术增加 - SRAS、LRAS都右移
    - 任何价格的变动(工资、工资预期、原料成本) - 只影响SRAS，不影响LRAS

Economic Growth and Sustainability

经济衰退 Recession

- 总需求下降
  - 产量降低，价格下降 - AD左移
- 工资下降、成本下降
  - 供给增加 - SRAS右移
  - 长期总供给不变(因为是由国家能力决定的，不受短期价格变动影响)
- GDP短暂下跌
- $P_0 > P_{SR} > P_{LR}$ 物价持续下跌

通货膨胀 Inflation

- 总需求上升
  - 产量更高，价格升高 - AD右移
- 工资上涨、成本上升
  - 供给下降 - SRAS左移
- GDP短暂上升，经济增长
- $P_0 < P_{SR} < P_{LR}$ 物价持续上涨

滞胀 Stagflation

- 正常：物价上涨导致经济增长，就业率提高
- 滞胀：物价上涨反而就业率下降，将导致政治动荡
- 原因：不是AD变动，而是AS减少
  - 原材料、能源价格上涨
    - 供给下降 - SRAS左移
    - 需求上升 - AD右移
  - GDP下跌，价格升高
- $P_0 < P_{SR} < P_{LR}$ 物价持续上涨，但经济衰退

原料价格下降

- 价格下跌，供给增加
- GDP增加，就业率上升
- 所以中东地区石油供应很重要

经济可持续发展

- Labor Supply
  - Labor force指16岁以上的人群

    - 改变因素：人口增长、移民、劳动参与率
- Human Capital
    - 有技术的人、受教育的人，高级劳动力
    - 改变因素：教育、培训
- Physical Capital
    - 工厂、机械设备
- Natural Resources
    - 矿业、黄金
- Technology
    - 创新
- 外部影响因素
    - 正向：研发环境、创新环境
    - 负向：环境污染
- 整体经济环境
    - 内部竞争框架 - 垄断、寡头、竞争
    - 良好的金融系统 - 提供资本以及资本分配
    - 国家开放程度 - 越开放越好
    - 社会稳定性、财产权利、法治体系健全
- 道格拉斯函数 Cobb-Douglas production function
    - $Y = AK^{\alpha}L^{(1-\alpha)}$
    - Capital和Labor的增加 不如技术的增加 对GDP的影响大
    - A指的是全生产要素 - 主要是技术，也包含教育、法制等等不属于K和L范畴的要素
    - GDP增长量 = 科技增长 + α 劳动力增长 + $(1-\alpha)$ 资本增长
    - 人均GDP增长量 = 科技增长 + α 人均资本深化
        - 资本深化：提高个人产量(比如使用工具)
    - 潜在GDP增长 = 长期劳动力增长 + 长期产量增长
        - 更多的劳动力、更高的Productivity

Business Cycles

商业周期

- 经济活动产生的波动情况
- 变量：真实GDP、失业率

- 四个阶段
  - 复苏 Recovery
    - GDP增速由负转正，失业率高，资本支出较少但在增加，存货/销量开始下降，消费者买耐用品，通胀维持或在减少
  - 扩张 Expansion
    -
  - 减速 Slowdown
  - 衰退 Contraction
- 类型
  - 经典周期 - 经济活动有波动，Activity变化
  - 增长周期 - 增长水平有波动，Growth变化
  - 增长率周期 - 增长率百分比有波动，Percentage变化
- 观测周期
  - Inventories 存货
    - Inventory to Sales Ratio
      - 扩张后期(Slowdown) - 存量多，销量少，I/S比正常值大
      - 衰退后期(Recovery) - 存量少，销量大，I/S比正常值小
  - Labor 劳动力使用情况
    - 扩张后期 - 减少工时，失业率增加有滞后性
    - 经济复苏 - 增加工时，就业率增加有滞后性
  - Physical Capital 生产设备使用情况
    - 扩张后期 - 减少产能，关闭生产线，也有滞后性
    - 经济复苏 - 增加产能，购买新设备，有滞后性
  - Housing Sector Activity 住房指标
    - 房地产贷款利率
      - 利率降低导致购房增加、建房增加
    - 住房成本/收入ratio
      - 占比少会增加购房
    - 人口结构
      - 婴儿潮会导致20年之后的购房潮
    - 特殊情况 - 次贷危机
  - External Trade Sector Activity
    - 本国GDP增速
      - 增加进口，NX下降，降低GDP增长
    - 外贸伙伴的GDP增速

        - 增加出口，NX增加，GDP上涨
    - 汇率
        - 本国货币增值，NX下降，打压GDP
        - 本国货币贬值，NX上升，增加GDP

信贷周期

- 定义：Change of **availability and pricing** of credit 贷款的总量和价格
- 银行并不是无限量房贷，有额度，当额度不足的时候可能会抽贷
- 经济好的时候利率低，Availability多
- 应用
    - 信贷周期对于商业周期的影响
        - 助长商业周期的趋势 Amplification
        - 商业周期和信贷周期不总是重合，信贷周期longer, deeper, sharper
    - 对于房地产行业商业周期的分析
        - 房地产受到贷款利率影响非常大
    - 更好地预测商业周期
    - 更好地预测相关政策
        - 经济不好的时候预测政府印钱

学院派对经济周期的解释

- 古典主义学派(自由主义)
    - 关注Supply curve
    - 影响因素：External Real Shocks
        - RBC(真实商业周期)：外部冲击导致商业周期变化，扩张和收缩都是市场本身的应对措施
        - 市场分配保持最高效率
    - 政府政策有滞后性，会放大经济周期
    - 主张政府不要干预经济
- 奥地利学派(自由主义)
    - 关注货币
    - 影响因素：过度投资
        - 泡沫经济，导致经济萧条
    - 政府不要干预经济，政府加大投资反而引起更多的泡沫
- 货币学派

        - 关注供给货币增速的变化(印钱速度的变化)
        - 影响因素：外部冲击导致经济衰退，不恰当地降低货币供给导致经济衰退
        - Fed无规律地印钱导致经济周期，主张不要乱印钱
        - 应该steady and predictable增加货币供应
- 凯恩斯学派
    - 工资是刚性的，工资很难降低
        - 企业成本很难下降
    - 政府应该拉动需求 - shift AD curve by increasing G
    - 主张政府宏观干预需求

经济指标

- 领先型指标 Leading indicators
    - 制造业每周平均工时 - 缩减工时意味着要裁员
    - 失业金申请人数 - 越多经济越差
    - 制造商新增消费品和原料订单 - 越少意味着预期消费越差
    - 延缓交货扩散指数 - 从下订单到提货的时长，越久说明订货的人越多，经济越好
    - 非国防重工业的制造商新订单 - 并不是为了打仗而下的订单
    - 新增私人住宅的建筑许可 - 盖房多意味着经济好
    - 股市 S&P500 - 预示着经济周期的转变
    - 货币供给、M2 - 货币多意味着消费多
    - 国债利率与隔夜拆借利率的差额 - 国债是benchmark，短期拆借利率低对经济好，差值越大经济越好
    - 消费者预期指数 - 消费增多，拉动经济
- 同步型指标 Coincident indicators
    - 非农就业指数，或者平均工资 - 工资上涨导致当月消费增加
    - 个人实际收入
    - 工业生产指数 - 反应需求增加，且能拉动市场
    - 制造与贸易总额
- 滞后型指标 Lagging indicators
    - 平均失业周期
    - 存货销售比
    - 单位劳动成本变化
    - 平均贷款基本利率
    - 工商业逾期未还贷款 - 不到最后一刻不会欠钱不还
    - 分期付款债务余额与收入比

    - 消费者物价指数CPI - 反映通胀
- 分析这些指标
    - Nowcasting
        - 对当前数值的估计，基于对市场的实时观测
        - 例如自己估计第四季度的数值来分析

失业率

- “Employed” - 有工作的，不包括违法的工作、不包括没有资质的工作
- “Labor Force” - 有意愿工作的，不包括不情愿找工作的人(家庭主妇)、儿童、退休的老人、学生
- “Working Age Population” - 工作适龄人口，也包括不想工作以及不能工作的人
- “Participation Ratio” = Labor Force / (Working Age Population)
- 失业原因
    - 摩擦性失业：跳槽空档期
    - 结构性失业：技能不匹配，科技导致的，没有办法
    - 周期性失业：商业周期导致的，政府可以干预
- 政府的目标
    - Full Employment - 没有周期性失业，达到Natural unemployment rate
- (!!) “Unemployment Rate” = # of Unemployed / Labor Force
- 滞后性 - 当经济复苏时失业率会上升
- 自然失业率
    - 充分就业下的失业率，不会造成通胀的失业率

通货膨胀

- 定义 - 物价上涨
    - 通胀率 - 物价上涨的百分比
    - 严重通胀 Hyperinflation - 物价疯涨
    - Disinflation - 通胀节奏放缓
- 通货紧缩 - 物价下降
    - 通缩率 - 物价下降的百分比
- CPI - 消费者物价指数
    - 计算方法：当期一揽子物价指数 / 即期物价指数
        - 一揽子 - 消费品加权
        - 即期 - 选定的基本指标，比如以2000年作为参照
    - 使用CPI的注意事项

        - 不同国家的CPI百分比不同
            - 消费者习惯不同 - 饮食结构不一样
            - 每件商品的权重不一样
            - 统计方法不一样、数据收集不一样
- CPI计算的权重分配
    - Lapsers Index
        - 使用之前的权重，代入当前和之前的物价
            - 新商品的引入导致拉氏指数高估CPI
            - 产品质量提升导致高估
            - 替代品效应导致高估
        - 解决方法：考虑质量提升、把新商品纳入篮子
    - Paasche Index - 使用当前的权重，代入当前和之前的物价
    - Fisher Index = （拉氏*\派氏） 开根号
- 其它衡量物价的指数
    - 物价指数 Price Index
    - GDP Deflator
    - 生产者价格指数 PPI - PPI带动CPI，采购成本转嫁给消费者
    - Headline Inflation - 全部的货物
    - Core Inflation - 排除了食物和能源的指数
- 通货膨胀的类型
    - 成本推动型
        - 原因：工资增加、原材料价格上涨
        - 变化：成本先变，政府干预增加需求，经济小幅下降
    - 需求拉动型
        - 原因：收入增多、政府拉动消费、出口增加
        - 变化：需求先变，供给上升，经济小幅提升

Fiscal Policy

- 定义：政府决定怎么花钱和征税来影响经济
- 收支平衡
    - 税收=政府支出：Balanced
    - 税收>政府支出：财政盈余 Budget Surplus
    - 税收<政府支出：财政赤字 Budget Deficit

- 和货币政策的关系
  - 二者都可以调节经济和物价
  - 财政政策还可以调节收入水平、财富重新分配
- 目标
  - 维持经济增长
  - 影响总需求
  - 进行财富再分配
  - 配置对应资源 - 补贴创新领域
- 工具
  - 转移支付 Transfer Payments
    - 收税后补贴其他人
  - 政府支出 Current Spending
  - 基础设施建设 Capital Spending
- 好处
  - 国防、基建、经济增长、降低失业率、保障最低生活标准、科技研发
- 税收
  - 直接税收 - 基于收入和财富
    - 所得税、财产税
  - 间接税收 - 基于商品和服务 - 快、而且征税成本小(只需要改变税率)
    - 增值税(VAT)
- 税收政策
  - 简单、强制执行、有效果(能收上来钱)、公平(相同水平征一样的税，富人交税多)、足够(支撑政府支出)
  - 滞后性（效果不会在当时显现）
- 财政乘数 Fiscal Multiplier
  - (!!) Fiscal Multiplier = $\frac{1}{1-MPC(1-t)}$
    - MPC是Marginal propensity of consumption - 消费占**税后收入**的比例
    - 如果给的是税前收入的MPC，需要多一步计算，不能直接代入
    - t是tax rate - 税率越高，财政乘数越小
- 财政政策的限制
  - 对经济的预测可能错误
    - 发现滞后、行动滞后、影响滞后
  - 误读统计数据
    - 失业率等数据的统计并不准确
  - Crowding-out effect

        - **Real interest rate上升**，小企业受到的打击更大，不利于私营投资
        - 银行倾向于贷款给大企业
    - 供给导致的通胀
        - 紧缩经济政策反而导致更高的通胀
    - 赤字
        - 扩张财政政策受到财政赤字数额的限制(2024 USA: 1.9 trillion)
    - 其它指标
        - 通胀、失业率也需要考虑
- Richardian Equivalence 理查德均衡
    - 增加财政赤字意味着未来有更多的税收
    - 纳税人考虑到将来税收增加，现在就不消费了
- 政府债务的影响
    - Debt Ratio 总债务债比水平 = 总债务和GDP比值
        - 如果real interest rate比real growth rate高 - 负债会越来越多(如果税率不变)
        - 如果税率增高，会抑制经济发展
        - 如果债权人不继续借钱，违约经济体会破产，如果印钱将导致高通胀
        - 反向观点：跟本国人民借钱，用来投资反而拉动经济，税务改革可以缓解赤字
    - 贷款拨给大公司/政府相关部门负责基建
        - 挤出效应，私营企业受到打击，失业率上升
- 财政政策的应用
    - 当整体经济不好时
        - 通过加大投资基建来增大需求，加大消费和投资
    - 当经济过热时
        - 通过减少基建投资和增加税收来减少需求，降低消费和投资

Monetary Policy

- 定义：央行决定货币供应
- 货币政策
    - 宽松货币政策：印钱，钱变便宜
    - 紧缩货币政策：烧钱，钱变贵了
- 钱的功能
    - 流通手段 Medium of exchange or means of payment
    - 价值尺度 Unit of account

        - 储藏手段 Store of value
- 货币乘数 Money Multiplier
    - 银行存款储备金 Bank Reserve
        - 存款储备金越低，钱被放大的效应越多
    - Money created = New deposit / Reserve requirement
    - Money Multiplier = 1 / Reserve requirement
- 货币的分类（不重要）
    - 狭义货币 - 现金、存款
    - 广义货币 - 狭义货币 + 银行票据(Liquid Assets)
    - M1 - 流动性最好的货币，旅行支票，
    - M2 - M1账户 + 储蓄账户、长期定额存单
    - M3 - M2 + 流动性更弱的债券
- Quantity Theory of Money - 重要
    - Money Supply $\times$ Velocity = Price $\times$ Real Output (MV=PY)
        - 流通速度恒定，真实产出(Real GDP)也不变
        - 所以通过货币流通量可以控制价格

货币和通货膨胀

- 货币的供求关系
    - 需求：人们对货币的需求受到利率、收入水平、物价水平的影响
        - 交易性需求：受到GDP影响
        - 预防性需求：受到经济情况影响，也就是GDP
        - 投机性需求：受到利率影响，与利率是反向
    - 供给：Central Bank，数值固定
    - 平衡点：(Real Money，Interest Rate)
        - 供给多需求少：利率将下滑到平衡点
        - 供给少需求多：利率将上升到平衡点
- 央行对市场的短期调控
    - 供给更多货币，利率下降
- Fisher Effect
    - 名义利率 = 真实利率 + E[I]
        - 真实利率是稳定的，名义利率受通膨预期Inflation expectation的影响产生变动
    - 名义利率 = 真实利率 + E[I] + Risk Premium
        - 对于投资者来说，还需要RP来补偿承担风险(对于通胀的不确定性)

Central Bank的功能 以及应对 非预期性通胀 的方法

- 印钱
- 管理其它银行
- 最终借款方
- 监管其它银行
- 持有黄金和外汇储备
- 制定货币政策
  - 控制准备金率
    - 存款准备金上升 - 可以借出去的钱少，货币供给下降，利率上升，紧缩
    - 存款准备金下降 - 货币供给上升，利率下降，扩张
    - 实施条件 - 银行愿意放贷，且消费者愿意贷款
  - 控制Policy rate
    - Policy rate下降 - 利率下降，融资成本低，释放流动性（扩张的货币政策）
    - Policy rate上升 - 利率上升，融资成本高，收紧流动性（紧缩的货币政策）
  - 公开市场操作(可以每月执行，实现短期调控)
    - 央行买债券 - 把钱给到市场，增加bank reserves，利率下降，扩张
    - 央行卖债券 - 降低市场中的货币量，减少bank reserves，利率上升，紧缩

Neutral Interest Rate 中性利率

- 衡量一个国家正常发展过程中的发展趋势，trend rate
  - 当市场处于中性利率时 - 既不促进经济增长，也不促进衰退
- Neutral Interest Rate = Real trend rate of economic growth + Inflation target
  - 中性利率可以作为衡量经济发展的Benchmark
  - Policy Rate 大于 Neutral Rate：利率高，Contractionary
  - Policy Rate 小于 Neutral Rate：利率低，Expansionary
- 政策失灵的情况
  - 紧缩的货币政策只能调节需求端影响的通胀
  - 对于Supply shock引发的通胀反而会更糟糕

货币政策如何影响市场 - 货币传导机制

- 央行改变Policy Rate来影响短期借贷利率
- 债券、股票、资产价格下降(估值时使用的是未来现金流折现，折现率上升导致估值下降)
- 消费者和公司会降低Expenditure

- 吸引外资，本币升值，打击出口
- 最终目标是影响通胀

央行的特点

- 独立性 - 不受到政府机构影响
    - 经营独立性、目标独立性
- 可信度 - 言出必行
- 透明度 - 定期披露文件

央行的目标

- 利率目标
- 通胀率目标 - 通常是2%，如果target是0%会导致有通缩风险
- 汇率目标 - 通常是美元汇率

货币政策的限制

- 利率提高可能导致Recession - too extreme
    - 长期债券购买量增加，价格上升，反而导致长期利率下降
- 流动性陷阱 - 市场中出现剧烈恐慌
    - 没人花钱，市场流动性消失，银行会增加货币供给，但依然没人消费
    - 银行不愿放贷
- 通缩
    - 对通缩的缓解有限，因为利率不能低于0
    - 应对方法：量化宽松(注入流动性，大量印钱，利率下调)

不同的市场 - 发展中国家的货币政策

- 没有很好的债券市场 - 流动性低，不好买卖债券
- 经济体变动快 - 中性利率难以确定，政策利率无法确定
- 金融创新
- 央行可信度
- 政府的影响 - 降低利率有利于政府还债，割人民韭菜

Geopolitics 地缘政治学

国际化的弊端

地缘政治工具

- 国家安全工具
  - 合作的：军事联盟
  - 不合作的：武装冲突、间谍活动
- 经济工具
  - 合作的：多边贸易协定、关税规则协调、共同市场、共同货币
  - 不合作的：国有化企业
- 金融工具
  - 合作的：跨境自由兑换货币、允许外国投资
  - 不合作的：限制本地货币市场准入、限制外国投资、制裁
- 多方面工具（涉及多个属性）
  - 合作的：cabotage国内运输权、欧盟、南亚联盟

地缘政治风险

- 事件风险 Event Risk
  - 政治事件 - 英国脱欧公投、大选
- 外生风险 Exogenous Risk
  - 起义、入侵、自然灾害 - 福岛核电站
- 主题风险 Thematic Risk
  - 气候变化、人口迁移、民粹主义、恐怖主义
- 地缘政治风险指数 GPR

International Trade

贸易优势

- 绝对优势
  - 绝对成本低
- 相对优势
  - Opportunity cost小
  - 按照相对优势进行交易

Richardian Model

- Labor是决定Production的唯一因素

    - 虽然科技很重要，但科技没有太大壁垒，假设贸易两国的科技没有区别

Heckerscher-Ohlin Model

- Capital和Labor都可以决定Production

贸易限制

- 原因
    - 保护国内的新兴产业
    - 国防安全
    - 保护本国工作、保护本国工业
- 手段
    - Tariff 关税 - 降低进口量
    - Quota 配额 - 限制进口总量，导致价格上涨，国外商家赚到Quota rents
    - Voluntary Export Restraint 自愿限制出口 VER - 本国限制出口
    - Export Subsidies 出口补贴 - 本国补贴出口，补贴太多会造成倾销
- 对于进口国
    - 关税：小国降低关税进口，大国可以提高关税
    - 配额：小国降低配额，大国可以增加
    - 补贴：本国福利下降，生产商更偏爱国外市场，造成死货损失deadweight loss
    - VER：本国福利下降，出口受到限制

投资限制

- 原因
    - 降低本国资产流通 - 尤其是股票和债券，容易被炒起来
    - 稳定汇率
    - 保持本国低利率
    - 保护本国企业

Capital Flows and FX Market

Balance of Payment

- Current 经常性账户 - Flows of goods and services
    - 商品和服务的采购：旅游业、交通、专利、版权、电影
    - 投资获得的收入：股利、分红

    - 单边转移 Unilateral transfers：捐钱给其它国家
- Capital 资本账户 - Non-produced, non-financial的资本转移
    - Capital Transfers：移民、债务豁免、赠予、跨国遗产税
    - 购买非金融资产：专利、商标
- Financial 金融账户 - Investment flows
    - 本国政府在国外获得的资产 - 黄金、外汇、外国股票
    - 外国资产 - 其它国家政府在本国投资

影响BOP的因素

- EX = X-M = Private Savings + Government Savings - Investment
    - 导致经常性账户亏空的因素
        - Lower levels of private savings
        - Larger government deficits
        - High rates of domestic investment

国际组织

- IMF 国际货币基金组织 International Monetary Fund
    - 为国际货币问题提供论坛
    - 促进国际贸易增长、促进就业、经济增长、脱贫
    - 稳定汇率，开放的国际支付体系
    - 通过出借外汇，协助成员国解决国际收支问题
- 世界银行 World Bank Group
    - 帮助发展中国家，强化和教育官方政府
    - 通过法律和监管系统鼓励商业发展
    - 保护个人财产权和契约精神
    - 发展足够强大的金融系统，满足企业融资需求
    - 反腐败
- WTO 世界贸易组织 World Trade Organization
    - 推崇自由贸易
    - 调停贸易摩擦
    - 多边贸易体系 - 会员之间进行贸易

贸易区 Trading Blocs

- Free trade areas 自贸区

    - 没有贸易壁垒，仅限产品和服务
- Customs union 关税同盟（英国 爱尔兰）
    - 同盟之间没有贸易壁垒，对外有共同的贸易限制
- Common market 共同市场（东非共同市场、南美共同市场）
    - 没有劳工和资本壁垒：A国公民随意去B国找工作
- Economic union 经济共同体（欧盟、一带一路）
    - 同一个机构、同一个经济政策
- Monetary union（欧元区）
    - 使用同一种货币

Exchange Rate

外汇

- 汇率：描述两种货币之间的关系
    - 直接标价 Direct quote：Domestic / Foreign
    - 间接标价 Indirect quote：Foreign / Domestic
    - 基准货币 Base Currency：汇率的分母
    - 定价货币 Price Currency：汇率的分子
- 计算：1.42 to 1.39 USD/EUR，后面的货币贬值
    - 本币升值相当于外汇贬值，直接标价法的汇率下降
- 名义和实际汇率
    - 真实汇率是根据购买力计算的
    - FX real(d/f) = FX nominal (d/f) $\times \frac{CPI_f}{CPI_d}$

远期市场和即期市场

- Spot Market 即期市场
    - 使用当前汇率进行交易
- Forward Market 远期市场
    - 使用未来汇率进行结算

国际贸易的participants

- Sell side: 跨国银行
- Buy side
    - Corporations 套期保值

    - 投资账户 - Real money accounts, Leveraged accounts
    - 政府
    - 零售市场 - 个体散户

Cross Rate
两个汇率中包含相同的国家，利用两个汇率来计算

远期汇率

- Forward Discount or Premium
    - 计算：AUD/EUR spot exchange rate is 0.7313, 1-year forward rate quoted at +3.5 points. point指的是0.0001，万分之一
- 货币强劲or货币疲软
    - Strong：升值
    - Weak：贬值
- 利率平价公式 IRP Interest Rate Parity
    - 描述利率对汇率的影响
    - $\frac{F}{S} = \frac{1+r_x}{1+r_y}$ 或者 $F_{f/d} = S_{f/d}(\frac{1+r_f}{1+r_d})$
        - F is forward exchange rate, S is spot X/Y
        - r_x and r_y are nominal risk-free rate in X and Y
        - 例如：假设即期汇率为1.6535，国内12个月无风险利率为3.50%，外币12个月无风险利率为5.00%。则12个月的远期汇率应等于：
          $F_{f/d} = 1.6535\left(\frac{1.0500}{1.0350}\right) = 1.6775$
    - 汇率的变化取决于两国之间的利率差
        - 外币利率高于国内利率：远期汇率高于即期汇率（远期溢价）
        - 外币利率低于国内利率：远期汇率低于即期汇率（远期折扣）
- 无风险套利
    - 无风险套现率 = 本币无风险利率-换汇投资回报率
    - 换汇投资回报率 = $S_{f/d}(1+r_f)\frac{1}{F_{f/d}}$ = 1.7550(1.045)[1/1.7900] = 1.0246 = 2.46%

汇率管理

- 不需要汇率管理的国家
    - 如果没有本币 - 不需要管理
    - 欧元区
- Currency board arrangement：保持恒定汇率，比如港币/美金
- Conventional fixed peg arrangement：变动范围较小，+/-1%的变动范围

    - 直接干预 - 政府操作影响价格
    - 间接干预 - 除了直接操作之外的手段，比如通货澎涨
- Target Zone：变动范围是+/-2%
- Crawling peg 爬行钉住：围绕设定的比率进行调节，调节依据是通货膨胀
    - Passive - 预测明天汇率变动，明天之后再行动
    - Aggressive - 预测明天汇率变动，今天赶紧采取行动
- Management of exchange rates within crawling bands
- Managed floating exchange rates：汇率变动
- Independently floating：完全浮动

汇率变化与净出口

- 弹性模型 Elasticity approach
    - 出口弹性、进口弹性 - 货币贬值/升值对进/出口的影响
    - 当(出口弹性+进口弹性)>1时，货币贬值导致NX为正，带动GDP
        - 弹性大的行业受益多：奢侈品
    - J-curve：如果采取贬值策略，在近期内会出现急剧的贸易赤字
        - 原因：短期进口需求依然存在，但本国货币贬值导致进口花销增大，贸易赤字
- 吸收法模型 Absorption approach
    - X - M = Y - (C + I + G)
    - 未达到full employment - 货币贬值可以拉动GDP，产生贸易盈余
    - 已达到full employment - 经济没有提升余地了，没有影响

Financial Analysis

Introduction

财务报表与分析-次要
财务报告 = 财务报表+补充信息
财务报表 = 4表1附注

- Balance sheet - 某一个时间节点的数据
- IS - Revenue(营业性收入)，Expenses，OCI
- CFS
- Statement of changes in Equity 所有者权益变动表

    - Paid-in capital 股本
        - 增：引入新股东，发放股票
        - 减：回购股票并注销
    - Retained earning 留存收益
        - 没有以dividend形式发给股东的
    - Non controlling interests
        - 合并报表时产生
    - Accumulated OCI
- Footnote
- Management commentary 管理层陈述 (MD&A)
    - 管理层对公司的陈述 Business of nature
    - 未经审计的(数据可能夸张、出错)
    - 国际准则 IASB 必须要陈述的：
        - 公司性质
        - 管理层的目标和战略
        - 公司关键的资源、风险、利益相关方的关系
        - 经营情况、结果
        - 计量方式、如何衡量自己的performance
    - 美国标准 SEC 必须要陈述的：
        - 未来发展形势、Events、不确定性
        - 通胀对于价格的影响、对公司的影响
        - 没有计入资产负债表的负债（表外负债）
        - 会计准则

审计报告 Auditor's reports

- 审计的角色
    - 所有权和控制权的分离：股东vs管理层
    - 雇佣第三方的审计师来检查财报
    - 提供Reasonable assurance - 不是absolute
- 审计报告
    - Unqualified audit opinion 无保留意见 - 造假迹象未被发现
    - Qualified audit opinion 保留意见 - 假报表
    - Adverse audit opinion 否定意见 - 举报诈骗犯
    - Disclaimer opinion 无法发表意见 - 无法找到相关证据

- 内控系统 Internal control system
    - 财报制作过程中没有不靠谱的人或者安排

其他数据来源 Other sources of information

- Proxy Statements 代理人陈述
    - 管理层的薪水
- Interim report 期中报告
    - 半年报、月报、季报 - 都没有被审计过
- 公司官网、调研电话 conference call
- 其它信息
    - 行业信息、宏观环境信息

财务报表分析的步骤

1. 确定分析目标
    - 信息来源：做分析的目的（评估投资、融资、信用评级）；客户关心的事情；辅助机构
    - 产出：是否找到了答案、时间节点、预算
2. 收集数据
    - 信息来源：财务报表、问卷调查、经济数据；管理层、上游、下游讨论；公司实地考察；历史数据
    - 产出：财务报告、分析表格、答卷
3. 处理数据
    - 信息来源：前面收集到的数据
    - 产出：调整后的财报、Common size statements 百分比分析法、财务比率和图
4. 分析解释数据
    - 信息：前面的数据
    - 产出：分析结果
5. 报告结论与意见
    - 信息：前面的数据、机构发表的报告
    - 产出：结论、推荐
    - 形式：Handbook
6. 更新分析
    - 更新自己的结论

财务报告准则

准则制定主体和监管机构

- 财务报告准则制定主体
  - 财报的目标：做决策
  - 财报的角色：形成对公司未来的期望
  - 财报准则制定主体：**Private sector, self-regulated** organizations
  - IFRS 国际会计准则
    - Single set of high-quality financial standards
    - Transparent, comparable, decision-making
    - Promote the convergence of national accounting
  - US GAAP 美国会计准则
    - New and revised standards
    - Decision-useful information
- 监管机构
  - 政府强制执行 - 政府监管机构
  - IOSCO 国际证券监管机构
    - 保护投资者、维护市场秩序、降低系统性风险
    - 促进跨境合作和证券监管的一致性
  - US SEC 美国证监会
    - 上市注册登记表
    - 年度/季度财务报表、财务披露、管理层讨论与分析、审计报告
    - Proxy statement 股东委托书
    - 重大事项公告：火灾、并购、管理层变动
    - 售卖限制性证券
    - 持股比例高于10%的员工在交易体系中的披露

国际财务报告概念框架与一般要求-次要

- 国际财务报告概念框架
- (!)财务报表一般要求
  - Fundamental
    - Relevance 与公司相关
    - Faithful representation 真实性
  - Enhancing - 需要平衡 trade off的特性
    - Comparability 可比较性：跟其他公司、不同年份

        - Verifiability 可验证性
        - Timeliness 及时性
        - Understandability 可读性
- 财务报表的限制
    - 生成财务报表的成本高
    - 一些信息未涵盖在报表中：创新能力、企业文化
- Financial position: Assets = Liability + Equity
- Financial performance: Revenue - Expenses = Net Income
- Underlying assumptions
    - Accrual accounting
        - 先给钱后记账：Unearned revenue, Prepaid expense
        - 先记账后给钱：Accrued revenue, accrued expenses
    - Going concern

有效财务报告-次要

- (!)有效财务报告框架体系的特征
    - 包含大框架、包含小细节、可比性
- 建立统一框架面临的挑战
    - IFRS和US GAAP的差异
        - 编制原则：US GAAP是by rules；IFRS是by principles
        - 存货：US GAAP允许LIFO

Analyzing Income Statements 利润表-关键

利润表的组成要素和基本结构

收入确认-关键

- (!)收入确认的总体原则：权责发生制
    - 不以现金收付为标准，而是以根据收入和费用发生的时间来确认
    - 确认时客户已获得商品或者服务的控制权
- (!!)收入确认的会计准则：五步法-关键
    - 识别合同
        - 确定与客户之间存在合同，合同可以是书面、口头、隐含的
    - 识别合同中的履约义务 Performance Obligations

        - 每一项履约义务应当单独确认
    - 确定交易价格
        - 转移商品或服务而有预期收取的对价总额
        - 交易价格应考虑所有可能影响收入的因素：折扣、回扣、退货等
    - 将交易价格分配至各履约义务
        - 将合同中的交易价格按照各履约义务的相对独立售价分配至每个履约义务
    - 履行履约义务时确认收入
        - 当客户获得该履约义务所规定商品或者服务的控制权时，确认相应的收入

费用的确认

- (!)费用确认的总体原则：权责发生制和配比原则
    - Expenses and Revenues are matched
        - 在确认收入的同期确认相对应的费用，matching of costs with revenues
    - Period Costs
        - 无法与Revenue直接挂钩的费用，发生的时候就记账
        - 比如administrative, managerial, IT, R&D, maintenance, 工资支出
- 费用确认原则的具体应用

费用化与资本化

- 费用化
    - 长期资产的折旧费用
        - 降低IS中的NI，降低B/S中的Asset value
        - 折旧费用不是真的现金支出，不影响CFS，只影响taxable income和tax payable
        - 计算PPE的剩余使用年限：
            - Net PPE = Gross PPE - Accumulated Depreciation
            - Remaining Useful Life = Net PPE ÷ Depreciation Expense
    - 不折旧，直接费用化
        - Net Income -= Purchase price $\times$ (1 - tax rate)
        - SHE -= Purchase price $\times$ (1 - tax rate)
        - 计算ROE
- 资本化
    - 利息的资本化
        - 限制条件：取得或建造资产直接相关的利息才能资本化
        - 被资本化的利息的去向

        - 随着时间推移被费用化，走折旧费用而不是利息费用；
        - 如果资产被卖掉了，就算做Cost of sale
    - 对现金流的影响
        - 资本化的利息增加Investing cash outflow
        - 费用化的利息减少Operating cash flow，因为NI减少，NI是CFO的起点
        - US GAAP只能费用化，IFRS都行
    - 对Interest coverage ratios的影响
        - 公式：EBIT / Interest Expense
        - 调整后的总利息：计算时应把资本化和费用化的利息都纳入考量
        - 调整后的income：如果之前被资本化的利息被折旧了，应该用EBIT + Amortization
- 软件研发成本的资本化

Non-recurring items

- Unusual or infrequent items - 记在Continue下面但单独写一栏，Other operating income (expense)
- Discontinued operations - 火灾不是discontinue
- Changes in accounting policy - Retrospective，prior periods最好按新的再写一遍
- Changes in scope and exchange rates - 不要求

每股收益 Earnings per share (EPS)-关键

- (!!) Basic EPS
    - 计算：EPS = (NI - 优先股分红) / 加权平均后的股数
    - 计算 Weighted average number of shares
        - 加权平均，追溯调整(所有调整都只针对发生在它前面的款项)
        - 如果有股票分割，则年初到分割日前一天的流通股数都要调整

- 例子：

Angler's Common Stock Shares

Shares outstanding on 1 January 2018	1,000,000
Shares issued on 1 April 2018	200,000
Shares repurchased (treasury shares) on 1 October 2018	(100,000)
Shares outstanding on 31 December 2018	1,100,000

1. What is the company's weighted average number of shares outstanding?

Hide Solution

Solution:

The weighted average number of shares outstanding is determined by the length of time each quantity of shares was outstanding:

1,000,000 × (3 months/12 months) =	250,000
1,200,000 × (6 months/12 months) =	600,000
1,100,000 × (3 months/12 months) =	275,000
Weighted average number of shares outstanding	1,125,000

- (!!)稀释每股收益
  - 稀释的原因
    - Convertible debt
    - Convertible preferred stock
    - Stock options
    - 以上这些有可能转换成股权，导致股数发生变化，导致股价下降，选择更小的那个股价
  - **对于convertible debt**
    - 计算：Diluted EPS = (NI - 优先股分红 + 可转换的费用的**税后**interest) / (加权平均后的股数 + 可转换过来的股数)
    - Debt securities不再outstanding, 更多的common stock会outstanding. 公司无需再付debt的interest, NI += 不用付的利息的税后部分
    - 例子：NI是750,000, weighted average of 690,000 shares of common stock outstanding, dilutive security: 50,000 of 6% convertible bonds, convertible to a total of 10,000 shares. Tax rate is 30%, calculate basic and diluted EPS.
      - Basic EPS = 750,000 / 690,000 = 1.09

        - Diluted EPS = (750,000+50,000*6%*70%)/(690,000+10,000) = 1.07
    - **对于convertible preferred stock**
        - 计算：Diluted EPS = (NI) / (加权平均后的股数 + 可转换过来的股数)
        - 这些可转换优先股不再outstanding，公司不再支付preferred dividends，加权平均后的股数增加，NI比计算basic EPS时要高
        - 例子：
    - **对于Stock options**
        - 计算：Diluted EPS = (NI - 分红) /
          [Weighted average number of shares outstanding + (New shares that would have been issued at option exercise -
          Shares that could have been purchased
          with cash received upon exercise) ×(Proportion of year during which the financial instruments were outstanding)]
        - 假定公司以平均股价来尽量买入股票，outstanding shares变多，+=(一开始发行的股数-后面赎回的股数)，NI不受影响
        - 例子：NI = 2.3 million, 800,000 weighted average common shares. 年初outstanding 30,000 options with exercise price of $35. 年末market price is $55.
            - Basic EPS = 2,300,000 / 800,000 = 2.88
            - Diluted EPS = 2,300,000 / [800,000 + (30,000 - 30,000*35/55)] = 2.84
    - Anti-dilutive 反稀释
        - 稀释后股价反而高。做题时一定要把basic和diluted EPS都算出来，选小的那个当作diluted EPS
    - 造成EPS增加的原因
        - NI增加，股份总数减小，或者both

利润表的分析

- Common Size Analysis 百分比占比法
    - 费用占Revenue的比例 - 研发费用占比、广告费用占比、人工费用依赖……
    - 一般考虑税前影响
- Time series analysis 时间序列 - 同公司不同年份的报表分析
- Cross-sectional analysis 横截面法 - 不同公司同年份的报表分析
- 计算
    - Gross Margin Level = (Sales - COGS) 占sales的百分比
    - Operating Margin Level = (Gross Margin - 其它各种费用) 占sales的百分比

- 不同财报表格之间的勾稽关系
  - 年初cash + cash inflows - cash outflows = 年末cash
  - 年初A/R + Revenues - cash collected from customers = 年末A/R

(!)其他综合收益Other comprehensive income

- 不算进NI中的收益
- 4+1项
  - Foreign currency translation adjustments 外币交易折算 [IFRS & US GAAP]
  - Unrealized gains or losses on derivative contracts accounted for as hedges 现金流量套期保值 [IFRS & US GAAP]
  - Unrealized holding gains or losses for available-for-sale securities [IFRS & US GAAP]
  - Certain costs of DB plans 养老金计划 [IFRS & US GAAP]
  - Value changes in the long-lived assets measured using the revaluation model 固定资产的增值部分 [only IFRS]

Analyzing Balance Sheets 资产负债表-关键

(!)资产负债表的构成要素和格式
Asset = Liability + Equity

资产的计量属性
历史成本vs公允价值属性

Intangible Assets 无形资产

- 定义
  - Identifiable non-monetary assets without physical substance
- 不同体系
  - IFRS接受cost model和revaluation model (revaluation只能在有活跃市场时使用)；
  - US GAAP只接受cost model
- 对于Finite useful life
  - 摊销，并每年估计useful life
- 对于Infinite useful life
  - 不摊销，但每年需要估计是否仍是Indefinite并test for impairment
- Impairment

    - Same as for PPE (移除累积摊销，B/S中减少资产，IS中记上损失)
- Internally created identifiable intangibles
    - 计入费用，而非B/S中的Asset
- Internally created intangible assets
    - IFRS：区分Research和Development phase
        - Research phase包括寻找知识和产品，必须Expensed
        - Development phase包括设计和测试，可以Capitalized
    - US GAAP：全部必须费用化
- 购买的无形资产 - Capitalized

Goodwill 商誉

- 定义
    - 购买价格 - Fair value of Assets and Liabilities > 0时，多余的部分recognized as an asset: Goodwill
- Accounting goodwill vs Economic goodwill
    - Economic Goodwill
        - 基于economic performance，反映在股价中
    - Accounting Goodwill
        - 只在Acquisitions时report
- 记账 - Capitalized
    - Not amortized but tested for impairment annually

(!!)金融资产 Financial Assets

- 计量
    - 公允价值 Fair Value
        - 市场报价：出售资产或转移负债的价格
        - 估值：
    - 摊余成本 Amortized Cost：初始售价 - principal repayments +/- amortization of discount/premium - any impairment
- 持有至到期投资 Hold-to-Maturity Investments, HTM
    - 计量：摊余成本法
        - 初始确认：Amortized cost算present value
        - 本金偿还：Amortized cost, gains and losses are recognized only when realized
        - 折价/溢价摊销：实际利率法, 不是coupon!

        - 减值：确认减值loss，并从Asset中扣除
- 交易性金融资产 Trading Financial Assets
    - 定义：短期内持有并打算通过出售获取利润的金融资产
    - 计量：Fair Value
        - 初始确认：Fair Value + 购买费用
        - 持有期间：Unrealized holding gain or loss记在IS中
        - 出售：实际gain or loss计入IS，并从B/S中移除Asset
- 可供出售金融资产 Available-for-Sale Financial Assets
    - 初始确认时未指明是前面哪个的资产
    - 计量：
        - 初始确认：Fair Value + 购买费用
        - 持有期间：Unrealized holding gain or loss计入OCI中
        - 出售/减值：Unrealized holding gain or loss从OCI中转出，计入利润表中

Non-current Liabilities 长期债务

- Bonds or Loans
    - 区别
        - Loans是从银行贷款，Bonds是向投资者筹集资金
        - Loans是固定或浮动利率，Bonds是固定的票面利率
        - Loans不可转让，Bonds可以出售
        - Loans发行成本较低，Bonds发行成本高，涉及承销费、法律费、会计费、注册费
    - 计量
        - 初始确认：Fair Value (是发行价格，不是面值) - 发行成本
        - 后续计量：摊余成本法
            - 将bond的初始确认金额(摊余成本)根据市场利率进行调整
            - 利息费用 = 实际利率$\times$摊余成本
            - 例子：面值100,000的债券，发行价为95,000，发行成本是1,000。年票面利率是5%，债券期限5年，实际市场利率6%。
                - 第一年的摊销和利息费用计算
                    - 初始摊余成本：94,000
    -

资产负债表分析

Analyzing Statement of Cash Flows 现金流量表-关键

(!)现金流量的分类

(!!)现金流量的计算

- (!!)经营活动
  - (!!)直接法
  - (!!)间接法
- (!)投资活动
- 融资活动

对现金流量表的分析

- 现金来源
  - 成熟公司的现金源自营业活动
  - 初创公司的现金流可能为负，不会一直是负数
- 决定因素
  - 成熟公司盈利质量高 - cash能与income对应
  - 激进型企业可能增加确认利润但没有对应的cash入账
- 钱花在哪里
  - 大量投入研发or大量投入销售
- 融资情况
  - 股权融资、债券融资
- Common-size analysis
  - 每一笔现金流入/流出 占总现金流入/流出的比重
  - 每一笔现金改变占 Net Revenue 的百分比

(!)自由现金流量

- 自由现金流量 FCF, Free cash flow
  - = Operating cash flow - Capital expenditure
  - 现金收入减掉运营成本
  - 两个流向：整个公司or股东权益
- 公司自由现金流量 FCFF
  - = NI + Non-cash Charges - Working Capital Investment - Cash Operating Expenses - Fixed Capital Investment + [Interest exp. * (1 - tax rate)]
  - 其中NI + NCC - WC Inv = CFO

    - [Interest exp. * (1 - tax rate)是要给债权人的利息
- 股权自由现金流量 FCFE
    - = FCFF - 给债权人的利息 + Net debt borrowing
    - 借来的钱会流向股东，所以要加上Net debt borrowing
    - 而债权人的钱不流向股东，所以要减掉那些利息

Financial Analysis Techniques 财务比率分析-关键

(!!)财务分析工具及比率分析

- (!)同比分析法
- (!!)常用比率
    - (!!)活动比率
        - Cash Flow to Revenue
            - = CFO / Net Revenue
        - Cash Return on Assets
            - = CFO / Average Total Assets
        - Cash Return on Equity
            - = CFO / Average Equity
        - Cash to Income
            - = CFO / Operating Income
        - Cash Flow per Share
            - = (CFO - Preferred Dividends) / # of common stock outstanding
    - (!!)流动性比率（短期偿债比率）
    - (!!)偿债能力比率
        - Coverage ratios 保证倍数，能cover多少倍的分母
            - Debt Coverage
                - = CFO / Total Debt
            - Interest Coverage
                - = (CFO + Interest paid + Taxes paid) / Interest paid
            - Reinvestment 单位固定资产能贡献多少CFO
                - = CFO / Cash paid for long-term assets
            - Debt Payment
                - = CFO / Cash paid for long-term debt repayment
            - Dividend payment

        - = CFO / Dividends paid
    - (!!)盈利能力比率
        - ROE
            -
        - Net Profit Margin or Return on Sales 净利率
            - = Net Income / Revenue
        - Gross Profit Margin 毛利率
            - = Gross Profit / Revenue
            - = (Revenue - COGS) / Revenue
            - 没有刨除各种费用，只是减掉了COGS
        - Operating Profit Margin 活动利率
            - = Operating Income / Revenue
            - = Income before interest and tax / Revenue
        - Pretax Margin
            - = Earnings before tax / Revenue
    - 估值比率
        - P/E 市盈率
            - = Price per share / Earnings per share (EPS)
            - Earnings的选择很关键，One-time events会影响很大
        - P/CF 每股现金流：单位现金流能撑起的股价
            - = Price per share / Cash flow per share
        - P/S 市销率：单位销售额能撑起的股价
            - = Price per share / Sales per share
            - 应用于亏损的公司来估值 (NI<0)
        - P/BV 市净率：
            - = Price per share / Book Value per share
            - 当 P/BV>1 时，公司的盈利能力远超过折现率，或者要求回报率
- (!!)杜邦分析法
    - **ROE** 权益净利率 Return of Equity
        - = NI / avg(Equity)
    - ROA 权益报酬率 Return of Asset
        - = NI / avg(Asset)
    - 财务杠杆 Financial Leverage
        - = Asset / Equity

- 销售净利率 Net Profit Margin
  - = NI / Sales
  - 利润表最后一行除以第一行
  - 体现赚钱能力
- 周转率or翻桌率 Turnover
  - = Sales / avg(Asset)
  - 体现企业efficiency经营效率
- 财务杠杆 Financial Leverage
  - = avg(A) / avg(E)
  - 体现企业财务政策
- EBT Earning Before Tax
- EBIT Earning Before Interest and Tax
- 两拆
  - $ROE = \frac{NI}{E} = \frac{NI}{A} \times \frac{A}{E}$
  - $ROE = ROA \times Financial\ Leverage$
- (!!)杜邦三步法
  - $ROE = \frac{NI}{avg(E)} = \frac{NI}{Sales} \times \frac{Sales}{avg(A)} \times \frac{avg(A)}{avg(E)}$
  - ROE = 销售净利率×总资产周转率×财务杠杆
  - 当ROA为正时，杠杆越大收益越多；当ROA为负时，杠杆越大越雪上加霜
- (!)杜邦五步法
  - $ROE = \frac{NI}{E} = \frac{NI}{EBT} \times \frac{EBT}{EBIT} \times \frac{EBIT}{Sales} \times \frac{Sales}{avg(A)} \times \frac{avg(A)}{avg(E)}$
  - ROE = (1-所得税税率)×Interest Burden Ratio×经营利润率×周转率×财务杠杆
  - (1-所得税税率)是Tax Burden Ratio; 税率变高，tax burden ratio变小lol，ROE变小
  - EBT/EBIT = Interest Burden Ratio; 利息越高，interest burden ratio越低，ROE越小。利息给了债权人，股权人拿到的就少
  -

财务分析、信用分析及企业分布报告

- 股权投资分析
  - 分红相关比率
    - Dividend Payout Ratio
      - % of earnings that pays out as dividends to shareholders
      - 一般是固定的，一旦改变，会影响预期，进而影响股价和earnings

        - Retention Rate (RR) 留存率
            - = 1 - Payout Ratio
            - % of earnings that company retains
    - (!)可持续增长率
        - = ROE * Retention Rate
- 信用分析
    - 信用风险：跑路风险
    - 两种分析方法
        - 现金流
        - 信用评估 - qualitative + quantitative factors
            - 定性分析
                - 整个行业：赛道、宏观环境、竞争情况
                - 公司本身：管理者、运转模式、策略
            - 定量分析
                - Profitability, leverage, cash flow adequacy, liquidity
                - Credit ratios
                    - EBITDA interest coverage
                        - = EBITDA / Interest expense
                    - EBIT Margin
                        - = EBIT / Total Revenue
                    - EBITDA margin
                        - = EBITDA / Total Revenue
                    - Debt to EBITDA
                        - = Total Debt / EBOTDA
                - Z-score
                    - Z = 1.2 A + 1.4 B + 3.3 C + 0.6 D + 1.0 E
                        - A = (Current assets - Current liabilities) / Total assets
                        - B = Retained earnings / Total assets
                        - C = EBIT / Total assets
                        - D = Market value of stock / Book Value of liabilities
                        - E = Sales / Total assets
                        - 如果 Z < 1.81，就风险过大，不给贷款
- 企业分部门报告 Segment Reporting
    - 分别披露世界各地的各个分公司和工厂
    - Segment Ratios

- Segment Margin
  - = Segment Profit(loss) / Segment Revenue
- Segment Turnover
  - = Segment Revenue / Segment Assets
- Segment ROA
  - = Segment Profit(loss) / Segment Assets
- Segment Debt Ratio
  - = Segment Liabilities / Segment Assets

Analysis of Inventories 存货-关键

(!)存货初始入账成本的确认

(!!)发出存货的计量

- 个别计价法
- 先进先出法
- 后进先出法
- 加权平均法

(!)存货盘点

- 实地盘存法
- 永续盘存法

(!!)存货减值

- 未来产生的经济利益下降
- IFRS
  - 比较Cost和Net Realizable Value，哪个小就用哪个
    - NRV = Selling Price - Selling Cost 销售成本，不是成本！
    - 如果cost大于NRV，就要发生减值
      - Inventory write down to NRV on B/S
      - A Loss is recognized in I/S
  - Reversal 转回: limited to the amount of the original write-down, recognized as a reduction in cost of sales
- US GAAP

    - 比较Cost和Market Value
        - 如何确定Market Value
            - Current replacement cost、NRV - normal profit margin、NRV这三者排序，中间的那个值是Market Value
        - 当Market Value比cost大时，说明多记了存货价值，这时候需要进行减值
        - 减值多少
            - 减到Market Value
                - Inventory write down to MV on B/S
                - A Loss is recognized in I/S
            - 不允许转回!
- 例外情况
    - 农林牧渔、矿业的存货
        - 估值时使用NRV
        - NRV = Fair value - 销售成本

(!)发出存货计价方法的变更

- 后进先出储备 LIFO Reserve
    - Income Statement changes
        - LIFO Reserve的变化影响利润表
        - $COGS_{FIFO} = COGS_{LIFO} - \Delta LIFO\ Reserve$ 减号!
        - $NI_{FIFO} = NI_{LIFO} + \Delta LIFO\ Reserve \times (1 - Tax\ rate)$
    - Balance Sheet changes
        - LIFO Reserve本身的数值影响的是资产负债表
        - $Inventory_{FIFO} = Inventory_{LIFO} + LIFO\ Reserve$
        - $RE_{FIFO} = RE_{LIFO} + LIFO\ Reserve \times (1 - Tax\ rate)$
    - Inventory Turnover Ratio
        - = $\frac{COGS}{avg(Inventory)}$
        - 记得把FIFO
- 后进先出储备消耗
    - LIFO Liquidation
        - 把前一个Layer的存货卖出去了
        - 经济危机时：公司需要降库存售价相同，成本变低，利润变高。
        - 判断依据：LIFO Reserve下降
        - 行动：需要对IS进行调整

(!!)与存货相关的财务报表和比率分析

- Evaluate the efficiency and effectiveness of inventory management
- Inventory turnover
- Days of inventory on hand
- Gross profit margin
    - Indicate the percentage of sales being contributed to net income as opposed to covering the cost of sales

存货管理

- 需要披露的事项
    - Accounting policies
    - Carrying amount of raw materials, work-in-progress, finished goods
    - NRV
    - Amount of inventories recognized as expense
    - Write-down expenses

Analysis of Long-Term Assets 长期资产-关键

(!!)长期资产的初始取得成本

- (!!)资本化与费用化
- (!)利息资本化
- (!!)资本化与费用化对财务报表的影响
- (!)无形资产的取得成本

(!)长期资产的折旧与摊销

- (!)固定资产的折旧
- 无形资产的摊销

(!!)长期资产的减值

- (!!)资产减值的步骤
    - IFRS
        - 比较carrying amount和recoverable amount可赎回价值 的大小
            - Recoverable amount = max(fair value - selling cost, value in use)
            - Value in use = present value of expected future cash flows

        - 如果Carrying amount比recoverable amount大，就需要进行减值
      - 减值可以被回调reversal，但只能回到最初的价格，不能比原价还高
    - US GAAP
      - 比较carrying amount和undiscounted expected future cash flows的大小，当carrying amount比较大时需要折旧
      - Measure: 减值到fair value的程度。减掉the difference between Fair Value and carrying amount
      - Reversal: Held for use不允许；Held for sale可以被转回，但不能超过原值
- (!!)资产减值的金额
- 对财报的影响
  - Assets: Decrease
  - Equity: Decrease
  - Debt / Equity: Increase 因为Equity变小了
  - Current income, ROA, ROE: Decrease 因为当期利润减少
  - Future income, ROA, ROE: Increase 当前减值不会对后期造成影响
  - Future depreciation expense: Decrease 相当于多折旧了很多，未来少折一些
  - Future asset turnover ratios: Increase 因为未来的Asset会降低
  - Cash flow: Same 现金流不受影响

长期资产的计量模式

- 成本模式 Cost model (IFRS & US GAAP)
  - Carrying amount / carrying value / net book value = historical cost - accumulated depreciation or amortization
- 重估模式 Revaluation model (only IFRS)
  - Carrying amount = Fair value - accumulated depreciation or amortization
  - 增值：计入OCI，在SHE中列为重估盈余 revaluation surplus
  - 减值：首先抵消以前的重估盈余，超出部分计入loss
- Investment property 投资性房地产 (under IFRS)
  - 为了投资而购买的，为了收租
  - Cost model：same as PPE
  - Fair value model：all changes affect net income
- 公允价值模式

长期资产的终止确认 De-recognization

- Sold 卖掉

    - Sale proceed和carrying amount的差值计为gain or loss
- Retired / Abandoned
    - Don't record cash proceeds, a loss equal to carrying amount is recorded
- Exchanged
    - Remove carrying amount

长期资产的剩余使用年限

- 先算Net PPE = Plant & Equipment - Accumulated Depreciation
- 再算Average Remaining Useful Life = Net PPE ÷ Annual Depreciation Expense

Topics in Long-Term Liabilities and Equity 长期负债-次要

(!!)债券

- 债券相关术语
- (!!)债券的发行和计量
- (!)债券终止
- 债券契约

(!)长期租赁

- 经营租赁 Operating lease：单纯使用资产，比如出租公寓
- 融资租赁 Financing lease：付清贷款之后所有权转换，比如分期付款租车
- 租赁的益处：便宜、抵抗产品更新换代
- (!)承租人角度 Lessee
    - 租期开始时：先确定ROU(Right-of-use)和Lease Liability (present value of fixed lease payments)
        - 资产采用直线摊销，负债使用摊余成本法
    - 租用期间：
        - IFRS
            - ROU需要折旧：折旧费用算在ROU Asset里
            - Interest Expense记在Lease liability：reduce the balance of lease liability
        - US GAAP
            - 对于Finance Lease：跟IFRS一样
            - 对于Operating Lease：recognize a single lease expense

                - 资产和负债都是摊余成本法
        - 特殊情况
            - 短租：小于一年的，直接费用化，进利润表
            - 租赁资产价值小：不需要确认资产负债，直接费用化
        - 例子：lease a machine for 4 years with annual payments of 1000 paid in arrears, interest rate on the least is 10%.
            - 计算ROU：N=4, I/Y=10, PMT=1000, FV=0, CPT PV = -3170
            - ROU摊销：原价3170，增加317，减少1000，剩余2487
- (!)出租人角度 Lessor
    - IFRS
        - Finance Lease
            - 租期开始时:
                - De-recognize the leased asset
                - Recognize a lease asset (包括租金和租赁结束时的剩余价值)
                - 对于Lessor是manufacturer or dealer的情况：
                    - 售价 Recognize the revenue (= value of the leased asset)
                    - 成本 COGS = carrying value of the leased asset
                    - 利润 Selling profit or loss = Revenue - COGS
            - 租期开始后：摊余成本法，recognize finance income
        - Operating Lease
            - Recognize lease income and depreciation expenses
    - US GAAP
        - 区分Sale-type
    - 例子：

养老金计划

- 设定提存计划
- (!)设定受益计划

Analysis of Income Taxes 企业所得税-次要

相关术语介绍

- 会计相关术语 - 在利润表中
    - Revenue - Expense = EBT

    - EBT - Income Tax Expense = Net Income
    - 权责发生制
- (!)税法相关术语
    - Taxable Revenue - Deductible Expenses = Taxable Income
    - Taxable Income -> Current Tax Payable
    - 现金收付实现制

(!!)暂时性差异

- (!!)暂时性差异的计算
    - 暂时性差异产生的原因
        - Income Tax Expense = Current Taxes Payable + ΔDTL - ΔDTA
        - 本期发生的税务费用和税务局认为的费用不一致
        - 除了对于资产折旧(企业直线折旧VS税法加速折旧)产生DTL，其它情况都产生DTA(包括无形资产研发、应收帐款、预收账款、预计负债)
    - (!!)计税基础的计算
    - (!!)递延所得税资产和递延所得税负债
        - DTA (Deferred Tax Assets)
            - 公司利润高，多缴税，未来经济利益流出变少(所以属于Asset)
            - 产生DTA：
                - 税局现在多收税，未来少收税
                - 公司利润高，现在多缴税 以后少缴税
        - DTL (Deferred Tax Liabilities)
            - 公司利润低，少缴税，未来经济利益流出将变多(所以属于负债)
            - 产生DTL：
                - 税局现在少收税，未来多收税
                - 公司利润低，现在少缴税 以后多缴税
- (!!)所得税费用的计算
    - Income Tax Expense = Current Taxes Payable + ΔDTL - ΔDTA
    - ΔDTL / ΔDTA = 当期Difference $\times$ Tax rate
        - 当税率增加时，ΔDTL 和 ΔDTA 都上升
            - DTA增加因为未来可以用来抵扣的税款金额增加
            - DTL增加因为未来要支付的税款金额增加
    - DTL和DTA不能Netted，需要分开报告
- (!)税率变化对报表的影响

永久性差异

- 产生的原因
- 影响

所得税相关分析

- 递延所得税资产的分析
- (!) 递延所得税负债的分析

Financial Report Quality 财务报告质量

(!)财务报告质量和盈利质量

- (!)财务报告质量和盈利质量的概念
  - 财报质量
    - 高质量财报
      - 提供相关信息，完整、中立、没有错报
    - 低质量财报
      - 提供不利于决策的信息 - 缺失、假信息
  - 盈利质量
    - 高盈利质量
      - 有现金流支撑、可持续
    - 低盈利质量
- 激进的会计方法与保守的会计方法
  - 激进型 - 两三年后的利润移到当期，window dressing粉饰报表
    - 资本化 - 操纵利润，把费用资本化
    - 折旧年限提高 - 当期利息高
    - 高估残值 - 折旧费用降低，利润虚高
    - 直线折旧法 - 费用较低，利润高
    - 减值滞后 - 减值费用影响当期利润
    - 坏账计提 Reserves for bad debt - 继续以应收帐款的形式存在，可能是虚假交易，也可能是坏账，没有回钱。可以查看账龄分析，如果时间越长 账目越多，可能存在销售造假
    - 低估Valuation allowances on deferred DTA
  - 保守型 - 遵循真实交易进行记录
    - 费用化

        - 折旧设备的年限低
        - 残值较低
        - 加速折旧法
        - 减值较早
        - 有更多的坏账reserve
        - 较多的Valuation allowances on deferred DTA
    - 操作NI的动机
        - 高估NI - 上市公司：提升盈利预期、拉高股价、维持债务条约、管理层津贴受盈利影响
        - 低估NI - 非上市公司：获得政府/税务补贴、逃避还债、逃避员工福利(与工会谈判)
    - 操作B/S的动机
        - 高估资产 - 高估Equity：加强流动性
        - 低估资产(较少) - NI低时让比例好看：获得更高的ROE, ROA, Asset turnover ratio
    - 为何造假
        - 有机会造假、有动机造假、自己骗自己
            - 内控系统失效 - 会计不行
            - 外部情况 - 钻会计准则的空子

财务报告质量的原因与应对措施

- Registration
- Disclosure
- Audit
- Management commentaries
- Responsibility statements
- Regulatory review of filing - 证监会审核，IPO财务不达标
- Enforcement mechanisms - 执法机构的筛查
- Private contracting - 贷款机构要求报表质量达标

(!)财务报告被操纵的迹象

- Revenue造假(>50%以上)
    - 查看Revenue的Recognition policies
    - Revenue的增长应与相似的竞争对手相当
        - 例子：浑水做空贝壳 - 做空报告指出其增长率过高

- Inventory造假
  - 存货增加量与竞争对手和行业基准进行比较
  - 计算inventory turnover ratio 存货周转天数
- Capitalization policies and Deferred costs
  - 长期资产的资本化
  - Deferred cost的处理
- Relationship of cash flow and net income
  - 看经营性现金流是否强劲
- 其它情况
  - 第四季度surprise - 把未来的利润挪到当年，灌水
  - 关联方交易 - 虚假交易灌水
  - 一次性售卖 - 一次性的大客户，不可持续支撑利润
  - 非常发费用 - 火灾
  - Gross profit和operating profit margin - 跟竞争对手比较
  - 初创公司 - 起初现金流往往不稳定
  - 管理层减少披露 - 重大事件简短报告
  - Management fixation on earning report - 为了增加盈利预期，管理层收入与股价挂钩，瑞幸咖啡

Financial Statement Modeling 综合应用

评估企业过往经营业绩
预测企业未来的经营成果
信用风险Credit risk评估

- 4C - Capacity, collateral, covenants, character
- Factors - Ratio
  权益投资分析
- 先从报表中得到相关数据
- 两种分析方法
  - Top-down：宏观经济进行分析，选择一个细分领域
  - Bottom-up：直接选中一家公司
- 对投资者进行分类
  - Growth investors - 投资增长型的企业
  - Value investors - 只要便宜就买 (巴菲特)

- Market-oriented investors - 投资市场偏好的类型
  分析师对财务报告的调整
- Accounting methods and estimate key accounting inputs
- Investments
- Inventory
- PPE
- Goodwill

Corporate Issuers

Organizational Forms, Corporate Issuer Features, and Ownership

Organizational Forms of Business

- Sole Trader or Proprietorship 独资企业
  - 一个人拥有和经营的企业
  - 例子：Family-owned business
- Partnership 合伙企业
  - General Partnerships 普通合伙企业
    - 普通合伙人承担无限责任
  - Limited Partnerships 有限合伙企业：
    - 普通合伙人(无限责任)：负责企业管理和决策
    - 有限合伙人(有限责任)：不参与管理，只有利润分享权
  - Limited Liability Partnerships (LLP) 有限责任合伙企业
    - 所有人都承担有限责任
  - 有更大的融资能力，税务处理简单(个人所得税)
- Limited Companies 有限公司
  - Private Limited Company (LLC) 私营有限责任公司
    - 有股份，Owners叫shareholder，选举board of directors来管理公司和分配利润
    - Board雇佣professional managers
    - 不公开发行股票，股份不能自由转让，少数股东持有
    - 通过个人所得税
  - Public Limited Company (PLC) or Corporations 上市公司

        - Board and management operated
        - 公开发行股票，大量股东
        - 公司要交Corporation income tax，股东拿到dividends要交personal income tax

Public Company VS Private Company

- 私有公司转公有公司
    - IPO Initial Public Offering - 有承销商underwriter、路演、定价，通过发行新股来筹集成本
    - 直接上市 Direct Listing - 不发行新股，现有股份直接挂牌交易
    - Acquisition - SPAC 特殊目的收购公司，通过IPO筹集资金，收购私有公司，实现上市
- 公有公司转私有公司
    - 投资者收购所有公开交易的股票并将公司私有化
- 内部控制 Internal control
    - 确定rights, roles, responsibilities
    - 目的是减小利益冲突 between insiders and external shareholders
- 两套体系
    - Shareholder theory 股东理论
        - 追求利益最大化
    - Stakeholder theory 利益相关方理论
        - 各方之间平衡
- Stakeholder groups
    - 只要跟公司有利益相关的都叫stakeholder
    - 股东、债权人、管理层、雇员、高管、客户、供应商、政府
- 股东：希望利益最大化
    - 控股股东 Controlling shareholders
    - 小股东 Minority shareholders
- 债权人 Creditors：银行和放贷人，在意偿债能力，还本付息
- 董事会 Board of directors
    - One-tier structure
        - 执行董事 Executive - Internal
        - 非执行董事 Non-executive - External, 监督平衡
    - Two-tier structure: 中日韩常见，国企
        - 监督 Supervisory board (Non-executive directors)

- 干活 Management board (Executive directors)

Investors and Other Stakeholders

ESG considerations

- 什么是ESG integration or ESG investing
  - 投资过程应考虑Environment, Social, Governance factors
  - 也叫做Sustainable investing (SI), responsible investing (RI), or Social Responsible Investing (SRI)
- ESG implementation methods
  - Negative Screening 黑名单
    - 不投资不利于社会长期发展的
  - Positive Screening / best-in-class 白名单
    - 只投资有利于发展的行业
  - ESG Integration
    - 全方位考量
  - Thematic Investing 主题投资
    - 大健康、新能源

Corporate Governance

原因

- Principal-agent relationship (Agency relationship)
  - 所有权和经营权分离

Shareholder conflicts

- Shareholder和Manager之间：风险诉求不同、信息不对称
- 控股股东和非控股股东之间：控股股东偏向自己的利益
  - Dual-class structure：同股不同权，“一票否决权”
- Shareholder和Creditor之间：风险承受度不同
- 客户和股东、客户和供应商、股东和政府监管

Corporate governance mechanisms
原则：legal, contractual, organizational, governmental infrastructure

Mechanisms of stakeholder management

- 股东大会
  - 年度股东大会 AGM, Annual General Meeting
    - 选任/罢免董事
    - 在一些国家可以批准财报
    - 投票：薪酬制度
    - 任免外部审计师
  - 临时股东大会 EGM, Extraordinary General Meeting
    - 公司合并和并购
    - 修改公司条例
    - 售卖重要资产
  - 投票表决通过
    - AGM需要大于50%
    - EGM需要大于2/3或75%
- Board of Director Mechanisms
- Audit Function
  - 内审：从内部提出建议
  - 外审：审核财报并公开
- 利益相关方交易
  - 避嫌，防止高价采购
- 制定薪酬制度
  - 将员工的利益与股东利益align
  - 以长期业绩作为回报
  - Clawback provisions - 今年赚多，明年赚少，要把奖金吐回来

Board of directors 董事会

- 连接Shareholder和Managers的中间人
- Staggered boards - 董事会被分为三组，每组任期相同，每年选一组。确保不会全部更换
  - 反收购措施，增加恶意收购的难度和成本
  - 连续性和稳定性
  - 长期规划
- 董事会的职责
  - Duty of care：努力干活

- Duty or loyalty：对股东负责，忠诚

Board of directors committees 董事会的分工(各种委员会)

- Audit Committee
- Governance Committee
- Remuneration / Compensation Committee
- Nomination Committee
- Risk Committee
- Investment Committee

影响Stakeholder relationship的因素

- 市场因素
  - 股东介入 Shareholder Engagement
  - 反对短期主义 Short-term activist investors
  - 阻止negative recommendations from proxy advisory firms
  - 投票上支持管理层
  - 股东积极主义 Shareholder Activism
  - 利用投票权,支持或反对管理层的提案
  - 与管理层沟通,影响公司决策方向
  - 公开呼吁或媒体宣传,给管理层施加压力
  - 代理权争夺战(proxy fight),推翻现有董事会,改选新的董事会成员
  - 法律诉讼,起诉公司管理层或董事会,改变公司行为或政策
  管理不好会导致
- Weak control systems
- Ineffective decision making
- Legal, regulatory, and reputation risk
- Default and bankruptcy risk

管理得好会导致

- Operational efficiency
- Improved control
- Better operating and financial performance
- Lower default risk and cost of debt

Analyst considerations

- Factors relevant to corporate
- Governance analysis

Working Capital and Liquidity

Cash Conversion Cycle

- Internal Financing 内部融资
  - After-tax operating cash flows
  - Accounts payable (流动资产)
  - Accounts receivable (流动资产)
  - Inventory & marketable securities (流动资产)
- External Financing 外部融资
  - Financial Intermediaries - 各种信贷，贴现factoring
  - Capital Market - 商业票据 financial paper，债券、混合证券、普通股股票(上市)
- Other Financing
  - Leasing Obligation 融资租赁 - 房子卖掉之后再租回来

Liquidity

- 定义：偿还短期债务的能力
- Primary source of Liquidity 一级流动性
  - 公司正常经营产生的现金流，健康
    - Free cash flow
    - Ready cash balances - 账上的存款
    - Short-term funds - trade credit, bank line of credit
    - Cash flow management - Receivable, Payable, Inventory
- Secondary source of Liquidity 二级流动性
  - 公司不正常时
    - 发行股票
    - Negotiating debt contracts - 跟债权人沟通，减少债务
    - Liquidating assets - 变卖资产
    - Filing for bankruptcy protection and reorganization - 破产
- Measurement of Liquidity
  - Liquidity Ratios - 衡量企业短期偿债能力
    - Current Ratio 流动比率

        - = Current Assets / Current Liabilities
        - Current Liabilities = Accounts Payable + Accrued Expenses
        - 通常流动比率为1或以上比较健康
    - Quick Ratio 速动比率
        - = (Cash + Short-term Securities + Receivables) / Current Liabilities
        - 排除了流动资产中的Inventory
        - Short-term securities包括短期商业票据等可以快速变现的证券
    - Cash Ratio 现金比率
        - = (Cash + Short-term securities) / Current Liabilities
        - 只考虑Cash和短期证券，最严格的流动性测量标准
- Activity Ratios - 衡量企业利用资产的效率
    - Accounts Receivables Turnover 应收帐款周转次数
        - = Credit Sales / Average Receivables
        - 一定期间内将应收帐款转化为现金的次数
        - 次数越多，表示企业收回应收帐款的效率越高
    - Inventory Turnover 存货周转次数
        - = COGS / Average Inventory
        - 在一定期间内将存货销售出去的次数
        - 次数越多，表示企业管理存货的效率越高
    - Number of Days of Receivables 应收帐款周转天数
        - = 365 / Receivable Turnover
        - 平均需要多少天来收回应收帐款
        - 天数越少，表示企业收回应收帐款的速度越快
    - Number of Days of Inventory 存货周转天数
        - = 365 / Inventory Turnover
        - 平均需要多少天来销售其存货
        - 天数越少，表示企业存货周转速度越快
    - Number of Days of Payable 应付帐款周转天数
        - = 365 / Payables Turnover
        - 平均需要多少天来支付其应付账款
        - 天数越多，表示企业在支付账款方面拥有较长的宽限期
    - Operating Cycle
        - = Days of Inventory + Days of Receivables
    - Cash Conversion Cycle 现金周转周期
        - = Days of Inventory + Days of Receivables - Days of Payables

        - 从购买存货到最终销售并收回现金所需的总天数
        - 周期越短，表示企业能够更快地将投入转化为现金，从而提高资金的周转效率
    - Free cash flow = cash flow from operations - investment in long-term assets

Managing Working Capital and Liquidity

- Drags and Pulls on Liquidity 抑制流动性的因素
    - 收钱慢 - Uncollected receivables, obsolete inventory, tight credit
    - 给钱快 - Early payment, reduced credit limit, low liquidity positions

Evaluating Short-term Financing Choices

- Size and Creditworthiness - 信用等级
- Legal and Regulatory considerations
- Sufficient access - 最好有多家选择
- Flexibility of borrowing options - 权力：违约/提前还款的情况

Capital Investments and Capital Allocation

The Capital Allocation Process

- 决定资本投在哪里的过程
- 步骤
    - Idea Generation
    - Investment Analysis
    - Capital Allocation Planning
    - Monitoring and Post-Audit
- Capital projects 资本项目
    - Replacement Projects 替换性项目 - 体量没有变
    - Expansion Projects 扩张性项目 - 体量变大
    - New Products and Services 新产品项目
    - Regulatory, Safety, and Environmental Projects - 出于监管要求，必须要买，可能产生负向现金流
    - Management Pet Projects 管理层喜好 - 丁磊养猪
    - High-risk Investments 高风险投资
- (!!) Capital Allocation Assumptions

- Decisions are based on cash flows 基于增量现金流
- Cash flows are not accounting net income or operating income 而不是会计收入或营业收入
- Cash flows are based on opportunity costs 投资其他项目获得的好处就是这个项目的机会成本
- Cash flows are analyzed on an after-tax basis 考虑税后情况
- Timing of cash flows is crucial 时间有价值，早拿到钱更好
- Financing costs / interest cost are ignored 在折现率中考虑，不在现金流中考量
- Sunk costs are ignored 不考虑沉没成本，无论做不做都要花的钱
- Cannibalization (negative externality) 投资这个项目可能对其它已投资的项目造成影响

Investment Decision Criteria

- Net Present Value (NPV) 净现值 - 用计算器
  - 定义：未来现金流的Present value与初始投资成本的差值
  - 计算：
    - 把每个时间节点给的钱折现到0时间，求和，减去Outlay
    - PV of the future after-tax cash flows - investment outlay
    - 计算器
      - 清除先前数据：按 `CF` 键进入现金流输入模式，按 `2ND` 然后按 `CLR WORK` 清除先前数据
      - 输入初始投资：按 `CF`，输入 `-100000`，按 `Enter`
      - 输入每期现金流：按向下箭头键；输入 `30000`，按 `Enter`，再按向下箭头键；重复上述步骤直到所有期的现金流都已输入 (连续发生五年就F=5)
      - 计算NPV：按 `NPV` 键，输入折现率 `10`，按 `Enter`；按向下箭头键，然后按 `CPT` 键计算NPV
  - Decision rule
    - Independent projects
      - NPV>0，赚，投
      - NPV<0，赔，拒绝
    - Mutually exclusive projects
      - 选择NPV最高的那一个来投
  - 优点
    - 具体的绝对数字

        - 可以明确value增加或减少
        - 考虑时间价值的影响
    - 缺点
        - 受到投资体量的影响大
- Internal Rate of Return (IRR) 内部收益率 - 用计算器
    - 定义：当NPV=0时对应的折现率，表示预期年均收益率
    - 计算：
        - 清除先前数据
        - 输入初始投资
        - 输入每期现金流
        - 计算IRR：按 `IRR` 键，按 `CPT` 键计算IRR
    - Decision rule
        - IRR > required rate of return, 收益率高于资本成本，投
        - IRR < required rate of return, 不投
        - 选IRR最高的那个来投
    - 优点
        - 是相对数值，不受投资体量的影响
    - 缺点
        - 再投资假设 - 不是所有投资都有那么高的回报率
        - 多元方程可能出现多个解或无解的情况，算不出IRR
        - NPV和IRR可能出现冲突，此时优先考虑NPV高的
- Return on Invested Capital (ROIC) 投入资本回报率
    - 定义：通过运营和资本投资获得的回报率，衡量利润率
    - 计算：
        - ROIC = After-tax operating profit / Average book value of invested capital (common, preferred, debt) 面值，不是市值！
            - Invested capital包括Long-term debt, share capital, Retained earnings
    - Decision rule
        - ROIC > Cost of capital，回报超过资本成本，公司创造价值，投
        - ROIC < Cost of capital，公司消耗价值，不投

Real Options 实物期权

- 定义
    - 用来评估企业在投资时面对不确定性时拥有的灵活性，与传统的NPV方法不同，考虑各种risk和管理层可以采取的行动

- 类型
  - Timing Options - 允许选择何时进行投资
  - Sizing Options - 允许调整投资规模，扩展/收缩/放弃投资
  - Flexibility Options - 允许转换生产模式或产品
  - Fundamental Options - 允许根本性变更，进入/退出市场

Capital Structure

The Cost of Capital

- 定义：投资者要求的rate of return
- 融资途径：Debt, Common stock, Preferred stock
- Weighted Average Cost of Capital (WACC) 加权平均资本成本
  - 定义：Margin cost of each sources of capital
  - 计算
    - WACC = $w_d \times r_d \times (1-t) + w_p \times r_p + w_e \times r_e$
    - w_d、w_p、w_e分别是debt, preferred stock, common stock的占比，根据market value决定，不是book value
    - r_d、r_p、r_e分别是它们的marginal cost
    - t是tax rate
  - 税率的影响
    - 只有debt能抵税，股票融资不行
    - Tax shield 税盾效应：企业支付的债务利息可以在税前抵扣，从而减少企业的应税收入，进而降低企业的税负
  - 占比比例
    - 如果未来的比例知道，直接用
    - 如果不知道，可以用目前的/估计未来趋势/竞争对手的比例
- Cost of Different Sources of Capital
  - Cost of Debt
    - YTM Approach
      - YTM (Yield to Maturity) - 计算折现率
      - 计算器：知四求一
      - Debt可以抵税，算出来要乘以(1-t)！
    - Debt Rating Approach
      - 找到相同评级的其它债券的回报率

        - 抵税之后得到回报率！
    - Cost of Debt Preferred Stock
        - 适用于nonconvertible, non-callable优先股，有固定股利，no maturity date
        - $r_{ps} = \frac{D_{ps}}{P}$
            - r_{ps} - The preferred stock dividend per share 股息成本
            - P - The Market Price of preferred stock per share 优先股市值
        - 不考虑tax！
    - Cost of Common Stock
        - CAPM Approach - Capital Asset Pricing Model
            - $E(R_i) = R_f + \beta_i[E(R_m) - R_f]$
                - R_f - Risk-free rate，一般是十年期国债 T-bill
                - β_i - Return sensitivity of stock i to changes in market return，衡量股票相对于市场的波动性
                - $E(R_m)$ - Expected market return
                - $E(R_m) - R_f$ - Risk Premium
            - 多用于大型上市公司的评估
        - Bond-yield + Risk-premium Approach
            - $R_e = R_d + Risk\ premium$
                - R_e - 普通股成本
                - R_d - Before-tax cost of debt 公司债券的收益率，普通股不考虑折税
                - 发展中国家的Risk premium一般是3～5%
            - 在没有准确的市场数据时使用，没有CAMP那么精准
- Estimating Beta
    - 历史数据回归法： Regression Analysis找斜率，横轴是Market Return，纵轴是Stock Return
    - 行业Beta调整法：使用行业平均Beta并根据公司特定情况进行调整(+公司债务/股本的市场价值)
    - 财务模型估算法：CAPM反过来用
- Flotation Costs 发行费用
    - 直接计算法
        - 浮动成本百分比 = 浮动成本 / 凑集的总金额
    - 资本成本法
        - $R_e = \frac{D_1}{P_0(1-F)} + g$
            - R_e - 普通股成本 Cost of Equity

        - D_1 - 下一年度预期股利 Exp Dividend for next year
        - P_0 - 当前股价 Current Stock Price
        - F - 浮动成本百分比
        - g - 股利增长率 Dividend growth rate
    - 调整：普通股成本 = $\frac{D_1}{P_0} + g$
        - 发行新股时，浮动成本使得公司实际收到的资金减小，所以根据浮动成本进行调整

Factors Affecting Capital Structure

- Company life cycle
    - Start-ups：股权融资占多数，债券融资很少
    - Growth business：融资途径多样
    - Mature business：压缩融资成本，找利率低的融资途径
- Cost of Capital - 利息高低
- Financing considerations - 条款
- Competing stakeholder interests - 利益相关方的诉求

Modigliani–Miller Capital Structure Propositions

- 解释公司资本结构对其整体价值的影响，公司的价值取决于创造的现金流
- 前提
    - Homogenous expectations 同质化预期：投资者预期的现金流是相同的
    - Perfect capital markets 理想化市场：没有税、手续费、破产成本，信息透明
    - Risk-free rate 无风险利率：贷款利率是国债利率(现实世界没有)
    - No agency cost 没有代理费：管理层时刻为股东着想
    - Independent decisions 融资和投资是分开考量的，互不影响
- MM Position I without Tax
    - 一个公司的资本结构不会影响其整体市场价值，无论公司是通过债务融资还是股权融资，其市场价值都是一样的
- MM Position II without Tax
    - 在没有税收的情况下，公司的股权成本（Cost of Equity）会随着财务杠杆的增加而线性增加。
    - 当公司增加债务融资时，由于股东承受的风险增加，他们要求的预期回报率也会上升
- MM Position I with Tax
    - 有债务公司的市场价值等于无债务公司的市场价值加上债务带来的税收盾的现值

    - 公司整体价值上升
- MM Position II with Tax
    - 杠杆有折税作用，多负债有利于整体价值提升
- 与现实之间的差距
    - 借债太多可能导致破产
    - 杠杆高之后，公司信用受到打击

Optimal and Target Capital Structure

- 最优资本结构 - Static Trade-off Theory 静态权衡理论
    - $V_L = V_U + t \times D - PV(Costs\ of\ financial\ distress)$
    - Capital structure determines optimal capital structure
    - 公司会在债务融资、税收收益、破产成本之间找一个平衡点，已确定最佳债务和股权比例
        - Tax Shield - 债务可以降低税负，增加公司价值
        - Bankruptcy Costs - 负债过高时，破产风险增加
        - Agency Costs - 高债务水平导致管理层和股东采取高风险项目，增加债务成本
        - Financial Distress Costs - 接近破产时运营效率下降，这些成本随着债务水平增加，抵消税盾效应
- Agency costs - Free cash flow hypothesis
    - Higher debt levels impose discipline on managers to avoid perks and non-value-adding acquisitions
- Asymmetric information - Pecking order theory
    - By investors and issuers and the important role of signaling
- 为何难以达到最优资本结构
    - 投资机会转瞬即逝，没空考虑收益和杠杆
    - 市场在变，股价高的时候多发股票融资
    - 信息不对称性：股东不如管理层有更多信息
    - 披露程度不同：管理层偏好不披露信息，不IPO就可以闷声发大财

Agency Costs 代理人决策成本

- 定义
    - 所有者和管理者之间存在利益冲突，管理者通常拥有更多信息，使得股东难以控制和监督管理者的行为
- 降低Agency cost的方法

Measures of Leverage

- 定义
  - 固定费用的占比 - 销售量的小变动➡️ NI的大变动
    - 经营杠杆 - 资产的折旧、租金
    - 财务杠杆 - Interest expense
  - 增加Volatility：放大风险、放大收益
- Business and Sales Risks
  - 商业风险 - 能影响利润的因素
    - 销售风险 Sales risk - 没有达到固定价格预期/销量预期
    - 财务风险 Financial risk - 支付利息和偿还本金的压力
      - 利用debt和preferred stock来融资，增加资金却不稀释现有股东的股权
      - Debt成本固定，优先股股息只有在盈利时才支付
- Operating Risk and Operating Leverage
  - 计算DOL - Degree of Operating Leverage
    - DOL = $\frac{\frac{\Delta EBIT}{EBIT}}{\frac{\Delta Q}{Q}} = \frac{sale-TVC}{sale-TVC-TFC}$
      - TVC - Total Variable Cost
      - TFC - Total Fixed Cost
  - 销量增加会导致杠杆变大，放大EBIT而不是NI
- Financial Risk and Financial Leverage
  - 计算DFL - Degree of Financial Leverage
    - DFL = $\frac{\frac{\Delta NI}{NI}}{\frac{\Delta EBIT}{EBIT}} = \frac{Q(P-V)-F}{Q(P-V)-F-C} = \frac{EBIT}{EBIT-利息支出}$
      - C - 固定财务成本
      - C>0时DFL>1; C<0时DFL<1
      - DFL不受Tax rate影响，因为税款不是固定财务支出
  - DFL对NI和ROE的影响
    - 杠杆增加能够降低NI
    - 进而导致ROE增加，以及增加Volatility of ROE
- Total Leverage and The Degree of Total Leverage
  - 计算DTL - Degree of Total Leverage 总杠杆系数
    - DTL = $DOL \times DFL = \frac{Q(P-V)}{Q(P-V)-F-C}$
  - 描述销量对NI的影响：销量增加5%，总杠杆是5 ➡️ NI增加25%
- Breakeven Points and Operating Breakeven Points
  - 盈亏平衡点：“收入=总成本”的点

        - $PQ = VQ + F + C$, 代入得到$Q_{BE} = \frac{F+C}{P-V}$
    - 经营盈亏平衡点
        - $Q_{OBE} = \frac{F}{P-V}$
    - 杠杆高➡️ 固定费用高➡️ 卖的东西多才能平衡固定支出➡️ 平衡点高
    - 销量距离平衡点越远➡️ 杠杆的作用越大

Business Models

Defining the Business Model

- The customers and the market
- Product or service offering
- Channels - sales and marketing & distribution
    - Direct sales - 厂家直接卖给消费者
    - Omnichannel - 多渠道销售(线上&线下)
- Pricing
    - Commodity producers - price taker
    - Differentiated products - more pricing power
- Pricing and Revenue Models
    - Price discrimination
        - Tiered pricing - 根据购买量或者feature不同定价，比如不同trim的车
        - Dynamic pricing - 淡季旺季、高峰期、节假日的售价不同
        - Value-based pricing - 根据顾客的机会成本不同定价，救命药
        - Auction/reverse auction models
    - Selling multiple or complex products
        - Bundling - 套装比单买便宜
        - Razor - 电动剃须刀便宜刀片贵，打印机便宜墨盒贵
        - Add-on pricing - 附加服务，比如游戏皮肤、特权
    - Penetration pricing - 用非常便宜的价格占领市场
    - Digital business - 边际成本很小
        - Freemium - 广告
        - Hidden revenue - 另外有赚钱办法
    - Subscription and Franchising - 替代所有权

Equity Investment

Market Organization and Structure

Functions of the Financial System

- Help people achieve their purposes in using the financing system
  - 存钱、借钱、筹钱、风险管理、资产交换、信息驱动型交易
- Determine rates of return
  - 回报率： Aggregate supply of funds = Aggregate demand of funds
- Capital allocation efficiency
  - 资本流向使资本利益化最大的地方，where uses that are most productive

Financial Market的分类

- 按照capital flow
  - Primary Market - Newly issued securities
  - Secondary Market - Investors trade to each other
- 按照Delivery data
  - Spot Market 现货市场 - trade for immediate delivery
  - Forward / Futures Market 期货市场 - trade contracts for delivery in the future
- 按照Maturity
  - Money Market 货币市场 - 1 year or less
  - Capital Market 资本市场 - more than 1 year
- 按照Position and underlying
  - Traditional Market 传统市场 - all publicly traded debts and equities and shares in pooled investment vehicles
  - Alternative Market 另类市场 - include hedge funds, private equity, commodities, real estate securities, collectibles...

Assets and Contracts

- Financial Assets的分类
  - Securities 证券
    - Fixed income 固守 = 债券
      - Notes, Bonds, bills, certificates of deposit, commercial paper
    - Equities 权益
      - Common shares, Preferred shares, Warrants 权证

        - Pooled investment vehicles
            - Open-ended funds, Closed-ended funds, ETFs, Asset-backed securities, Hedge funds
                - Open-end和Close-end的区别：卖完之后是否能再多发，open-end的流动性高，溢价高；Close-end需要折价出售
                - ETF 开放型指数基金
    - Currencies 货币
    - Contracts
    - Commodities
    - Real Assets

Securities

- Fixed Income - Interest and principal payments
    - Bonds and Notes - Bonds are long-term; Notes are short-term
    - Convertible Bonds - 可以转换成stock
    - Bills, Certificates of Deposit, Commercial paper - short-term instruments issued by 政府、银行、公司
    - Repurchase Agreements (Repos) - short-term lending
- Equities
    - Common shares - Ownership of residual rights to assets and dividends
    - Preferred shares - preferred rights to cash flows and assets
    - Warrants 权证 - allowing holders to buy stock at a specific price
- Pooled investments - pool money from many investors
    - Mutual Funds - open-ended funds issuing and redeeming shares based on net asset value
    - Closed-end Funds - Fixed number of shares that trade in secondary markets
    - ETFs Exchanged-Traded Funds and ETN Notes - Open-ended funds traded in secondary markets, price converging with net asset values
    - ABS Asset-backed Securities - Securities derived from a pool of assets, passing through interest and principle payments
    - Hedge Funds - Investment funds with varied strategies, involving leverage and performance-based compensation

Currencies, Commodities and Real Assets

- Currencies 货币

    - Primary reserve currencies: US dollar and euro
    - Secondary reserve currencies: British pound, Japanese yen, Swiss franc
    - Spot exchange rate - immediate exchange
    - Institutional trades - settle in 2 business days
- Commodities
    - 石油、天然气、稀有金属、农产品、碳配额
    - 应用：套期保值 hedge operational risks, speculate on future price changes
    - Preferred Commodities for Trading
        - Nonperishable products with low delivery and storage costs
        - 例如贵金属、工业水晶、高价工业金属(铜铝汞)，碳配额
- Real Assets
    - 房地产、飞机、机械、lumber stands 木材储备
    - 直接投资：在我名下
    - 间接投资：买房地产投资公司的股票
        - REITs 房地产投资信托 and MLPs 大宗商品LP 提供更高的流动性

Contracts

- Contracts
    - Forward, futures, swap, option contracts
    - 合同的价值取决于underlying asset的价值
    - Settlement 交割方式
        - Physical 实物交割 - 物品的交换
        - Cash 现金结算
    - Forward contracts 远期合同
        - 在未来以今天约定的价格交易
        - 通常用于风险对冲
        - 缺点：不能退出合同，只能等待结算日到来，有交易对手违约风险
    - Future contracts 期货合同
        - 由clearinghouse担保的标准化远期合同
        - 通过margin accounts保证金来进行每日结算，以管理风险并确保履约
            - 低于maintenance margin时要补钱，不然position会立刻被trade to offset
        - 优点：没有交易对手违约风险、增加流动性
    - Swap contracts 掉期合同
        - 根据未来资产价格或利率交换周期性现金流

        - 类型：利率掉期、大宗商品掉期、货币掉期、股票掉期
    - Option contracts 期权合同
        - 在指定价格之前或指定日期买入/卖出
        - 类型：call option认购期权、put option认沽期权
        - 欧式风格：只在到期时行使；美式风格：在到期之前任何时候行使
        - 期权费：compensating writers 期权卖家 for potential liabilities
    - Other contracts
        - 保险合同
        - 信用违约掉期 CDS Credit Default Swaps：针对债券违约的保险，将高风险债券转换为安全投资

Financial Intermediaries 金融中介

- Brokers 经纪人
    - 定义：Agents who fills orders for their clients without trading with them
    - 类型
        - Individual Brokers: Work for brokerage firms, banks, or exchanges.
        - Block Brokers 区块经纪人: Handle large orders to minimize market impact. 处理大宗交易，通过分解大订单、分散交易时间等方式来减少订单对市场造成冲击
    - 功能：Reduce the cost of finding counterparties, help clients trade efficiently
- Exchanges 交易所
    - 定义：Venues where traders meet to arrange trades
    - 功能：Act as brokers by using electronic order matching systems
- Alternative trading systems (ATS) 另类交易系统
    - 定义：Electronic trading venues similar to exchanges but without regulatory authority
    - 类型
        - Electronic communication networks (ECNs)
        - Multiple trading facilities (MTFs)
    - 功能：Offer innovative trading systems, often used by large investment managers to minimize market impact
    - Dark pools - Alternative trading systems that do not display the orders that their clients send to them.
- Dealers 做市商/交易商
    - 定义：Traders who fill their clients' orders by trading with them

    - 功能：Provide liquidity by buying from sellers and selling to buyers, aiming to reverse trades for profit
    - Broker-dealers - Perform both brokerage and dealing functions，存在天然冲突，利益诉求不同：broker寻求最低价格，dealer更希望高价售出
    - Primary dealers - Trade with central banks to conduct monetary policy，e.g., buying and selling government securities
- Arbitrageurs 套利商
    - 定义：Traders who exploit price differences of identical or similar instruments in different markets
    - 功能：Provide liquidity by connecting buyers and sellers in different markets, profiting from price discrepancies.
    - 类型
        - Pure Arbitrage - buying and selling the same instrument in different markets
        - Hedging Arbitrage - trading closely related instruments
    - 技术
        - **Replication**: Using financial strategies to replicate the returns of securities and contracts, managing risk and creating or eliminating contracts in response to market demand.

Securitizers, Depository Institutions and Insurance Companies

- Securitizers 证券化机构
    - 定义：Banks and investment companies create new financial products by buying and repackaging securities or other assets into pools and selling shares of these pools to investors
    - 证券化过程
        - Example: Mortgage banks originate residential mortgages, place them in a pool, and sell shares of the pool as mortgage-backed securities (MBS).
        - Investors receive monthly principal and interest payments after servicing costs.
    - Tranches: Different classes of securities with varying rights to the cash flows, 低级分层证券承担更多风险，被叫做“toxic waste”
- Depository Institutions
    - Raise funds from depositors and investors, lend to borrowers. Offer interest, transaction services, and returns to depositors

- Insurance Companies
  Settlement and Custodial Services and Summary
  Positions 头寸
- Long position 多头头寸
  - 买入，看涨，承担有限风险
- Short position 空头头寸
  - 看跌，先借券，卖出，在跌了之后再买回来还上，承担无限风险
  - 赚的钱 = 下跌的差价 - 借债券的费用
  - Lender
  - Payments-in-lieu 以付款代替：借走期间的dividend要给股票的原主人
  - 费用
    - Collateral - proceeds of the short sale on deposit
    - Short rebate interest - 如果难以借到，可能是负值
- Leverage position 杠杆头寸
  - Buy on margin 保证金交易
    - 本金50，借100：Margin保证金是50，Margin loan保证金贷款是100
    - Call money rate - 保证金贷款利率
    - Financial leverage ratio = 1 / MM
    - 1 / 杠杆 = 自有资金占总仓位的比重
  - Initial margin requirement 初始保证金 IM
    - = 自有资金 / 总仓位
  - Maintenance margin requirement 维持保证金 MM
  - Margin call 追加保证金
  - Margin call price
    - $P_c = P_0 \frac{1-IM}{1-MM}$
    - 需要追加保证金的警戒线

Orders and Execution Instructions

- Price quoted by dealers 做市商
  - Bid price 买价 - the price at willing to buy
  - Ask/offer price 卖价 - the price at willing to sell
    - Ask prices总是高于bid prices
  - Bid sizes, sell sizes - the quantities to trade
  - Bid-ask spread - difference between the best bid and the best offer
    - Bid-ask spreads are an implicit cost of trading

        - Two-sided market - dealer quote both bid and ask prices
        - The market spread is never more than any dealer spread
    - The best bid - highest bid in the market 愿意买入的最高价
    - The best ask/offer - lowest ask/offer in the market 愿意卖出的最低价
- Orders
    - Execution instructions 执行指令 - how to fill the order
        - Market orders 市价单：buy or sell immediately at the best current price
            - 缺点：非常贵(交易的过程会影响价格，best current price的position很少)
        - Limit orders 限价单：当股票价格达到或超过设定的限价时，按限价或更好的价格执行
            - 确定交易在限定的价格或更好的价格执行
            - 比较Aggressive，可能购买很大量(如果价格一直达不到指定值)
            - 因为指定了价格区间，更容易成交，也有很多立即成交
        - Make the market 做市 - the best bid and the best offer
        - Take the market 接市 - 接受当前市场报价并进行交易，a limited buy order at best ask, or a limited sell order at best bit
        - Make a new market - 提供一个新的报价，在当前的best bid和best ask之间
        - Behind the market - 标价远离市场最优价(成交概率低)
        - Far from the market - 标价太远离市场
        - Other instructions
            - All-or-nothing (AON) orders - 要么全部成交，要么全都不成交
            - Hidden orders 隐藏单 - only exposed to brokers/exchangers
            - Iceberg orders 冰山指令 - expose only a specific display size, the rest is hidden from the public
    - Validity instructions 时效指令 - when the order may be filled
        - Day orders 当日有效单
        - Good-till-cancelled
        - Immediate-or-cancel
        - Good-on-close 要闭市时下单
        - Good-on-open 刚开市时下单
        - Stop orders 止损单 - 在股票价格达到或跌破设定的止损价格时，将订单转换为市场订单：到了limit才刹车，停在哪里就是哪里
    - Clearing instructions 结算指令 - how to settle the trade
        - Retail trades - customer's broker来

        - Institutional trades - custodian或another broker
        - Must indicate the trade is a long sale or a short sale

Primary Security Markets

- 功能
    - Public offering - IPO, seasoned / secondary offering
    - Other primary market transactions
        - Private placement
        - Shelf registration
        - Dividend reinvestment plan (DRPs)
        - Rights offering
- IPO (Initial public offerings) 首次公开发行
    - Underwriting offering 承销 - Investment bank guarantees the sale of the entire issue, book building (build a book of orders which they can sell the offering)
    - Best effort offering 代销 - IB只作为broker
- Seasoned offerings / Secondary offerings 增发新股
    - New shares issued by firms already have shares
- Private placement 私募/定向增发
    - Corporations sell securities directly to a small group of qualified investors
- Shelf registration 上架注册
    - 一次注册，多次发行
- Dividend reinvestment plan (DRPs)
    - 把dividend换成股票
- Right offering 股权出售
    - 现有股东的权力，以更低的价格购入股票
    - 抢钱：别人都行权，自己不行权，占比就变少了，控制权被稀释

Secondary Security Market and Contract Market Structures

- 按照trading sessions分类
    - Call Market 点对点市场 / 集合竞价市场
        - All buy and sell orders are gathered, a single price is chosen to maximize the total volume of trade 按照成交量最大的价格进行交易
    - Continuous trading market 连续竞价市场
        - Trades can be arranged and executed anytime the market is open
        - 缺点：不同时间的buyer and sellers没法trade with each other

- 按照execution mechanisms分类
  - Quote-driven markets 报价驱动市场
    - Customers trade with dealers
    - 除股票之外的多数交易发生在quote-driven markets
    - 价高者得，也叫dealer market or over-the-counter (OTC) market
  - Brokered market 经纪人市场
    - Brokers arrange trades between their customers
    - 特点：每个客户有独特且流动性差的商品
    - 例子：房地产、大宗交易、艺术品
  - Order-driven markets 指令驱动市场
    - 根据相关规则来match buy orders to sell orders
    - 依赖交易体系：exchanges and automated trading systems
    - Order matching rules
      - Price priority - 出价最高的买家和报价最低的卖家优先交易
      - Display precedence - 出价相同的订单：普通单优先交易，隐藏单置后
      - Time precedence - 上面两项都相同：先下单先交易
    - Trading pricing rules
      - Uniform pricing rule - call market用，交易量最大的价格优先
      - Discriminatory pricing rule - 连续竞价市场用，价格歧视
      - Derivative pricing rule - 用其它market的价格来定价

Well-functioning Financial Systems

- 特点
  - Complete Market
  - Operationally efficient - low transaction fee
  - Informationally efficient - security prices reflect their fundamental values
  - Allocationally efficient - resources go where they are most valuable
- 目标
  - Ensure long-term liabilities are funded

  Market Regulation

Security Market Indexes

Index Definition and Calculations of Value and Returns

- 定义：A security market index represents a given security market, market segment, or asset class
- Constituent securities 成分证券 - 组成security market index的individual securities
- Price return index - reflect only the prices of constituent securities
- Total return index - not only prices of constituent securities but also **reinvestment of all income (dividends, interest)** received
- 计算 Value of price return index
  - $V_{PRI} = \frac{sum(n_i P_i)}{D}$
  - V_{PRI} - the value of the price return index
  - n_i - the number of units of constituent security i held in the index portfolio
  - N - the number of constituent security in the index
  - P_i - the unit price of constituent security i
  - D - the value of the divisor (人为规定的)
- 计算 Return of price return index (Value的变化)
  - $PR_I = \frac{V_{PRI1} - V_{PRI0}}{V_{PRI0}}$
  - V_{PRI1} and V_{PRI0} - the value of the PRI at end / beginning of the period
- 计算加权平均之后的Return
  - $PR_I = w_1 PR_1 + w_2 PR_2 + \ldots + wNPR_N$
- 计算Return of total return index
  - $TR_1 = \frac{V_{PRI1} - V_{PRI0} + Inc_I}{V_{PRI0}}$
  - V_{PRI1}, V_{PRI0} - the value of the PRI at end / beginning of the period
  - Inc_1 - the total income from all securities in the index

Index Construction

- Price weighting 通过价格进行加权
  - 单个股票的价格 / 总价格，不考虑有多少share
  - 缺点：高价股票的比重高，stock split发生时不能反映市场真实情况，需要调整divisor来实现
  - 计算Return：(期末价格总和-期初价格总和) / 期初价格总和
- Equal weighting
  - 买每支股票的钱相同(每只股票的value相同)
  - Index return是每只股票return的算数平均
  - 缺点：small-cap bias 小盘股票的权重高，且有更好的volatility，需要frequent rebalance as prices change
  - 计算Return：每只单独算收益率，取平均数

- Market-capitalization weighting 市值加权
  - 权重 = 每只股票的市值 / 总市值
  - 优点：表现真实市场情况
  - 缺点：高市值的公司影响大，lead to momentum tilt
  - 计算Return：按市值算权重，（sum(share×每只的期末股价)-sum(share×每只的期初股价)）/ sum(share×每只的期初股价)
  - Float-adjusted market-cap weighting 流通市场加权
    - Exclude shares held by controlling shareholders, other corporations and governments
  - Free-float-adjusted market capitalization weight
    - Exclude shares not available to foreign investors (外国人投资的流通性不好)
- Fundamentally weighting 基本面加权
  - 利用股价之外的财报因素加权：book value, cash flow, revenues, earnings, dividends
  - 效果：Value tilt, 倾向于数值较好的公司; Contrarian effect 紧缩效应, rebalance后倾向于股价下跌的公司

Index Management: Rebalancing and Reconstitution

- Rebalancing - Adjusting the weights, usually quarterly, creates turnover
  - Equal-weighted需要定期调权重，price和market-cap不需要
- Reconstitution - 换constituent securities
  - Creates turnover

  Uses of Market Indexes
- Gauges of market sentiment - 市场情绪
- Proxies for measuring and modeling returns, systematic risk, and risk-adjusted performance - 只是proxy，在一定程度上可以参考，但不是绝对的考量
- Proxies for asset classes in asset allocation models
- Benchmarks for actively managed portfolios - 评价基金经理表现，能否跑赢大盘，与被动基金无关
- Model portfolios for investment products - 懒人投资法，直接抄权重来构建portfolio

Equity indexes 股权指数

- Broad market indexes 主板指数 - 涵盖超过90%的股票of the selected market
- Multi-market indexes 全球和区域指数，比如MSCI

- Sector indexes - 不同行业：energy, health care, technology, consumer goods
  - Aggregation of sector index family = broad market index
  - 用来衡量PM的stock selection和sector allocation能力
- Style indexes - 反映投资者风格：growth investor, value investor, small-cap investor

Fixed-income indexes

- 政府和公司发行的债券，固收证券的规模比股权证券大好几倍
- 构建债券指数时的issue
  - Broad universe - 指标太多，难以选择
  - High turnover - 债券有到期日，股票没有
  - Dealer markets and illiquidity - 市场流动性差，投资者难以复现固收证券的组合
- 分类
  - 根据issuer - 政府、政府代理机构、公司
  - 根据type of financing - general obligation, collateralized
  - 根据currency of payments

Indexes for Alternative Investments

- Commodity indexes 大宗商品指数
  - 由future contract组成，比如农产品、牧业、稀有金属、金银铜、石油、天然气
  - 每个index的Weighting method很不相同 - 导致risk和return不一样
- Real estate indexes - 比如REIT，包括appraisal index和repeat sales index
- Hedge fund indexes - 自愿披露，幸存者偏差

Market Efficiency

The Concept of Market Efficiency

- 定义：asset prices reflect new information quickly and rationally, the market reflect all past and present info
- 在有效市场中很难获得超额收益，passive strategy优于active strategy, 例如bridge water
- 市场只对unexpected信息有反应
- Market value vs intrinsic value
  - Market value - 当前售价/买价
  - Intrinsic value - 综合所有信息的价值

Factors Affecting Market Efficiency including Trading Costs

- Market participants - 参与的人越多越有效
- Information availability - 可以获得的信息越多越有效
- Limits to trading - 对做空和套利的限制会抑制有效性
- Transaction costs and information-acquisition costs - 手续费、购买信息的成本

Forms of Market Efficiency

- Weak-form efficient market hypothesis 弱有效市场
  - 股价反映历史价格和交易量的信息
  - 投资者很难用technical analysis长期获得超额收益
    - Technical analysis - Quant research找pattern
- Semi-strong form efficient market hypothesis 半强有效市场 (包含弱有效市场)
  - 股价完整反映公开信息
  - 投资者很难用Fundamental analysis (基本面分析)来获取超额收益
    - Fundamental analysis - 通过publicly available info和formulation of forecasts来预测intrinsic value of assets
- Strong form efficient market hypothesis 强有效市场
  - 股价反映both公开信息and内幕信息
  - 投资者即使使用内幕信息也无法获得超额收益

Implications of the Efficient Market Hypothesis

Market Pricing Anomalies 市场异常

- 市场波动不基于新信息
- Time-series anomalies
  - Calendar anomalies
    - January effect - 一月前几天回报率高，原因是tax-loss selling和window dressing
      - Tax-loss selling 税损出售 - 在年底出售亏损股票以实现税收损失，年初再买回来，股价上涨
      - Window dressing - PM在年底把亏损的股票卖掉，让自己业绩看起来更好，年初再买回来
    - Turn-of-the-month effect - 月末和月初的股价上涨
    - Day-of-the-week effect - Monday下跌，其它天数上涨
    - Weekend effect - 周末的return小于周一的return

        - Holiday effect - 节假日前最后一天return高，黑五之前下跌(变现后在黑五买理财产品)
    - Momentum anomalies
        - 短期内持续上涨/下跌的惯性
        - 与弱有效市场假说最不一致 Contradict to weak-form efficiency
    - Overreaction anomalies
        - 股价会在公司宣布好/坏消息时过度反应
- Cross-sectional anomalies
    - Size effect - 小市值公司的股票往往在未来表现优于大市值公司的股票
    - Value effect - 低市盈率股票往往在未来表现优于高市盈率股票
- Other Anomalies
    - Close-end fund discounts
    - Earnings Surprise -
    - IPO - 一开始有超额收益，长期表现会低于平均
    - Economic fundamentals - 利率、流动性、股利的变化和股票收益率挂钩

Behavioral Finance 行为金融学

- Loss Aversion 损失厌恶
- Herding 羊群效应 - 跟风买，缺少独立判断
- Overconfidence 过度自信
- Information Cascade 信息瀑布
- Other behavioral biases:
    - Representativeness - 迷信，把偶然当必然
    - Mental accounting 心理账户 - 不把portfolio当作整体进行考量
    - Conservatism - 对新消息的反应慢
    - Narrow framing - 只关注一点信息，一叶障目

Overview of Equity Securities

Importance of Equity Securities

- 风险高，回报也比bond高
- North Korea的人均持股量最少，澳大利亚和新西兰的人均持股量最大

Characteristics of Equity Securities

- Common shares
  - Ownership interest
  - Dividend - not obligated to do so
  - Voting rights
    - Statutory (one vote per share)
    - Cumulative (# of shares $\times$ # of directors being elected)
- Preference shares
  - Priority
    - Rank above common shares in dividend payments and liquidation distributions
    - Don't have voting rights unless specified
  - Characteristics
    - Fixed Dividends - similar to debt, but not a contractual obligation
    - Perpetual - pay dividends indefinitely without a fixed maturity date
    - Callable and Putable - allowing the company or shareholders to redeem or sell back the shares at a specific price
  - Types of dividends
    - **Cumulative**: Unpaid dividends accrue and must be paid before common dividends
    - **Participating**: Shareholders receive additional dividends if company profits exceed a certain level, and may receive more in liquidation.
  - Convertible Preference Shares
    - Can be converted to a specified number of common shares.
    - Offer higher dividends, potential profit sharing, and price stability compared to common shares.

Private VS Public Equity Securities

- Public Equity
  - 在二级市场中交易，市场价格透明，价格由市场决定
  - 财报和公开信息披露，监管要求严格
- Private Equity
  - 在一级市场中交易，非公开发行，流动性低，价格由谈判决定
  - 投资期限较长，不需要公开财报信息，监管要求宽松
- 私募类型
  - Venture Capital VC

- 投资对象：投资初创企业和早期公司
- 投资者：家人、朋友、私募股权基金
- 退出策略：IPO、卖给其它投资者
- Leveraged Buyouts LBO
- 方式：通过大量债务购买所有已发行的普通股
- 管理层收购MBO：由公司现有管理层进行杠杆收购
- 对象：Companies with undervalued assets and strong cash flows
- 目标：重组和改善公司，为将来public offering做准备
- Private Investment in Public Equity PIPE
- **目的**：为需要快速获得额外资本的公开公司提供资金
- **特点**：通常以低于市场价格的折扣购买股份
- **用途**：公司可能需要资金进行扩展、减债或改善运营

Non-Domestic Equity Securities

- Methods of investing non-domestic equity
  - Direct Investing 直接投资
    - 缺点：交易、清算、结算的法规不同，汇率风险，市场透明度低
  - Depository Receipts (DRs) 存托凭证
    - 定义：外国企业的shares在本地交易所交易
    - 优点：无需换汇，以本地货币报价和付dividend
  - Global Registered Shares (GRS) 全球注册股票
    - 定义：公司在不同交易所上市，以不同货币交易普通股
    - 特点：不用换汇，灵活性高
  - Basket of Listed Depository Receipts (BLDRs) 上市存托凭证篮子
    - 定义：ETF representing a portfolio of Depository Receipts
    - 优点：跟踪DR的index表现，全天交易，像个股一样买卖
- Depository Receipts
  - 创建：外国公司的shares放在Deposit bank中，银行发行代表这些share的DR
  - Sponsored - 外国公司直接参与，DR investors have the same right as shareholders
  - Unsponsored - 外国公司不直接参与，投票权由存托银行保留
- 美国存托凭证(ADR)的类型
  - **Level I**: Trade over-the-counter (OTC); minimal registration requirements.
  - **Level II and III**: Trade on major US exchanges (NYSE, NASDAQ); allow companies to raise capital and make acquisitions; must meet SEC requirements.

    - **SEC Rule 144A and Regulation S**: Privately placed with qualified institutional buyers (QIBs); no SEC registration required.

Risk and Return Characteristics

- Return的来源
    - Price change - 买卖价差变大
    - Dividend
    - Foreign exchange gains - 只针对外资投资
- Risk的来源
    - Equity Type and Features
    - Preference Shares vs. Common Shares
    - Dividend Payment Uncertainty

Equity and Company Value

- Equity securities的功能
    - Raise capital, increase liquidity, and provide a means for acquisitions and employee incentives
- Book Value vs. Market Value of Equity
    - **Book Value**: Reflects the historical cost of assets minus liabilities and is directly influenced by **management decisions**. It increases with retained net income.
    - **Market Value**: Determined by investor expectations about future cash flows and is influenced by external perceptions and market conditions. It rarely equals book value due to differing views on the company's future performance.
- ROE
    - **Definition**: Measures how effectively management uses equity capital to generate profits.
    - 计算：$ROE_t = \frac{NI_t}{(BVE_{t-1}+BVE_t)/2}$
        - 注意要用book value的平均数
    - ROE增加的原因
        - Issue debt to repurchase outstanding shares of equity
- Market Value of Equity and Price-to-Book Ratio
    - MV = market price per share $\times$ # of shares outstanding
    - MP = 市场价
    - Total BV = SHE
    - BV per share = Total SHE / Shares outstanding

    - **Price-to-Book Ratio** = MP / BV
    - P/B ratio: Indicates investor expectations about a company's future opportunities. Higher ratios suggest more favorable views on growth prospects.
- Cost of Equity
    - Dividend Discount Model (DDM) and Capital Asset Pricing Model (CAPM) are commonly used to estimate cost of equity.
- Required return

Company Analysis: Past, Present, and Forecasting

Company Research Reports

- Elements
    - Issuer and Security Identifiers
    - Recommendation - buy / hold / sell
    - Company Description - business model and strategy
    - Industry Overview & Competitive Positioning - Porter's Five Forces, PESTLE
    - Financial Analysis and Model - key drivers of revenue, historical and forecast
    - Valuation
    - Environmental, Social, and Governance (ESG) Considerations
    - Risks
- Types
    - Initial Company Research Report (Initiation) - 给外行人看的，详细报告
    - Subsequent Company Research Reports - Shorter updates, new info, changes

Determining the Business Model

- Elements of a Business Model
    - Products/Services Sold
    - Customers and Key Customer Groups
    - Sales Channels
    - Pricing and Payment Terms
    - Resources, Suppliers, and Partnerships
- Business model is the foundation of company analysis
- 与竞争对手无关

Revenue Analysis

- Bottom-Up Approach
  - Decomposes revenues into drivers like sales volume, price, product line, segment, or geography
- Top-Down Approach
  - Expresses revenues as a function of drivers like market share, addressable market size, and GDP growth
- Pricing Power
  - 定义：ability to set prices without affecting its sales volumes significantly
  - 影响因素：market structure and competitive positioning

Operating Profitability and Working Capital Analysis

- Classification of Costs
  - **Research and Development:** Classified as operating costs.
  - **Depreciation and Amortization:** Classified as operating costs but added back to operating cash flow
  - **Interest Expense:** Classified as operating (US GAAP) or operating/financing (IFRS)
  - **Income Taxes:** Classified as operating costs
- Behavioral Cost Classification: Fixed vs. Variable Costs
  - Operating Profit=$[Q \times (P - VC)] - FC$
  - Degree of Operating Leverage
    $DOL=\frac{\% \Delta Operating \ Profit}{\% \Delta Sales} = \frac{Sales-VC}{Sales-VC-FC}$
- Measures of Operating Profitability
  - **Gross Profit:** Net sales - Cost of sales
  - **EBITDA:** Earnings before interest, taxes, depreciation, and amortization
  - **EBIT:** Earnings before interest and taxes
- Working Capital Analysis
  - **Days Sales Outstanding (DSO):** Indicates how quickly a company collects cash from sales
  - **Days Inventory on Hand (DOH):** Indicates how long inventory is held before sale
  - **Days Payable Outstanding (DPO):** Indicates how long a company takes to pay its suppliers
  - **Cash Conversion Cycle:** Measures the time taken to convert investments in inventory into cash flows from sales
  - **Net Working Capital (NWC):** Current assets minus current liabilities

Capital Investments and Capital Structure

- Evaluation
  - Degree of Financial Leverage

    DFL=\frac{\% ΔNet\ Income}{\% ΔOperating \ Income}=\frac{Operating\ Inc
  - WACC
  - ROE

Industry and Competitive Analysis

Uses of Industry Analysis

- Industry Analysis
  - 原因
    - Understand profitability differences - industry决定长期盈利模式和寿命
    - Improving forecast - 竞争力、外部压力
    - 鉴别投资机会 - 相对竞争对手的优势、投资整个行业而非押注单一公司
- Industry and Competitive Analysis的步骤
  - Define the Industry - 确定行业边界，商业活动、产品、服务
  - Evaluate Industry Environment - Demand and Supply analysis
  - **Competitive Forces Analysis 波特五力**
    - Threat of new entrants
    - Bargaining power of suppliers
    - Bargaining power of buyers
    - Threat of substitute products or services
    - Rivalry among existing competitors

Industry Classification

- Global Industry Classification Standard (GICS) vs. Standard Industrial Classification (SIC)
  - SIC - 只有US，更新速度慢
  - GICS - 世界范围，每年更新，新公司较快加入
  - 缺点：对于参与多个行业的公司，准确度不高。难以确定哪个是主要业务
- Cyclical vs. Defensive Sectors
  - 周期性行业 - 经济越好，利润越高：汽车、房地产、金融、科技、材料、能源
  - 非周期行业 (防御型行业) - 必需品：医药、食品、文具、utilities
- 影响公司利润的因素

- 行业因素
  - **Market Structure:** The competitive dynamics within an industry, such as the number of competitors, barriers to entry, and the presence of substitutes, significantly impact profitability.
  - **Regulatory Environment:** Industries are subject to varying degrees of regulation, which can influence costs, pricing power, and market access.
  - **Economic Sensitivity:** Some industries are more sensitive to economic cycles, impacting growth and profitability based on macroeconomic conditions.
  - **Technological Change:** Industries with rapid technological advancements can create opportunities and risks for companies, affecting their ability to innovate and maintain competitive advantages.
- 公司本身
  - **Business Model:** The approach a company takes to create value for its customers can differentiate it from competitors within the same industry.
  - **Competitive Strategy:** Strategies such as cost leadership, differentiation, and focus can lead to varying levels of success and profitability within an industry.
  - **Size and Scale:** Larger companies may benefit from economies of scale, which can lower costs and increase profitability.
  - **Execution:** The ability of management to effectively implement strategies and adapt to changes within the industry plays a crucial role in determining a company's performance.
- 统计学相似性
  - 盈利变动，过去的投资回报相似
  - Limitations
    - 容易得到反直觉的结论 - 啤酒和纸尿裤正相关
    - 不同时间和地区的关联不同
    - 不能保证过去的相关性可以预知未来
- 构建peer group
  - 先确定行业类别，检查年报和竞争环境，检查竞争对手的年报，审查公司对外公开的资料，公司的相似商业活动

Industry Survey

- Industry Size and Historical Growth Rate

    - Industry size is typically measured by total annual sales from the product or customer perspective
    - Growth rate is calculated as year-over-year or compounded annual growth rate over multiple years
    - Industry size should include sales from private companies and be corroborated with economic indicators or third-party data
- Characterizing Industry Growth
    - **Growth Industries:** Industries not yet fully saturated, often benefiting from emerging technology
    - **Mature Industries:** Industries with fully penetrated markets, growing in line with broader economic activity or declining
    - Sensitivity to the business cycle: The degree to which industry sales are affected by economic changes, determined by factors like the nature of the products (discretionary vs. necessary) and interest rate exposure
- Industry Profitability Measures
    - Return on Invested Capital (ROIC) is the best measure, but profitability of publicly traded companies can be used as a proxy
    - Evaluating trends in profitability over time is crucial
- Market Share Trends and Major Players
    - Measure market shares as percentages of industry size each year, assess whether companies are gaining or losing market share
    - Industry concentration can be measured using the Herfindahl-Hirschman Index (HHI)

Industry Structure and External Influences

- PSETLE Analysis - describes industry theme
    - **Political Influences**: Government policies, fiscal and monetary changes, geopolitical conditions
    - **Economic Influences**: GDP growth, inflation, interest rates, exchange rates
    - **Social Influences**: Cultural trends, demographic changes, lifestyle shifts
    - **Technological Influences**: Innovations, both sustaining (incremental improvements) and disruptive (fundamental changes)
    - **Legal Influences**: Changes in laws and regulations affecting business practices
    - **Environmental Influences**: Transition to lower-carbon economy, waste and land use regulations

Competitive Positioning

- Categories
  - **Intentional Strategy:** Results from company-wide planning, performance measurement, and feedback loops
  - **Unintentional Strategy:** Results from individual teams pursuing their own incentives without coordination, which can exacerbate communication problems
- Evaluation
  - Defense Against Five Industry Forces
  - Alignment with PESTLE Analysis
  - Resources and Capabilities
- Generic Competitive Strategies
  - Cost Leadership 成本领先 (Walmart)
    - **Execution:** Economies of scale, favorable access to raw materials, strict cost control, aggressive pricing, low-cost distribution.
    - **Risks:** Cost inflation, loss of cost leadership, technological changes
  - Differentiation 差异化 (Apple)
    - **Execution:** Investment in brand, customer service, proprietary distribution, superior quality, premium pricing
    - **Risks:** High costs, imitation by competitors, overpricing
  - Focus 细分领域 (Ferrari)
    - **Execution:** Proximity to customers, strong understanding of specific needs. Creates loyalty in a specific market segment
    - **Risks:** Limited market share, larger competitors may outcompete, market segment may narrow

Forecasting

- Approaches
  - Historical Results
    - **Uses**: past trends to forecast future condition
    - **Appropriate for:** Stable industries with low business cycle sensitivity
    - **Less appropriate for:** Cyclical industries or companies undergoing significant changes
  - Historical Base Rates and Convergence
    - **Uses:** Compare to industry averages or larger peers

        - **Appropriate for:** Well-established industries, smaller companies maturing into larger peer profiles
        - **Less appropriate for:** Changing or new industries, highly cyclical industries, industry leaders
    - Management Guidance
        - **Types:** Annual, quarterly, long-term strategic aspirations
        - **Importance:** Forward-looking, provides assumptions embedded in forecasts
        - **Appropriate for:** Companies with a reliable track record; less so for highly cyclical companies
    - Analyst's Discretionary Forecast
        - **Uses:** Surveys, quantitative models, analogies, unobservable inputs
        - **Appropriate for:** Cyclical industries, companies with few comparables, fundamental changes
- Forecasting Revenues
    - Top-down drivers
        - **Growth Relative to GDP Growth**
            - Forecast nominal GDP growth
            - Adjust for company’s growth relative to GDP based on life cycle stage or business cycle sensitivity
        - **Market Growth and Market Share**
            - Forecast growth rate of the product market
            - Determine company’s current market share and expected changes over time
    - Bottom-up drivers
        - **Volumes and Average Selling Prices**
            - Forecast volumes and prices individually, then multiply for total revenue
            - Commonly used for media, internet companies, airlines, asset managers, and commodity producers
        - **Product-Line or Segment Revenues**
            - Forecast revenues for individual products, lines, or segments and aggregate
            - Used when company disclosures provide detailed segment information
        - **Capacity-Based Measures**

        - Example: Number of stores and sales per store, or same-store sales growth
    - **Return- or Yield-Based Measures**
        - Forecasts based on account balances and revenue yields on them
- Non-Recurring Revenue or Revenue Growth
    - **Non-Recurring Items:** Exclude from forecasts to avoid distorting recurring revenue figures
        - Disclosed by management: Changes in exchange rates, extra selling days, acquisitions/divestitures
        - Analyst judgment required: Pandemic effects, unique market conditions (e.g., cryptocurrency mining for GPUs)
- Risk factors
    - Competition
    - Changes in the Business Cycle
    - Inflation and Deflation
    - Technological Developments
- Forecasting Operating Expenses
    - COGS and Gross Margins
        - Forecasted as a percentage of sales
        - Break down into segments, inputs, product lines if possible
        - Consider hedging strategies and the impact of fluctuating input costs
    - SG&A Expenses
        - Less Direct Relationship with Revenues (selling, general, administration expenses)
        - Often modeled using a fixed growth rate or as a percentage of sales
- Forecasting Working Capital
    - Use Efficiency Ratios
        - Common Ratios
            - Days Sales Outstanding (DSO)
            - Inventory Days on Hand (DOH)
            - Days Payable Outstanding (DPO)
        - Approach
            - Combine efficiency ratios with sales and cost forecasts to project accounts receivable, inventory, and accounts payable
- Forecasting Capital Investments

    - Capital Expenditures (CapEx)
        - **Maintenance** - sustain current operations
            - based on historical depreciation and amortization expenses, adjusted for inflation in capital goods
        - **Growth** - expand (new stores, new product lines)
            - More discretionary and linked to management's expansion plans and revenue growth projections
    - Depreciation and Amortization
        - Based on the useful lives of PP&E and intangible assets as assumed by management
        - Can be approximated by the ratio of gross fixed assets to depreciation and amortization expenses
- Forecasting Capital Structure
    - Leverage Ratios
        - Common Ratios: Debt to capital, debt to equity, and debt to EBITDA
        - Use historical company practices, management's financial strategy, and capital requirements implied by CapEx assumptions
        - Management may provide guidance on target capital structure, debt covenants, and capital expenditures
    - Balance Sheet Modeling
        - Forecast PP&E and Intangibles
        - Based on projected CapEx and depreciation/amortization expenses

Equity Valuation 如何估值股票

Estimated Value and Market Price

- Estimated value > market price: undervalued, 价格低于intrinsic value, 买
- Estimated value = market price: fair valued
- Estimated value < market price: overvalued, 价格高于intrinsic value, 卖

Categories of Equity Valuation Models

- Present value models 最常用
    - Dividend Discount Models (DDM)
    - Free Cash Flow to Equity Models (FCFE)

    - 不会用到book value，另外两个方法会用到
- Multiplier models
    - Price Multiples - P/E, P/B, P/S, P/CF，用于与其它公司比较
    - Enterprise Value (EV) Multiples - EV/EBITDA, EV/Revenue
        - **Enterprise Value Calculation:** Total market value minus cash and short-term investments
- Asset-based valuation models
    - **Method**: estimate the intrinsic value based on the estimated value of a company's assets minus its liabilities and preferred shares
    - **Underlying Theory:** The value of a business is the sum of the value of its assets

Background for the Dividend Discount Model

- Dividend
    - Cash dividend
    - Special / Extra dividend - share profit, participating preference share
- Dividend发放形式
    - Stock dividend - 以股票形式发放，股数多了但股价下跌，实际上仓位没变
    - Stock split 拆股 - 跟上面的一样
    - Reverse stock split 并股 - 跟上面一样
    - Share repurchase 回购 - 相当于cash dividend，公司认为自己的股票被低估，或者公司增长乏力
- Payment chronology
    - Declaration date - issue a statement
    - Ex-dividend date (ex-date) 除夕日 - 在这一天内或之后购买的股票将无法获得分红 (这一天的股价通常会跌dividend的数值)
    - Holder-of-record date - 在这天之前登记在册才能领分红
    - Payment date

Dividend Discount Model (DDM) and Free-Cash-Flow-to-Equity Model (FCFE)

- DDM
    - V0 = sum(Dividend / discount rate)
    - Discount rate (r) 更难估值
    - Gordon growth model
        - g = retention rate $\times$ ROE

        - Earnings retention rate = 1 - dividend payout ratio
    - 适用于pay dividend的公司
- FCFE = CFO - FCInv + Net borrowing
    - V0 = sum(FCFE / 1+r)
    - 反映capacity to pay dividend，适用于不pay dividend的公司
- Required rate of return = Risk-free rate + β(Market risk premium)

Preferred Stock Valuation

- Non-callable, non-convertible preferred stock
    - $V_0 = \frac{D_0}{r}$
        - D - Fixed dividend
        - r - Constant required rate of return
- Non-Callable, Non-Convertible Preferred Stock with Maturity
    - $V_0 = sum(\frac{D_t}{(1+r)^t}) + \frac{F}{(1+r)^n}$
        - Same as bond
- Callable or Retractable Preferred Stock
    - Callable reduces value to investors
    - Putable increases value to investors

The Gordon Growth Model

- 假设：assuming dividends grow indefinitely at a constant rate
- 计算：$V_0 = \frac{D_1}{(r-g)}$
    - g is the constant growth rate of dividend
- 如何求g：$g = b \times ROE$
    - $b = 1 - Dividend\ payout\ ratio$
        - Dividend payout ratio = Dividend per share / EPS = Total Dividend / NI
            - 公司挣的钱有多少用来分红
    - ROE的计算：ROE = ROA * financial leverage
- Value dividend-paying companies in a **mature phase of growth**

Multistage Dividend Discount Models

- Two-Stage Dividend Discount Model (DDM)
    - Growth Phases
        - Initial high-growth period

        - Transition to a lower, sustainable growth rate
    - Formula
        - $V_0 = sum(\frac{D_0(1+g_S)^t}{(1+r)^t}) + \frac{V_n}{(1+r)^n}$
            - $V_n = \frac{D_{n+1}}{r-g_L}$ and $D_{n+1} = D_0(s+g_S)^n(1+g_L)$
            - D_0 - Current dividend
            - g_S - High growth rate
            - g_L - Sustainable growth rate
    - **Usage**: Companies transitioning from high growth to stable growth
- Three-Stage DDM
    - Growth Phases
        - Initial high growth
        - Transition phase with moderate growth
        - Long-term sustainable growth
    - **Usage**: Often used for young companies entering the growth phase or established companies experiencing renewed growth through innovation or market expansion
- Advantages
    - **Flexibility**: Models can accommodate varying growth rates, making them suitable for different company growth stages
- Disadvantages
    - **Complexity**: Requires accurate estimation of growth rates and transition points, which can be challenging and subjective
    - **Assumptions**: Relies on the assumption that growth rates and required returns remain constant, which may not always hold true

Multiplier Models and Relationship Among Price Multiples, Present Value Models, and Fundamentals

- Rationale for Using Price Multiples
    - **Screening Mechanism**: Identifying undervalued or overvalued stocks for purchase or sale
    - **Comparison**: Examining groups or sectors of stocks to find attractively valued securities
- Common Price Multiples
    - **Price-to-Earnings Ratio (P/E)**: Stock price divided by earnings per share. Frequently cited by the media and used by analysts. 市盈率表示投资者愿意为每

一元的收益支付多少价格
    - **Price-to-Book Ratio (P/B)**: Stock price divided by book value per share. Inversely related to future rates of return. 市净率衡量股价与公司账面价值之间的关系，通常用于资产密集型行业，如银行业
    - **Price-to-Sales Ratio (P/S)**: Stock price divided by sales per share. Useful for predicting future returns. 市销率表示投资者愿意为每一元的销售额支付多少价格，适用于收入增长快但盈利能力较低的公司
    - **Price-to-Cash-Flow Ratio (P/CF)**: Stock price divided by cash flow per share. Cash flow measures include free cash flow (FCF) and operating cash flow (OCF). 市现率衡量股价与公司现金流之间的关系，现金流通常比净利润更能反映公司的财务健康状况
- Forward vs. Trailing Multiples
    - **Trailing Multiples**: Based on historical or current values of the divisor
    - **Forward Multiples**: Based on forecasted values of the divisor, considering future performance
- Specialized Industry Ratios
    - **Cable TV**: Market value to total number of subscribers, revenue per subscriber
    - **Oil Industry**: Proved reserves per share
- Justified Forward P/E
    - $\frac{P_0}{E_1} = \frac{D_1/E_1}{r-g} = \frac{p}{r-g}$
        - p - dividend payout ratio
        - g - calculated by b $\times$ ROE
        - Justified P/E is very sensitive to small changes in assumptions

Method of Comparables and Valuation Based on Price Multiples

- P/E
    - Low P/E - undervalued, 但也可能由于市场预期公司未来增长缓慢或风险较高
    - High P/E - overvalued, 或者投资者对公司未来的增长预期较高
- P/B
    - Low P/B - undervalued, 但也可能反映出公司资产回报率低或财务困境
    - High P/B - overvalued, 或者公司拥有高价值的无形资产
- P/S
    - Low P/S - undervalued, 但也可能是由于公司盈利能力低或未来增长乏力
    - High P/S - overvalued, 或者市场对公司未来销售增长预期较高
- P/CF

- Low P/CF - undervalued, 但也可能是由于公司现金流稳定性较低
- High P/CF - overvalued, 或者公司现金流强劲且稳定

Enterprise Value

- Enterprise Value Multiples
  - EV
    - Definition: the total market value of a company.
    - EV = market value of equity plus the market value of preferred stock and debt, minus cash and equivalents. 企业价值通常被视为收购的成本
  - **Enterprise Value Multiples (EV multiples)** are widely used in Europe
- Key Enterprise Value Multiples
  - **EV/EBITDA**
    - The ratio of enterprise value to earnings before interest, taxes, depreciation, and amortization
    - **Use**: This multiple assesses a company's overall operational efficiency and its ability to generate cash flow, especially useful in capital-intensive industries
  - EV/Operating Income (EV/OI)
    - **Use**: This multiple evaluates a company's core business profitability and is useful for comparing companies with different capital structures
- Advantages
  - **Comprehensive**: EV multiples consider a company’s debt and cash, making them more effective for comparing companies with different capital structures
  - **Stability**: Using EBITDA or operating income, which are typically more stable than net income, provides a more reliable valuation
  - **Wide Applicability**: EV multiples are applicable to companies with various capital structures and profitability levels, even those with negative net income
- Disadvantages
  - **Data Availability**: Accurate EV calculation requires precise market value debt data. When market quotations are unavailable, estimates may be imprecise
  - **Ignoring Capital Costs**: While EBITDA excludes non-cash expenses, it does not account for capital costs, potentially overstating a company’s profitability
  - **Estimation Dependence**: Market value estimations can be influenced by assumptions and market conditions, introducing uncertainty

Asset-Based Valuation

- Definition
  - Calculates the company's equity value as the difference between the market value of its assets and its liabilities
  - This approach is particularly suitable for companies with significant tangible assets and minimal intangible assets
- Applicability
  - Most useful for companies with high proportions of current assets and liabilities
  - Often used in conjunction with multiplier models, especially for private companies
  - Increasingly relevant as public companies disclose more fair value information
- Advantages
  - Provides a tangible baseline or "floor" value for a company
  - Useful for companies with significant tangible assets or those in liquidation
  - Can complement other valuation models, adding robustness to the overall valuation
- Disadvantages
  - Estimating values for intangible assets not reflected on the balance sheet, such as goodwill or brand value. Difficulty in valuing intangible assets can lead to undervaluation
  - Adjusting for hyper-inflationary environments which complicate fair value estimation
  - Market values of assets and liabilities can be challenging to determine accurately

Fixed Income

Fixed-Income Instrument Features

Key Features of Fixed-Income Securities

- Debt Instruments
  - **Loans**: private, between individuals/companies and banks
  - **Bonds**: Standardized contracts, between larger issuers and investors
- Issuers
  - **Government Issuers**: national or local governments, supranational organizations, quasi-government entities.

    - **Corporate Issuers**: corporate issuers, special purpose entities, ABS
- Maturity
    - **Tenor**: the remaining time to maturity
    - Money market securities: with a tenor one year or less
    - Capital market securities: with tenors longer than one year
    - Perpetual bonds: with no stated maturity
- Coupon
    - Corporate bonds tend to pay **semiannually**
    - Floating-rate notes (FRNs): Variable Coupon, determined by:
        - **Market Reference Rate (MRR)**: benchmark rate, a short-term interest rate
        - **Credit Spread**: usually fixed at the time of issuance and remains constant over the life of the note
            - 1 basis points (bps) = 0.01 %
        - **只有MRR改变会改变coupon**，credit spread变化不影响已经购买的coupon rate
    - Zero-coupon bonds / Pure discount bonds: typically issued at a discount to par
- Seniority
    - Senior > Junior (subordinated)
- Contingency Provisions
    - Embedded options: call, put, and conversion to equity options
- Yield Measures
    - **Current Yield (CY)**: Annual coupon divided by bond's price
    - **Yield-to-Maturity (YTM)**: Internal rate of return (IRR) using bond's price and expected cash flows
- Yield Curves
    - **Definition**: Graphical depiction of YTM for an issuer's debt instruments over time
    - **Credit Risk Measure**: Comparison of issuer's yield curve to sovereign bonds (e.g., US Treasuries)

Bond Indentures and Covenants

- Bond Indentures
    - Bond issuer
    - Sources of repayment proceeds
    - Collateral & Asset-backed

    - Credit enhancements
    - Covenants
- Sources of Repayment
    - **National Governments**: Tax income, print currency.
    - **Local/Regional Governments**: Taxing authority, fees
    - **Corporate Bonds**: operating cash flows
- Collateral & ABS (Asset-backed securities)
    - Collateral
        - **Secured**: with specific assets pledged as secondary repayment sources
        - **Unsecured**: higher credit quality, cash flows are the *sole* source of repayment
            - Senior unsecured
            - Junior unsecured (subordinated debt)
    - ABS
        - Cash flows from a group of loans or receivables owned by the special purpose issuer
        - **Tranches**: Different classes of ABS with varying priority claims to cash flows
            - 索偿权：Secured > Senior unsecured > Junior unsecured
- Credit Enhancement
- Bond Covenants
    - **Affirmative Covenants**: Specify what issuers are required to do
        - Examples: Use of proceeds, timely financial reports, permitting bondholders to redeem bonds at a premium if the issuer is acquired
        - Pari passu clause: Ensures equal treatment with other debt obligations 确保与其他类似债务同等对待
        - Cross-default clause: Specifies default if the issuer defaults on another debt obligation 如果发行人在其他债务上违约，则被视为违约
    - **Negative Covenants**: Specify what issuers are prohibited from doing
        - Examples: Limitation on liens, restrictions on sales and leasebacks, merger and consolidation limitations
        - Incurrence test: certain financial conditions an issuer must meet to take specific actions
        - Negative pledge clause: restricts the issuer from pledging its assets to secure future debt without offering the same security to existing

bondholders
    - Protect bondholders from dilution of claims and ensure issuer’s ability to make payments
- Consequences of Covenant Violations
    - Changes in financial terms (e.g., increased interest rates)
    - Accelerated debt payments
    - Termination of the debt agreement

Fixed-Income Cash Flows and Types

Common Cash Flow Structures

- Bullet Bond
    - Standard fixed-coupon bond
- Amortizing Debt
    - **Fully Amortizing Loan**: Periodic payments include both interest and principal, spreading repayments over the life of the loan.
        - $A = \frac{r \times P}{1-(1+r)^{-N}}$
            - r - Periodic interest rate
            - P - Principal amount
            - N - Total number of payment periods
    - **Partially Amortizing Bond**: Periodic payments that include interest and partial principal repayment, but a significant portion of the principal (balloon payment) is repaid at maturity.
        - $A = \frac{r \times P_{amortizing}}{1-(1+r)^{-N}}$
            - $P_{amortizing}$ - Portion of the principal that is amortized over the loan term
            - $P_{balloon} = P - P_{amortizing}$
    - Sinking Funds
        - Requiring the issuer to retire a portion of the bond’s principal outstanding each year
        - Used primarily by government and some corporate issuers
    - Waterfall Structures
        - Determines timing of cash flows to different investor classes with varying priority claims

        - Commonly used in ABS and mortgage-backed securities (MBS)
- Zero-Coupon Bonds
    - Sold at a discount, with no periodic interest payments. The principal is repaid at maturity.
- Deferred Coupon Bonds
    - No interest payments in the initial years; higher coupons later
- Variable Interest Debt
    - **Floating-Rate Notes (FRNs)**
    - **Step-up bonds**: a bond coupon increases by specified margins at specified dates
    - **Credit-linked notes**: Bonds whose coupon changes when the bonds' credit rating changes
    - **Payment-in-kind (PIK)**: coupon payments can be fully or partially paid in the form of additional issuance or added to the principal amount
    - **Index-linked bonds**: interest and/or principal payments linked to a specified index
    - **Inflation-linked bonds** (linkers): tied to a broad consumer price index are by far the most common type of index-linked bonds
    - **Capital-indexed bond**: changes in the index are captured with adjustments to the principal. e.g. Treasury Inflation Protected Securities (TIPS) 本金变了,利息也会变,所以本金和利息都抗通胀
    - **Interest-indexed bonds**: pay a fixed nominal principal amount at maturity. Only the coupon is index linked and pays an inflation adjustment

Contingency Provisions 应急条款

- Definition：specific actions if certain events or circumstances occur
- **Callable Bonds**
    - Definition: Allow the issuer to redeem (or "call") all or part of the bond before the specified maturity date
    - **Fixed-Price Call**: Allows issuer to buy back the bond at a set price.
    - **Make-Whole Call**: Issuer repurchases debt at a high price based on YTM of a similar sovereign bond, rarely executed
- **Putable Bonds**
    - Definition: Give bondholders the right to sell the bond back to the issuer at a predetermined price on specified dates

    - **Put price** is typically the par value of the bond
- **Convertible Bonds**
    - Definition: Allow bondholders to exchange the bond for a specified number of the issuer's common shares
    - Yield is lower than Callable and Putable bonds
    - **Conversion price** is set at issuance, often at a premium to the current share price
        - Conversion ratio = Convertible bond par value / Conversion price
            - The number of common shares that each bond can be converted into
        - Conversion value = Conversion ratio × Current share price
            - The value of the bond if it is converted at the market price of the shares
    - **Warrant** - 可以分离交易,期权可以单卖
        - An attached option that gives its holder the right to buy the underlying stock of the issuing company at a fixed exercise price until the expiration date
    - Contingent convertible bonds (CoCos)
        - Bonds that automatically convert to equity if a specific event or circumstance occurs, such as the issuer's equity capital falling below the minimum requirement set by regulators.

Legal and Regulatory Considerations

- Domestic Bonds: Bonds issued by entities incorporated in the same country
- Foreign Bonds: Bonds issued by entities incorporated in another country
- Eurobonds: Bonds issued outside the jurisdiction of any single country
    - Outside the jurisdiction of any single country, are usually unsecured, and may be denominated in any currency, including the issuer's domestic currency
    - **Bearer bonds**: ownership is not recorded, only the clearing system knows
    - **Registered bonds**: ownership is recorded by either name or serial number
- Global Bonds: Issued simultaneously in the Eurobond market and at least one domestic market

Tax Considerations

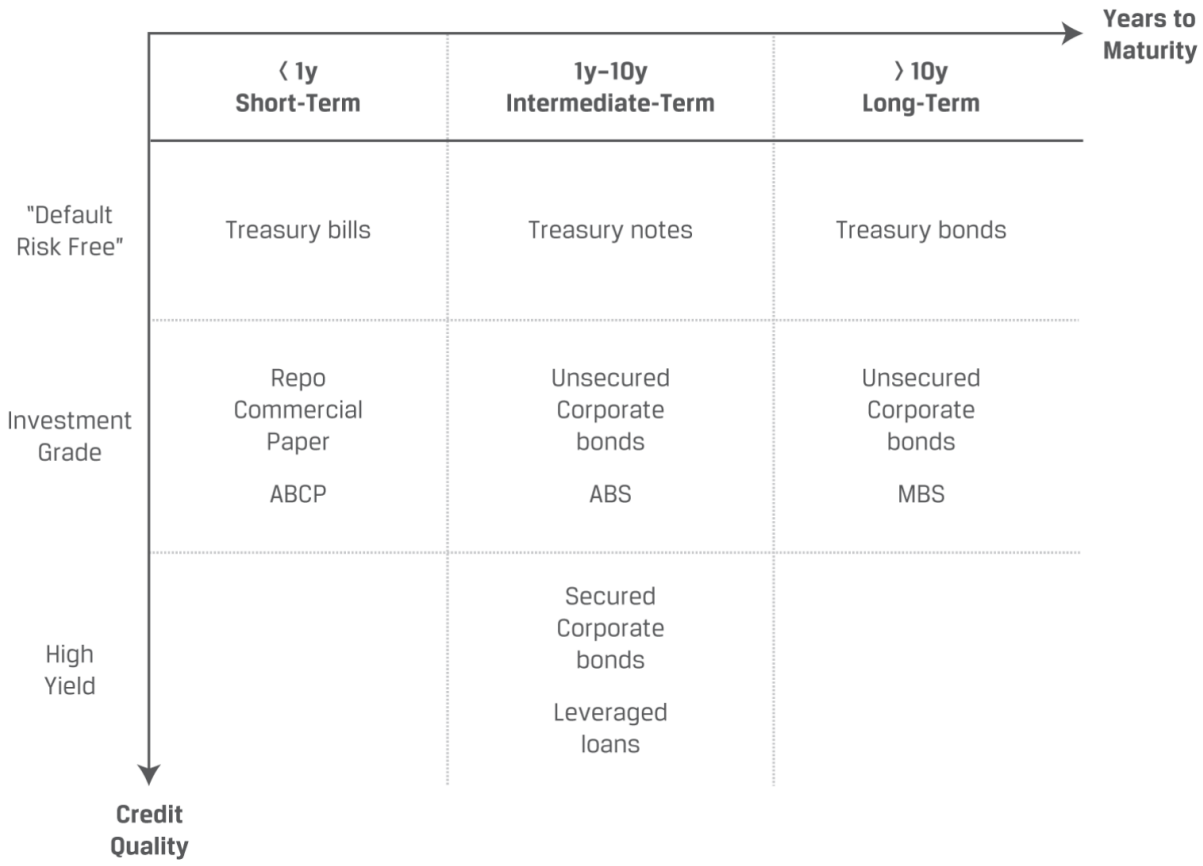
- **Interest Expense Deductibility**: Interest expense is often tax-deductible, influencing the choice between debt and equity financing

- Investors
  - **Interest Income**: Typically taxed as ordinary income
    - US Treasuries' interest income is subject to federal tax but exempt from state and local taxes 国债利息收入不用交州税
    - Municipal bonds in the US are often exempt from federal income tax and state income tax if issued within the investor’s state of residence 市政债券不用交税
  - **Capital Gains and Losses**
    - Capital gains from selling bonds at a higher price than purchase are taxed differently from interest income
    - Long-term capital gains (held for more than a year) often have a lower tax rate than short-term gains
  - **Original Issue Discount (OID)**
    - For zero-coupon bonds, the difference between the issue price and par value is treated as interest income
    - In the US, OID is prorated and taxed each year, while other jurisdictions may treat it as capital gains at maturity

Fixed-Income Issuance and Trading

- Dimensions
  - Issuer type (sector)
  - Credit quality
  - Time to maturity
  - Additional conditions: geography, currency, and ESG characteristics

- Spectrum



- Investor Preferences
  - **Money Market Securities**: For near-term obligations and liquidity.
  - **Long-Term Bonds**: For long-term obligations and higher expected returns.
  - **Pension Funds and Insurance Companies**: Favor instruments with fixed periodic cash flows matching long-term liabilities.
- Credit Ratings
  - **Investment Grade**: Rated BBB- (Baa3) or higher.
  - **Speculative Grade (High Yield)**: Rated BB+ (Ba1) or lower

Fixed-Income Indexes

- Fixed-income indexes track the performance of bond markets
  - A single issuer may have many fixed-income securities outstanding
  - Bonds have finite maturities and frequent new issuances, leading to higher turnover in fixed-income indexes
    - Bond indexes are usually rebalanced monthly
  - Fixed-income index constituents are usually weighted by the market value of debt outstanding

        - Changes in the bond market composition, such as public versus private issuer debt and credit quality, are reflected in the indexes
- Types of Fixed-Income Indexes
    - Aggregate Indexes
        - Broad indexes with many constituents
        - Example: Bloomberg Barclays Global Aggregate Index
    - Narrow Indexes
        - Based on specific criteria such as sector, credit quality, maturity, geography, or ESG considerations
        - Examples: J.P. Morgan EMBI+ Index, Bloomberg Barclays MSCI Euro Corporate Sustainable SRI Index

Primary and Secondary Fixed-Income Markets

- Primary Fixed-Income Markets
    - initial sale of new bonds
    - **Public Offering**: Open to the general public
    - **Private Placement**: Limited to a select group of investors
    - Issuance Process
        - Debut Issuers
            - Requires registration and roadshows to familiarize investors
            - Issuance process is extensive, similar to IPOs in equity markets
            - Debut issuers often issue bonds to refinance existing private debt
        - Repeat Issuers
            - More abbreviated process
            - Can use existing shelf registrations
            - Can reopen existing bonds or issue new bonds priced near par
                - **Reopening**: Not common, increasing the size of an existing bond issue with a price significantly different from par
        - High-Yield and Secured Bond Issuance
            - Longer and more involved process
            - May involve complex covenants and collateral
            - Often not underwritten, but rather sold on a best-efforts basis
- Secondary Fixed-Income Markets
    - trading of existing bonds
    - mostly quote-driven or over-the-counter (OTC) markets

- Liquidity
  - On-the-run sovereign bonds are the most liquid
  - Recently issued corporate bonds of high credit quality are more liquid
  - Distressed debt trades frequently but at significant discounts
    - **Distressed debt**: Debt of mature companies in financial difficulty, in bankruptcy, or likely to default on debt.
- Bid-Offer Spread
  - Key measure of liquidity
  - Tight spreads for highly liquid securities
  - Wider spreads for less frequently traded or distressed bonds

Fixed-Income Markets for Corporate Issuers

Short-Term Funding Alternatives

- For Non-Financial Corporations
  - External Loan Financing
    - **Uncommitted** Bank Lines of Credit
      - Least reliable form of bank borrowing
      - Offers flexibility and low cost
      - Typically unsecured, requires stable cash deposits
      - Banks can refuse to honor the credit line if economic conditions deteriorate
    - **Committed** Bank Lines of Credit
      - More reliable than uncommitted lines
      - Formal written commitment from the bank
      - May involve upfront costs such as a commitment fee
      - Commonly used as backup credit for other financing forms
    - Revolving Credit Agreements (Revolvers)
      - Most reliable source of short-term bank funding
      - Multiyear credit commitments with covenants
      - Similar borrowing rates and commitment fees as regular lines
  - Secured Loans and Factoring
    - Secured loans require collateral like fixed assets or high-quality receivables

        - Factoring involves selling accounts receivable to a lender (factor) at a discount
        - Provides immediate cash flow but at a higher cost due to the discount
    - External, Security-Based Financing
        - Commercial Paper (CP)
            - Short-term, unsecured notes issued by large, highly-rated companies
            - Maturities typically less than three months
            - Backed by committed lines of credit to minimize rollover risk
- For Financial Institutions
    - Deposits
        - Demand Deposits
            - Checking accounts with no stated maturity, paying little or no interest
            - Stable source of funding due to fee rebates and other services
        - Savings Deposits
            - For non-transactional purposes with a stated term
            - **Certificates of Deposit (CDs)**: Short-term maturity, paying interest at maturity.
                - **Non-negotiable CD**: payment of principal and interest at maturity to the initial depositor, with a penalty for early withdrawal
                - **Negotiable CD**: allow a depositor to withdraw funds by selling the CD in the open market prior to maturity
    - Interbank Market
        - Short-term borrowing and lending among financial institutions
        - Unsecured loans and deposits range from overnight to one-year terms
        - Central bank funds market allows banks to borrow or lend surplus funds
    - Commercial Paper
        - Dominated by large financial institutions
        - Asset-Backed Commercial Paper (ABCP) involves selling loans or receivables to an **SPE that issues ABCP** to investors
            - ABCP: **off-balance-sheet financing**, providing cash and reducing capital costs for the issuing bank

Repurchase Agreements (Repos)

- **Definition**: the sale of a security with a simultaneous agreement by the seller to buy the same (or a similar) security back from the purchaser at an agreed-on repurchase price and future date called the repurchase date
  - Repo Rate = Annual Interest Rate
- Calculation
  - Repurchase price = Face Value $\times$ (1 + Repo Rate $\times$ Repo Term Days / 365)
- Features of Repos
  - Initial Margin
    - The ratio of the price of collateral to the value of cash exchanged in a repo
    - $Initial\ Margin = \frac{Security\ Price_0}{Purchase\ Price_0}$
    - A value over 1.0 or 100% indicates overcollateralization
    - For a 102% initial margin: Purchase Price = Security Price $\div$ 1.02
  - Repo Haircut / Repo Margin
    - Difference between the security price and purchase price, expressed as a percentage 抵押物比借的钱多的价值
    - Haircut = (Security Price−Purchase Price) $\div$ Security Price
  - Variation Margin
    - Adjusts collateral to maintain the initial margin ratio throughout the repo term
    - $Variation\ Margin = (Initial\ Margin \times Purchase\ Price_t)$ –
    - a security price *decline* requires a cash borrower (security seller) to provide additional collateral to the seller
- Applications and Benefits
  - Financing Security Ownership
  - Earning Short-Term Income (for cash lenders)
  - Borrowing Securities (for short selling)
- Factors affect Repo Rate
  - Money market interest rates
  - Collateral quality: Higher collateral risk increases repo rates
  - Repo term: Repo rates generally increase with maturity
  - Collateral uniqueness: The higher the demand for a specific security, the lower the repo rate
  - Collateral delivery
- Risks
  - Default risk

- Collateral risk
- Margining risk (minimize collateral shortfalls)
- Legal risk
- Netting and settlement risk
- **Triparty repo**: use a third-party agent for the transaction

Long-term Corporate Debt

- Investment-Grade (IG) vs. High-Yield (HY) Issuance
  - Similarities
    - Both consider the trade-offs between maturity, interest rates, and credit spreads
  - Differences
    - **Credit Quality**
      - IG: Strong capacity to meet future obligations
      - HY: Higher likelihood of financial distress
    - **Yield Composition**
      - IG: Higher proportion attributed to government benchmark yield
      - HY: Higher proportion attributed to issuer-specific credit spread
    - **Monitoring**
      - IG: Limited monitoring from bondholders
      - HY: More monitoring and constraints from bondholders
    - **Flexibility**
      - IG: High degree of flexibility in choosing debt maturities (up to 30 years)
      - HY: Less flexibility with more restrictions
    - **Covenants**
      - IG: Few restrictive covenants
      - HY: More restrictive covenants (所以更多会选择发行股票)
  - Fallen Angels
    - **Definition**: Companies downgraded from investment-grade to high-yield
    - **Features**: Often retain investment-grade features (non-callable, fewer restrictions)
    - **Market Impact**: Can suffer significant price deterioration due to forced sales by investment-grade investors

Fixed-Income Markets for Government Issuers

Sovereign Debt 主权债务

- Issuers
  - Developed Market (DM) Sovereign Issuers
    - **Characteristics**: Strong, stable, well-diversified domestic economies
    - **Fiscal Policy**: Stable and transparent with broad-based individual and business tax cash flows
    - **Debt**: Often referred to as default-risk-free with unconstrained market access across maturities, usually denominated in major reserve currencies
  - Emerging Market (EM) Sovereign Issuers
    - **Characteristics**: Higher growth but less stable and less well-diversified economies
    - **Fiscal Policy**: Subject to greater fluctuations and often depend on dominant domestic industries
    - **Debt**: Can be denominated in restricted domestic currencies or foreign currencies. EM debt often faces liquidity and convertibility issues
- Sovereign Debt Management
  - **Short-term securities**: Treasury bills with maturities ranging from 1 to 12 months
  - **Medium- and long-term securities**: Treasury notes and bonds, including fixed-rate, floating-rate, and inflation-linked instruments
  - **Guaranteed instruments**: Such as mortgage-backed securities in the US
- Ricardian Equivalence Theorem
  - A government's choice of debt maturity is irrelevant for the present value of future tax cash flows under the following assumptions:
    - Rational expectations of future taxes by taxpayers
    - Perfect capital markets with no transaction costs
    - Altruism across generations by taxpayers
- Debt Maturity Structure
  - Issuing medium- to long-term securities can help manage and stabilize refinancing needs and interest rate risks

Sovereign Debt Issuance and Trading

- Issuance of Sovereign Debt

- Public Auctions
    - Competitive Bids
        - Competitive bids are ranked from the lowest yield (highest bond price) until the desired amount is reached
        - **Single-price auction**: All bidders pay the same price and receive the same coupon rate regardless of their bid
            - Advantages:
                - lower cost of funds
                - broader distribution among investors
                - reduce yield volatility
        - **Multiple-price auction**: Generates different prices among bidders for the same bond issue
    - Non-Competitive Bids
        - Bidder agrees to accept the price determined at auction and always receives securities
- Financial Intermediaries
    - **Primary Dealers**: participate in all auctions, facilitate open market operations
- Trading of Sovereign Debt
    - **OTC Markets:** Sovereign debt is typically traded over-the-counter (OTC) by broker/dealers, although some markets, like Australia, trade on an exchange
    - **On-the-Run vs. Off-the-Run Securities:** The most recently issued sovereign debt securities (on-the-run) are used for benchmark yield analyses due to higher liquidity compared to older, infrequently traded off-the-run securities

Non-Sovereign Government Funding

- Government Agencies
    - Issue debt to fund specific public goods or services, primarily repaid by cash flows related to its underlying activities
- Local and Regional Government Authorities
    - General Obligation Bonds (GO Bonds)
        - Used to fund public goods and services with repayment from local tax cash flows
    - Revenue Bonds

        - Fund specific projects or infrastructure with repayment linked to project revenue streams (e.g., tolls, fees)
- Supranational Organizations
    - **Examples:** World Bank, International Monetary Fund (IMF), and Asian Development Bank (ADB)
    - **Funding:** Supported by member states providing implicit and explicit financial support

Fixed-Income Bond Valuation: Prices and Yields

Bond Pricing and the Time Value of Money

- Calculate bond price
    - **DCF analysis**: The bond's price is the present value (PV) of its promised interest and principal cash flows
    - $PV = sum(\frac{PMT_t}{(1+r)^t}) + \frac{FV}{(1+r)^N}$
        - 所有未付coupon和face value的present value
    - If the bond's periodic coupon rate exceeds the periodic market discount rate, the bond will trade at a premium to par
- Calculate YTM
    - 已知PV、coupon payments和principal, 求解r
    - 用计算器或者Excel
    - The price increase when the yield decreases is usually more significant than the price decrease when the yield increases by the same amount
- Flat Price, Accrued Interest, and the Full Price
    - When a bond is priced between coupon payment dates
    - Full\ Price = Flat\ Price + Accrued\ Interest
        - Full price = invoice price = dirty price
        - Flat price = quoted price = clean price
    - $AI = \frac{t}{T} \times PMT$

Relationships Between Bond Prices and Bond Features

- Inverse Relationship
    - Bond price changes inversely with changes in YTM
- Coupon Effect: Lower coupon bonds have a greater price change

- Maturity Effect: Long-term bonds have a greater price change
    - Exceptions: only for low-coupon (but not zero-coupon) long-term bonds trading at a discount
- Constant-Yield Price Trajectory
    - Bond prices change over time even if the YTM remains constant, converging towards par value as maturity approaches
- Convexity Effect
    - The relationship between bond prices and yields is convex. A decrease in YTM results in a greater percentage price increase than the percentage price decrease from an equivalent YTM increase

Matrix Pricing

- Use: estimate the price of bonds that are not actively traded or not yet issued by using the prices of comparable, more frequently traded bonds with similar characteristics
- Features to use
    - Time-to-maturity
    - Coupon rate
    - Credit quality

Yield and Yield Spread Measures for Fixed-Rate Bonds

Periodicity and Annualized Yields

- Periodicity: the number of interest compounding periods in a year
- Effective Annual Rate (EAR) 有效年利率
    - Consider the compounding effect within the year
    - Periodicity Conversion: 把不同periodicity的bond换算成相同的周期回报率来进行比较
- Strip Bonds / Zero-coupon bonds贴现债券

Yield Measures and Conventions

- Current Yield
    - Annual coupon divided by the bond's flat price
    - Simplest measure of return

        - Does not consider the frequency of coupon payments, reinvestment of interest, or accrued interest
    - Street Convention Yield
        - Assumes payments occur on scheduled dates, **ignoring weekends and holidays**
        - True Yield
            - Accounts for actual payment dates, considering weekends and holidays. It is typically slightly lower than street convention yield
    - Government Equivalent Yield
        - Converts a corporate bond yield from a 30/360 day count basis to an actual/actual day count basis to compare with government bond yields
    - Simple Yield
        - Sum of coupon payments plus the straight-line amortized share of the gain or loss, divided by the flat price. Used mainly for Japanese government bonds (JGBs)
    - Option-Adjusted Yield
        - Adjusts the bond price for the value of the embedded call option
        - **Yield-to-Call (YTC):** Adjusts yield calculations for callable bonds, taking into account the bond's call features
        - **Yield-to-Worst (YTW):** The lowest yield among yield-to-maturity and various yield-to-call measures. Provides the most conservative rate of return

Yield Spreads over Benchmark Rates

- YTM = Benchmark + Issuer-specific Spread
    - **Benchmark Rate:** Reflects top-down macroeconomic factors
        - **On-the-Run Bonds:** Most recently issued government bonds with high liquidity and low default risk
        - **Off-the-Run Bonds:** Older, less liquid government bonds
    - **Issuer-Specific Spread:** Reflects bottom-up microeconomic factors
- **Benchmark Spread (G-Spread)**
    - Difference between a bond's yield-to-maturity and the yield on a benchmark government bond of the same maturity
    - Useful for analyzing relative value by controlling for macroeconomic factors
- **Interpolated Spread (I-Spread)**
    - Yield spread over the standard **swap rate** in the same currency

    - Common for pricing and quoting euro-denominated corporate bonds
- **Zero-Volatility Spread (Z-Spread)**
    - Constant yield spread over a government or swap spot curve
    - Adds the spread to each spot rate to make the present value of a bond's cash flows equal its price
- **Option-Adjusted Spread (OAS)**
    - Z-spread adjusted for the value of an embedded option in the bond
    - Measures the spread after accounting for the option's value

Yield and Yield Spread Measures for Floating-Rate Instruments

Floating-rate notes (FRNs or floaters)

- Margins
    - Quoted Margin
        - The spread over the reference rate stated in the bond's terms
        - It is a fixed percentage added to the reference rate
    - Required Margin
        - The market-determined yield spread over the reference rate that prices the FRN at par value on a reset date
        - Determined by market, based on credit risk, liquidity,...
    - Discount Margin
        - The yield spread over the reference rate that equates the bond’s current market price to its present value of future cash flows
        - It reflects the current market conditions and the credit quality of the issuer
- Pricing Relationship
    - **If RM > QM**: The bond is priced at a discount because the market requires a higher yield than what the bond offers through its quoted margin
    - **If RM = QM**: The bond is priced at par because the bond’s yield matches the market’s required yield
    - **If RM < QM**: The bond is priced at a premium because the bond offers a higher yield than what the market requires

Money Market Instruments

- Examples include Treasury bills, commercial paper, and certificates of deposit

- Yield measurement compare to bond
  - Annualization without Compounding
  - Different Periodicities
  - Different Pricing Equations and Non-standard Interest Rates
- Yield Measures
  - Discount Rate (DR) Basis
    - Used for instruments like commercial paper and Treasury bills
    - Interest is included in the face value of the instrument
    - $DR = \frac{Year}{Days} \times \frac{FV-PV}{FV}$
    - $PV = FV \times (1 - \frac{Days}{Year} \times DR)$
      - DR is Discount Rate
  - Add-On Rate (AOR) Basis
    - Used for instruments like certificates of deposit and repos
    - Interest is added to the principal amount
    - $AOR = \frac{Year}{Days} \times \frac{FV-PV}{PV}$
    - $PV = \frac{FV}{1+\frac{Days}{Year} \times AOR}$
      - AOR is interest rate in a year
- DR and AOR conversion
  - Example: 90-day commercial paper with a discount rate of 0.10% for a 360-day year
    - $PV = 100 \times (1 - 0.10\% \times 90/360) = 99.975$
    - $AOR = \frac{360}{90} \times \frac{100-99.975}{99.875} = 0.1018\%$

The Term Structure of Interest Rates: Spot, Par, and Forward Curves

Maturity Structure of Interest Rates and Spot Rates

- Spot rate: YTM on default-risk-free zero-coupon bonds
- Spot curve: Yields-to-maturity on a series of default-risk-free zero-coupon bonds
  - Only the **most recently issued and actively traded** government bonds are used to build a yield curve
- Bond Pricing using Spot Rates
  - Calculation: solve PV, given PMT, FV, and each year's spot rates

- Example: Suppose that the one-year spot rate is 2%, the two-year spot rate is 3%, and the three-year spot rate is 4%. The price of a three-year bond making a 5% annual coupon payment is calculated as follows:
  - $Price = \frac{5}{1.02^1} + \frac{5}{1.03^2} + \frac{105}{1.04^3} = 4.902 + 4.713 + 93.345 = 102.960$
- When PV > FV, the bond is priced at a premium, YTM must be less than coupon rate

Par and Forward Rates

- Par Rate
  - Definition: YTM that makes the PV of a bond equal to par (100% of face value)
  - To trade at par, a bond's coupon rate and yield-to-maturity must be equal
  - Calculation: solve each year's PMT, given PV=FV, each year's spot rates
  - Example:
    - The one-year par rate is 5.263%
      - $100 = \frac{PMT+100}{(1.05263)^1}; PMT = 5.263$
    - The two-year par rate is 5.606%
    - $100 = \frac{PMT}{(1.05263)^1} + \frac{PMT+100}{(1.05616)^2}; PMT = 5.606$
- Forward Rate / Implied Forward Rate (IFR)
  - Definition: breakeven reinvestment rates, linking returns on shorter-term bonds to longer-term bonds
  - Calculation: given YTM of bond maturity at A and B years, calculate forward rate
  - $(1 + Z_A)^A \times (1 + IFR_{A,(B-A)})^{B-A} = (1 + Z_B)^B$
    - $IFR_{A,(B-A)}$ is the forward rate from A to B
    - Z_A and Z_B are spot rates for period A and B
  - Example: Given three-year and four-year zero-coupon bond YTMs of 3.65% and 4.18%, respectively. To find the one-year forward rate three years from now (3y1y):
    - $(1 + 0.0365)^3 \times (1 + \text{IFR}_{3,1})^1 = (1 + 0.0418)^4; IFR_{3,1} = 0.057863 = 5.79\%$
  - Application:
    - Compare the return on different investment strategies
      - 如果预期三年后的一年期债券的rate of return更高，将会买三年期债券并在到期后reinvest一年期债券，而不是现在购买四年期债券

Relationships between these yield curves

- Yield curves: interest rates across different maturities
    - **Spot Curve (Spot Rates):** The spot curve shows the yields on zero-coupon bonds for various maturities
    - **Par Curve (Par Rates):** The par curve is derived from spot rates and represents the yields-to-maturity on bonds that are priced at par (100% of face value)
    - **Forward Curve (Forward Rates):** The forward curve shows the implied future interest rates based on current spot rates
- Observations
    - **Spot Rates:** Positive and increasing with maturity
    - **Par Rates:** Slightly below spot rates, with the difference more pronounced at longer maturities
    - **Forward Rates:** Higher than both spot and par rates, reflecting incremental returns
        - The forward rate reflects the market's anticipation of economic conditions

Interest Rate Risk and Return

Rate of Return

- Source of Return
    - Promised coupon and principal payments
    - Reinvestment of coupon payments
    - Potential capital gains or losses on the sale of the bond prior to maturity
- Interest Rate Risk
    - **Reinvestment Risk:** the risk of decreasing reinvestment returns on cash flows, which occurs when **interest rates fall**
    - **Price Risk:** declining prices and occurs when **interest rates rise**
- **Carrying Value:** The purchase price plus (minus) the amortized amount of the discount (premium) if the bond is purchased below (above) par value
    - Discount: 携带价值=购买价+已摊销discount金额, 逐渐增加，达到面值
    - Premium: 携带价值=购买价−已摊销premium金额, 逐渐减少，达到面值

Investment Horizon

- Macaulay Duration

    - A measure of the weighted average time until a bond's cash flows (coupons and principal) are received
        - It indicates the bond's sensitivity to interest rate changes
        - helps identify when the impact of interest rate changes and reinvestment income offset each other
    - Calculation
        - Calculate PV of each PMT and FV, sum to total PV
        - Calculate weights of each cash flow
        - MD = sum(how many years till mature $\times$ weight)
            - = $1 \times w_1 + 2 \times w_2 + 3 \times w_3$
- Investment Horizon: the period an investor plans to hold a bond
    - If investment horizon < Macaulay duration: the investor faces **price risk** (risk of rising interest rates)
    - If investment horizon > Macaulay duration, the investor faces **reinvestment risk** (risk of falling interest rates)
    - If investment horizon = Macaulay duration, the price risk and reinvestment risk offset each other
- Duration Gap
    - Duration gap = Macaulay duration – Investment horizon
    - **Negative** duration gap: reinvestment risk is the dominant source of interest rate risk, from **falling interest rates** 负的gap对应利率下降，有reinvestment risk
    - **Positive** duration gap: price risk is the dominant source of interest rate risk, from **rising interest rates** 正的gap对应利率上升，有price risk

Yield-Based Bond Duration Measures and Properties

Modified Duration

- Definition: measures a bond's price sensitivity to changes in yield, providing a more practical measure of interest rate risk compared to Macaulay duration
- Bond Price and Yield Relationship:
    - Bond prices move inversely with yields
- Calculation
    - $Modified\ Duration = \frac{Macauley\ Duration}{1+r}$
        - r is the yield per period

        - Example: For a bond with ModDur of 5, a 100 bps increase in yield would decrease its price by approximately 5%
    - Use ModDur to estimate the percentage price change: $\%\Delta PVFull \approx -AnnModDur \times \Delta AnnYield$
        - Provides a linear approximation of the price change, useful for small yield changes
- Application
    - Bonds with higher modified durations are more sensitive to yield changes
    - In a declining interest rate environment, bonds with higher durations will perform better due to larger price increases
    - Conversely, in a rising rate environment, these bonds will suffer more significant price declines

Money Duration

- Definition: the product of the annualized modified duration and the full price (PVFull) of the bond
- Calculation
    - $MoneyDur = AnnModDur \times PVFull$
    - $\%\Delta PVFull \approx -MoneyDur \times \Delta Yield$
- Price Value of a Basis Point (PVBP)
    - **PVBP** estimates the change in the full price of a bond given a 1 basis point (bp) change in its yield-to-maturity
    - $\mathrm{PVBP} = \frac{(\mathrm{PV}^- - \mathrm{PV}^+)}{2}$
    - $\mathrm{PV}^-, \mathrm{PV}^+$are the full prices calculated by decreasing and increasing the yield-to-maturity by 1 bp.
    - Example: first calculate PV+ and PV- by adding / subtracting 1bp (0.01%) from YTM, then use PV- and PV+ to calculate PVBP

Properties of Duration

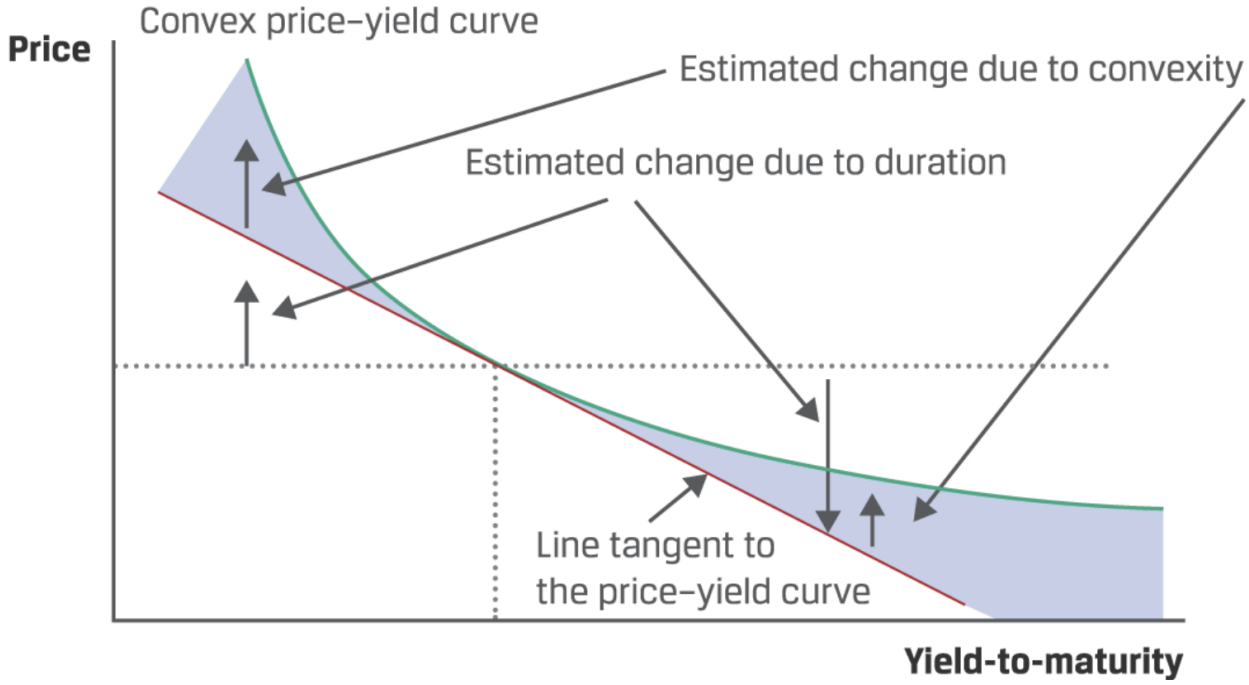
- **Duration** measures a bond's sensitivity to interest rate changes. The key factors affecting a bond's duration and interest rate risk are its time-to-maturity, coupon rate, yield-to-maturity, and the fraction of the current coupon period that has elapsed.
- Relationships
    - **Coupon Rate (c)**:

        - Inverse relationship: As the coupon rate increases, the bond's duration decreases.
        - Lower-coupon bonds have higher duration and greater interest rate risk than higher-coupon bonds.
    - **Yield to Maturity (r)**:
        - Inverse relationship: As the yield to maturity increases, the bond's duration decreases.
        - Lower yields increase the weighted average time to receipt of cash flows, thus increasing duration.
    - **Time-to-Maturity (T)**:
        - Direct relationship: As the time-to-maturity increases, the bond's duration increases.
        - Longer times-to-maturity correspond to higher duration, especially for bonds trading at par or at a premium.
    - **Fraction of Current Coupon Period that has Elapsed (t/T)**:
        - Inverse relationship: As more of the current coupon period elapses, the bond's duration decreases.

Yield-Based Bond Convexity and Portfolio Properties

Bond Convexity

- Definition: measures the second-order (non-linear) effect of yield changes on price for an option-free fixed-rate bond
- bond prices rise more when yields decrease and fall less when yields increase than when estimated using duration alone



- (!)Calculation:
  - $\%\Delta PVFull \approx (-AnnModDur \times \Delta Yield) + [\frac{1}{2} \times AnnConvexity \times (\Delta Yield)^2]$
  - $ApproxCon = \frac{(PV-)+(PV+)-[2\times(PV_0)]}{(\Delta Yield)^2 \times (PV_0)}$
  - Calculation: given AnnModDur, ΔYield, and AnnConvexity, calculate % of PV change
  - Calculation: given PV0 and PV-, PV+ corresponding to ΔYield, calculate convexity
- A fixed-rate bond will have greater convexity
  - the *longer* its time-to-maturity
  - the *lower* its coupon rate
  - the *lower* its yield-to-maturity
- For two bonds with the same duration
  - the one with the greater dispersion of cash flows has greater convexity
  - The benefit of greater convexity arises when their yields change significantly

Portfolio Duration and Convexity

- Weighted Average of Time to Receipt of Aggregate Cash Flows
  - This method is theoretically correct but difficult to implement in practice
- Weighted Averages of the Durations and Convexities of **Individual Bonds**
  - This method is commonly used by portfolio managers and is easier to implement

- The weights are based on the **market value** of each bond in the portfolio 按照market value的比重来加权平均，算出Duration and convexity
- The calculated duration indicates the portfolio's sensitivity to changes in yield
- Limitations
  - The assumption of a parallel shift in the yield curve (A parallel shift in the yield curve occurs when interest rates across all maturities increase or decrease by the same amount)

Curve-Based and Empirical Fixed-Income Risk Measures

Curve-Based Interest Rate Risk Measures

- Effective Duration and Convexity
  - **Effective Duration (EffDur):** Measures the sensitivity of a bond's price to a parallel shift in the benchmark yield curve. It accounts for the changes in cash flows due to options embedded in the bond.
  - **Effective Convexity (EffCon):** Measures the curvature or second-order sensitivity of a bond's price to changes in the benchmark yield curve. It reflects how the duration of a bond changes as interest rates change.
- Advantages
  - Better for bonds with unstable cash flow (callable, ABS)
  - Valid for both small and large changes in yields (Yield方法只能计算small changes)
  - 对于给定的benchmark yield curve shift, 可以计算% of bond full price change
- Effective Duration Calculation
  - 计算有效久期与计算近似修正久期类似：$\text{EffDur} = \frac{(PV_{-}) - (PV_{+})}{2 \times (\Delta\text{Curve}) \times (PV_0)}$
- Effective Convexity Calculation
  - 计算有效凸性与计算近似凸性类似：$\text{EffCon} = \frac{[(PV_{-}) + (PV_{+}) - 2 \times (PV_0)]}{(\Delta\text{Curve})^2 \times (PV_0)}$
- Bond Price Change Calculation
  - The percentage change in the full price of a bond due to a change in the benchmark yield curve is estimated using:
    $\%\Delta PV_{Full} \approx (-\text{EffDur} \times \Delta\text{Curve}) + \left[\frac{1}{2} \times \text{EffCon} \times (\Delta\text{Curve})^2\right]$
- Practical Use
  - For callable bonds:
  - When the benchmark curve shifts downward (interest rates decline), effective duration declines, and effective convexity may turn negative, limiting price

appreciation.
- When the benchmark curve shifts upward (interest rates rise), effective duration and effective convexity also decline, limiting price depreciation.

Key Rate Duration

- **Key rate duration** measures a bond's sensitivity to a change in the benchmark yield at a specific maturity
  - This measure is crucial for assessing the impact of non-parallel shifts in the yield curve, such as changes in the shape of the curve (steepening, flattening, or twisting)
- Formula
  - The key rate duration at a specific maturity k is calculated using: $\text{KeyRateDur}_k = -\frac{1}{PV} \times \frac{\Delta PV}{\Delta r_k} \sum_{k=1}^{n} \text{KeyRateDur}_k = \text{EffDur}$
    - shifting the yield at specific maturities (key points) on the yield curve by a small amount (e.g., 1 bp),
    - then calculating the new bond prices (PV+ and PV–) and the key rate duration for that maturity
- Application
  - **Bond A (5 years):** Key Rate Duration = 2.702
  - **Bond B (10 years):** Key Rate Duration = 3.953
  - **Bond B** will have a greater percentage change due to the higher key rate duration
  - Using key rate durations, a portfolio manager can over- or underweight specific tenors to maximize risk-adjusted return

Empirical Duration

- Key concepts
  - **Analytical duration** uses *theoretical and mathematical formulas* to estimate the sensitivity of a bond's price to changes in interest rates.
    - **Based on Theoretical Models:** Analytical duration relies on models like Macaulay duration, modified duration, and effective duration
    - **Assumes Independent Yield Movements:** It assumes government bond yields and credit spreads are uncorrelated
    - **Use Cases:** Suitable for *government bonds and high-quality bonds* with little or no credit risk

    - **Empirical duration** uses *historical data and statistical models* to estimate the sensitivity of a bond's price to interest rate changes.
        - **Based on Historical Data:** Empirical duration uses past data to analyze how bond prices have responded to changes in interest rates and other factors over time
        - **Accounts for Correlation:** It considers the correlation between benchmark yields and credit spreads, especially during different economic scenarios
        - **Use Cases:** Particularly useful for *corporate bonds and securities with significant credit risk or liquidity risk*
- Challenges
    - **Data Availability:** Obtaining sufficient historical data for specific bonds, especially for newer issues or less liquid bonds, can be difficult
    - **Economic Conditions:** Empirical duration estimates can vary significantly across different economic environments, making it challenging to use historical data to predict future movements
    - **Model Complexity:** Building accurate statistical models that incorporate all relevant factors (e.g., credit risk, liquidity risk, macroeconomic variables) requires complex modeling techniques and substantial computational resources
    - **Market Events:** Unexpected market events or structural changes in the economy can make historical data less relevant for predicting future bond price movements

Credit Risk

Sources of Credit Risk

- $Expected\ Loss = POD \times LGD$
- Probability of Default (POD)
    - The likelihood that a borrower will fail to make the required payments on time
    - Typically measured as an annualized percentage
- Loss Given Default (LGD)
    - The amount of loss the lender or investor incurs if the borrower defaults
    - Calculated using the exposure at default (EAD) and the recovery rate (RR)
        - $LGD = EAD \times (1 - RR)$
    - Expressed either in currency terms or as a percentage of the principal

- Factors Affecting Credit Risk
  - Borrower-Specific Factors
    - **Capacity:** Ability to make timely payments
    - **Capital:** Resources available to reduce reliance on debt
    - **Collateral:** Quality and value of assets backing the debt
    - **Covenants:** Legal terms that the borrower must adhere to
    - **Character:** Management's reputation and willingness to repay
  - General Economic Factors
    - **Conditions:** Economic environment affecting borrowers
    - **Country:** Geopolitical and legal system influencing debt repayment
    - **Currency:** Exchange rate risk for issuers with foreign currency debt
- Measuring Credit Risk
  - Credit risk can be assessed by comparing the expected loss (EL) with the credit spread. The credit spread compensates investors for assuming the credit risk of a borrower.
  - Example: POD=6%, LGD=50%, Credit spread=3.3%
    - Investors are more than fairly compensated as credit spread > EL.

Credit Rating Agency

- Major credit rating agencies: Moody’s, Standard & Poor’s (S&P), and Fitch Ratings
  - These agencies assess the credit risk of bonds and issuers
  - They use symbol-based ratings to indicate the potential risk of default
- Long-Term Rating Scale
  - Investment Grade: Above BBB- or Baa3
  - Non-investment Grade: Below BB+ or Ba1
- Limitations of Credit Ratings
  - Lag in Market Pricing and Credit Spreads
  - Overlooked Risks
    - Some risks, such as litigation, environmental risks, and natural disasters, are difficult to capture in credit ratings
    - Leveraged transactions and complex risks may be underestimated
  - Potential Miscalculations
    - May fail to anticipate significant events
  - Sticky Ratings

        - Credit ratings tend to be sticky and may not immediately reflect changes in market conditions or creditworthiness

Factors Impacting Yield Spreads

- Yield Spread
    - Credit spread risk refers to the risk of increased expected loss due to changes in credit conditions influenced by macroeconomic, market, and issuer-specific factors
- Macroeconomic Factors
    - Business Cycle
        - **Improvement:** Credit spreads narrow as investors are willing to assume more credit risk
        - **Deterioration:** Credit spreads widen as credit risk is perceived to increase
        - **Peak:** Spreads are narrowest at the top of the credit cycle
        - **Trough:** Spreads are widest at the bottom of the credit cycle
    - High-Yield (HY) Bonds Benefits
        - **Portfolio Diversification:** HY bonds often have lower correlation with IG bonds and default risk-free interest rates, increase diversification and risk-adjusted return
        - **Capital Appreciation:** Economic recovery or issuer-specific improvements can have a more positive impact on HY bond prices than IG bonds
        - **Equity-like Returns with Lower Volatility:** HY bonds may offer a more stable return than equities due to their larger income component
- Market Factors
    - Liquidity Risk
        - **Transaction Costs:** Market liquidity risk is the cost associated with selling a bond. Less liquid bonds tend to have higher bid-ask spreads
        - **Issuer Size and Credit Quality:** Larger issuers and those with higher credit quality typically have lower liquidity risk and narrower bid-ask spreads.
        - **Market Conditions:** During financial stress, liquidity can decline sharply, causing yield spreads to widen
- Issuer-Specific Factors
    - Financial Performance

        - **Debt Coverage:** The sufficiency of a borrower's resources to make debt payments
        - **Leverage:** The relative reliance on debt versus other financing sources
        - **Sector Comparison:** Yield and yield spreads are often evaluated by comparing bonds within the same credit rating category or sector
- Liquidity Spread
    - $\text{Liquidity spread} = \text{Yield at bid price} - \text{Yield at offer price}$
    - Calculate IRR for both bid and offer price, then find liquidity spread
- Credit Spread
    - \text{Credit spread}=\text{Total spread}–\text{Liquidity spread}
    - Use the total spread and the liquidity spread to calculate credit spread, then build the bond yield
    - 

- Spread Risk
    - Definition: The effect on prices and returns from changes in spreads
    - Impact factors
        - The modified duration of the bond
        - The magnitude of the spread change
    - Calculation
        - For small change in yield spread
            - \%ΔPV^{Full} = –AnnModDur × ΔSpread
            - Lower (higher) spreads have a positive (negative) impact on bond prices and thus returns
        - For large spread changes, convexity needs to be incorporated
            - \%ΔPVFull = –(AnnModDur × ΔSpread) + 1/2 \times AnnConvexity × (ΔS
            - For option-free bonds, convexity should be scaled so it has the same order of magnitude as duration squared and the spread change is expressed as a decimal

        - For example, if a bond has duration of 5.0 and reported convexity of 0.235, then first re-scale convexity to 23.5, and then apply the formula

Credit Analysis for Government Issuers

Sovereign Credit Analysis

- Qualitative Factors
    - **Government Institutions & Policy:** Rule of law, property rights enforcement, debt repayment culture, transparency, ease of doing business, political stability
    - **Willingness to Pay:** Sovereign immunity limits bondholders' legal recourse, debt restructuring is common
    - **Fiscal Flexibility:** Ability to maintain fiscal discipline, manage public finances, and enforce tax collection
    - **Monetary Effectiveness:** Central bank independence, policy effectiveness
    - **Economic Flexibility:** Economic size, diversification, growth potential
    - **External Status:** International trade policies, capital flows, foreign exchange policies
- Quantitative Factors
    - **Fiscal Strength:** Debt-to-GDP, debt-to-revenue, interest-to-revenue ratios
    - **Economic Growth and Stability:** GDP size, per capita income, real economic growth rates, variability
    - **External Stability:** Foreign currency reserves, external debt ratios, current account balances
    - A key distinction is whether domestic currency is considered to be a **reserve** currency, that is, one that is fully convertible and held by foreign central banks and other investors

Non-Sovereign Credit Risk

- Non-Sovereign Government Issuers
    - **Agencies:** Quasi-government entities created by sovereign law to fulfill public services. They often have implicit or explicit government backing.
    - **Public Banks and Development Financing Institutions:** Financial intermediaries established to promote specific sovereign objectives, often enjoying government support

    - **Supranational Issuers:** Organizations owned by multiple sovereign governments to achieve common objectives, such as the World Bank or regional development banks
    - **Regional Government Issuers:** Provincial, state, and local governments issuing debt, often supported by tax revenue or specific projects
- Types of Bonds
    - **General Obligation (GO) Bonds:** Unsecured bonds backed by the general revenues and taxing authority of the issuing government
    - **Revenue Bonds:** Bonds issued to finance specific projects, repaid from the revenue generated by those projects
    - **Agency Bonds:** Issued by government agencies or quasi-government entities, often with implicit or explicit backing from the sovereign government
- Credit Analysis
    - **GO Bonds:** Focus on the issuer's ability to levy and collect taxes, the local business climate, major industries, and prudent budget management
    - **Revenue Bonds:** Analyze the project's need, projected utilization, economic base, operating results, cash flow, liquidity, and capital structure. Key credit measure is the ***debt service coverage ratio***.
        - The ratio of project revenue available to cover interest and principal payments to debt service
    - **Agency Bonds:** Consider the implicit or explicit government backing and the agency's mandate and financial health

Credit Analysis for Corporate Issuers

Assessing Corporate Creditworthiness

- Qualitative Factors
    - **Business Model**: stable and predictable cash flows, innovative and evolving business models may face higher business risk
    - **Industry and Competitive Environment**: High competition and fragmented industries can increase business risk
    - **Business Risk**: Execution risks, such as transitioning to new technologies, can impact a company's creditworthiness. Supply chain dependencies and technological shifts can heighten business risks.

    - **Corporate Governance**: Strong corporate governance and transparent accounting practices.
- Quantitative Factors
    - **Profitability**: Stable and strong earnings
    - **Leverage**: Lower leverage is preferable for debt investors, indicating more resources per unit of debt
    - **Coverage**: Compares earnings or cash flow to debt service requirements
    - **Liquidity**: ability to meet short-term obligations with readily available assets. Includes cash, marketable securities, and committed bank facilities

Financial Ratios in Corporate Credit Analysis
Key Credit Analysis Ratios

- Leverage Metrics
    - **Debt to EBITDA:** Measures leverage by comparing total debt to earnings. Higher ratios indicate more leverage and higher credit risk.
    - **Debt to Capital:** Compares debt to total capital (debt plus equity). Higher ratios indicate more leverage
    - **RCF (Retained Cash Flow) to Net Debt:** Compares retained cash flow to net debt (debt minus cash). Higher ratios indicate lower leverage
- Coverage Metrics
    - **EBIT to Interest Expense:** Measures how well operating profits cover interest payments. Higher ratios indicate less credit risk.
    - **EBITDA to Interest Expense:** Adds back depreciation and amortization to EBIT for a broader measure of coverage.
    - **EBITDAR to Interest Expense:** Includes rental expense to assess companies with significant lease obligations.
- Profitability and Cash Flow Metrics
    - **EBIT Margin:** Measures operating performance before interest and taxes. Higher margins indicate more profits available to service debt.
    - **EBITDA:** Adds back depreciation and amortization to EBIT. Useful for companies with significant non-cash expenses.
    - **FFO (Funds from Operations):** Adjusts net income for non-cash items and working capital changes. Provides a conservative measure of cash flow.
    - **RCF:** FFO minus dividends. Indicates cash flow retained for debt servicing and growth.

Seniority Rankings

- Definition: Seniority ranking refers to the priority of payment in the event of a corporate borrower's default or bankruptcy
- Secured Debt:
  - Debt holder claim to specific assets as collateral
  - Includes first lien debt (e.g., property, equipment) and second lien debt
- Unsecured Debt
  - Debt holders have a general claim on the issuer's assets and cash flows
  - **Senior Unsecured Debt:** Most common corporate bond, ranks below senior secured debt
  - **Subordinated Debt:** Ranks below senior unsecured debt
  - **Junior Subordinated Debt:** Lowest priority of claims among debt, often with little or no recovery in default

Recovery Rates

- Definition: Recovery rates represent the percentage of the face value of defaulted debt recovered by creditors. These rates vary by seniority ranking and industry
- **Secured Bonds:** Higher recovery rates due to collateral
- **Unsecured Bonds:** Lower recovery rates.
- **Subordinated Bonds:** Even lower recovery rates.

Issuer and Issue Ratings

- Rating agencies provide issuer and issue ratings
- **Issuer Rating:** Applies to senior unsecured debt, reflects overall creditworthiness
- **Issue Rating:** Specific financial obligations, considering seniority and recovery expectations
- **Notching:** Adjusting ratings up or down based on seniority and expected recovery

Fixed-Income Securitization

Securitization

- Securitization
  - Definition: pooling various types of financial assets and issuing securities backed by these assets

    - Process: Originator → Pooling → SPV → Issuance → Servicing
- Types of Securitized Products
    - **Covered Bonds:** Pool of assets remains on the balance sheet; backed by the issuer's assets
        - Issued by the bank
        - Not full securitization because the assets are not transferred to SPE
        - Investors receive payment directly from the bank
    - **Pass-through Securities:** Assets removed from the balance sheet and transferred to a separate legal entity.
        - They are true securitizations
        - Investors receive the principal and interest payments
        - 财产分割
    - **Bonds with Structural Enhancements:** Tranches created to manage and redistribute payment risks
        - **Tranching:** Creating bond classes (senior, subordinated) with different priorities for payments and risk exposures
        - **Credit Enhancement:** Methods to improve credit quality (e.g., overcollateralization, guarantees)
- Benefits
    - Benefits to Issuers
        - **Improved Profitability:** Separation of loan origination and financing allows banks to earn origination fees and reduce capital requirements
        - **Increased Lending Capacity:** Selling assets removes them from the balance sheet, enabling further loan origination
        - **Fee Income:** Generates income from structuring and servicing securitized products
    - Benefits to Investors
        - **Tailored Interest Rate and Credit Risk Exposures:** Investors can select securities that match their risk tolerance and return expectations
        - **Increased Liquidity:** Securitized assets are more liquid than the original loans
        - **Diversification:** Access to a wider range of underlying assets
    - Benefits to Economies and Financial Markets
        - **Market Efficiency:** Creation of tradable securities and determination of equilibrium prices

        - **Alternative Funding:** Provides businesses with additional funding sources beyond traditional methods
        - **Increased Liquidity:** Improves overall liquidity in the financial system, reducing liquidity risk
- Risks
    - Timing of Cash Flows
        - **Contraction Risk:** Risk that payments will be received earlier than expected
        - **Extension Risk:** Risk that payments will be received later than expected
    - Credit Risk
        - **Default Risk:** Risk of underlying loans defaulting
        - **Creditworthiness Changes:** Fluctuations in the credit quality of the underlying assets

The Securitization Process

- Steps in Securitization
    - **Loan Origination:** The originating entity (e.g., a financing company subsidiary of a car manufacturer) provides loans to customers
    - **Pooling of Loans:** The loans are pooled together and sold to an SPE. SPE必须是一个separate legal entity
    - **SPE Issues ABS:** The SPE issues Asset-Backed Securities (ABS) to investors, backed by the pooled loans
    - **Cash Flow Distribution:** The cash flows from the underlying assets (loan repayments) are distributed to the ABS investors
- Parties Involved
    - **Seller/Depositor:** The originator of the loans (e.g., JP Morgan)
    - **SPE/Issuer:** The entity that purchases the loans and issues ABS (e.g., JP Morgan Auto Loan Trust)
    - **Servicer:** Manages the loans, collects payments, and handles defaults (e.g., BRWA’s financing subsidiary)
    - **Third Parties:** Accountants, lawyers, trustees, underwriters, rating agencies, and financial guarantors who ensure the transaction's legality and efficiency

Asset-Backed Security (ABS) Instrument and Market Features

ABS (Asset-Backed Securities)

- Definition: ABS are securities backed by a pool of various financial assets like auto loans, credit card receivables, and student loans
- Features: Tranching and credit enhancement techniques
- Risks: credit, prepayment, and interest rate risk

Covered Bonds

- **Definition:** Senior debt backed by a cover pool
- Features
  - **Dual Recourse:** cover pool and issuer's assets
  - **Balance Sheet Treatment:** The assets remain on the issuer’s balance sheet and are ring-fenced into a separate cover pool
  - **Regulatory Framework:** Covered bonds are subject to specific legal and regulatory frameworks which vary by jurisdiction
  - **One Bond per Cover Pool**
  - **Dynamic Nature of the Cover Pool**: covered bond issuer must replace any prepaid or non-performing assets to ensure sufficient cash flows
  - **Overcollateralization**: collateral underlying the transaction which *exceeds the face value* of the issued bonds
  - **Fixed interest rates and defined maturity dates**
- Redemption Regimes
  - **Hard-Bullet:** Immediate default and acceleration of payment on missed payments
  - **Soft-Bullet:** New maturity date with payment lapse
  - **Conditional Pass-Through:** Converts to pass-through if unpaid at maturity
- Comparison with ABS
  - ABS involves removal of assets from the balance sheet
  - Covered bonds offer lower yields but lower credit risk
- Benefits and Risks
  - Lower cost of funding for issuers
  - Stable and predictable returns for investors
  - Enhanced market liquidity but subject to regulatory variations

Credit Enhancement

- **Credit Enhancement:** Mitigates credit risk through various methods that absorb losses from defaults on underlying loans
- Internal Credit Enhancements
  - **Overcollateralization:** Collateral value **exceeds the face value** as a cushion against defaults
  - **Excess Spread:** Difference between loan interest and ABS interest
  - **Subordination (Credit Tranching):** Hierarchical structure of bond classes
    - **Senior Tranche:** Lowest risk, paid first, lowest return
    - **Mezzanine Tranche:** Moderate risk, higher return
    - **Junior Tranche:** Highest risk, paid last, highest return
    - **Waterfall Structure:** Determines the order of payments and loss absorption
- External Credit Enhancements
  - **Financial Guarantees:** Provided by banks or insurance companies
  - **Letters of Credit:** Issued by financial institutions to guarantee payments
  - **Cash Collateral Accounts:** Funds set aside to cover potential shortfalls

Non-Mortgage Asset-Backed Securities (ABS)

- Amortizing Loans
  - Periodic payments include both principal and interest
  - Examples: auto loans, traditional residential mortgages
  - Over time, the number of loans and their total value decrease as they are paid off
- Non-Amortizing Loans
  - No scheduled principal repayments during a lockout or revolving period
  - Examples: credit card debt
  - Principal repaid during the lockout period is reinvested to acquire additional loans
  - After the lockout period, any repaid principal is distributed to ABS holders during the amortization period
- Types of Non-Mortgage ABS
  - Credit Card Receivable ABS
    - Collateral: Pool of non-amortizing credit card receivables
    - Benefits
      - Reduce cost of funding

        - Reduce cost of default risk
        - Generate additional fee income
    - Factors affect cash flow
        - **Rapid amortization provisions**: trigger early repayment of principal to investors during the revolving period
- Solar ABS
    - Collateral: Loans or leases for solar energy systems
    - Cash Flows: Generated from loan repayments or lease payments
    - Benefits: Reduce default risk, Promote sustainability, qualify as green bonds, and can be attractive for ESG-focused investors
- Risks: Prepayment Risk, Default Risk

Collateralized Debt Obligations (CDOs) 抵押债务债券

- Definition: pool various types of debt—such as loans or bonds—and redistribute them into tranches with varying degrees of risk and return
- Types of CDOs
    - **Collateralized Bond Obligations (CBOs)**: Backed by corporate and emerging market bonds
    - **Collateralized Loan Obligations (CLOs)**: Backed by leveraged bank loans
    - **Structured Finance CDOs**: Backed by other CDOs
    - **Synthetic CDOs**: Backed by a portfolio of credit default swaps on other structured securities
- Key Features of CDOs
    - **Collateral Pool**: The assets that generate cash flows for the CDO
    - **Tranching**: CDOs are divided into tranches that have different priorities for receiving cash flows.
        - **Senior Tranches**: Receive payments first and have the lowest risk and yield (fixed return, but ***higher*** than corporate bonds)
        - **Equity Tranches**: Receive payments last and have the highest risk and yield but can earn equity-like returns, *determines CLO viability*
    - **Collateral Manager**: Responsible for managing the collateral pool by buying and selling assets to generate sufficient cash flows to meet obligations to the CDO bondholders
    - **Cash Flows**: Payments to CDO investors come from interest payments, principal repayments, and sale of collateral assets

- Risks of CDOs
  - **Credit Risk**: Risk of default on the underlying assets
  - **Market Risk**: Risk of changes in market conditions affecting the value of the collateral
  - **Liquidity Risk**: Risk of not being able to sell the underlying assets at a desirable price
  - **Manager Risk**: Risk that the collateral manager will not perform adequately

CLO (The major CDO structure)

- Types of CLOs
  - **Cash Flow CLOs**: Most common type, where cash flows from interest payments and principal repayments are redistributed across the tranches
  - **Market Value CLOs**: The value accruing to the tranches depends on the market value of the portfolio, Sizes of tranches have greatest variability
  - **Synthetic CLOs**: The collateral pool is created synthetically through credit derivatives, Relies on OTC contracts
- Features
  - **Collateral Management**: Collateral manager selects, manages, and replaces loans in the pool, influencing CLO performance. The pool is not static
  - **Coverage Tests**: Ensure the CLO meets obligations to different tranches by monitoring collateral pool performance (e.g., overcollateralization ratio)
  - **Ramp-Up Period**: Time after transaction close when additional assets are added to the collateral pool
  - **Deleveraging**: If coverage tests fail, cash flows are diverted to pay off senior tranches, reducing leverage

Mortgage-Backed Security (MBS) Instrument and Market Features

MBS (Mortgage-Backed Securities)

- Definition: MBS are securities backed by a pool of mortgage loans
- Types: **RMBS** (Backed by residential mortgages) and **CMBS** (Backed by commercial real estate loans)
- Features: Pass-through securities

- Collateralized Mortgage Obligations (CMOs): Structured into tranches with varying maturities and risk levels.
- Risks: prepayment, extension, and credit risk
- Important metrics: WAL, WAC, WAM

Prepayment Risk

- Definition: borrowers might repay their loans earlier or later than expected
- Contraction Risk
  - Occurs when interest rates decline, leading to higher-than-expected prepayments
  - Borrowers refinance at lower interest rates, shortening the maturity of the MBS
  - For investors, this results in the need to reinvest at lower interest rates and reduces potential price appreciation
- Extension Risk
  - Occurs when interest rates rise, leading to lower-than-expected prepayments
  - Borrowers delay refinancing and home purchases, extending the maturity of the MBS
  - For investors, this leads to cash flows being received over a longer period at a higher discount rate, reducing their present value
- Time Tranching
  - Definition: manage prepayment risk by creating tranches with different maturities
  - allows prepayment risk to be redistributed among bond classes

Residential Mortgage Loans

- Secured by real estate property
- **Lender's Right:** First lien and security interest in the property, enabling foreclosure in case of default.
- Key Metrics
  - Loan-to-Value Ratio (LTV)
    - Ratio of the loan amount to the property's value
    - $\text{LTV} = \frac{\text{Loan Amount}}{\text{Property Value}}$
    - The difference is the down payment
  - Debt-to-Income Ratio (DTI)
    - $DTI = \frac{\text{Monthly Debt Payment}}{\text{Monthly Pre-tax Income}}$

- Types of Mortgages
  - Prime Loans
    - High credit quality borrowers
    - Low DTI, substantial equity, and first lien on the property
  - Subprime Loans
    - Lower credit quality borrowers
    - High DTI, higher LTV, and may include second liens
- Agency and Non-Agency RMBS
  - **Agency RMBS:** Guaranteed by government agencies or GSEs
  - **Non-Agency RMBS:** Issued by private entities, not guaranteed by government or GSEs
    - Gained credit enhancement through pool insurance, letters of credit, guarantees, or subordination
- Mortgage Contingency Features
  - Prepayment Option
    - Right to repay more than scheduled principal
  - Default and Foreclosure
    - **Negative Equity:** Home value less than the mortgage owed
    - **Strategic Default:** Borrower defaults despite having resources, due to non-recourse nature of the loan
    - Lender can foreclose and sell the property
    - **Recourse Loan 追索贷款:** Lender can claim the shortfall from borrower's other assets
    - **Non-recourse Loan:** Lender can only recover the outstanding mortgage balance from the property

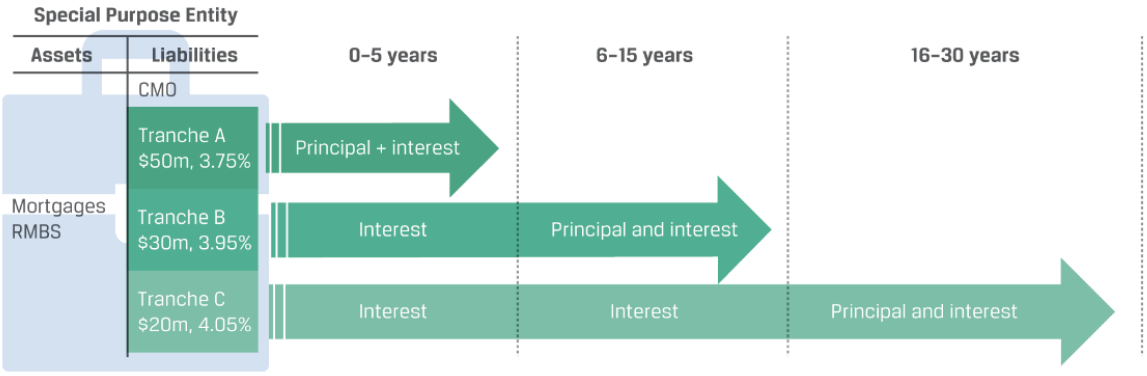
Mortgage Pass-Through Securities

- **Cash Flows:** Depend on the monthly cash flows of the underlying pool of mortgages, which cover both the cash flow passed to the security holders and administrative charges for servicing the pool
- **Administrative Charges:** Include collecting payments, forwarding proceeds, sending payment notices, maintaining records, initiating foreclosure proceedings, and providing tax information
- **Pass-Through Rate:** The *coupon rate* of a mortgage pass-through security, *lower than the weighted average mortgage rate* of the pool due to administrative charges.

- **Weighted Average Coupon Rate (WAC):** Weighted average interest rate of the mortgages in the pool
- **Weighted Average Maturity (WAM):** Weighted average remaining months to maturity of the mortgages in the pool
- Calculation
  - **WAC Calculation:** $WAC = \sum_{i=1}^{N} \left(i_i \times \frac{CB_i}{\sum CB} \right)$
  - **WAM Calculation:** $WAM = \sum_{i=1}^{N} \left(MM_i \times \frac{CB_i}{\sum CB} \right)$
  - CB is the Current Balance
  - MM is # of Month to Maturity
  - i is Interest Rate
  - WAC：先把所有的CB加起来，算总CB，然后把每个Mortgage的interest rate*CB/总CB加起来，得到WAC

Collateralized Mortgage Obligations (CMOs)

- Key Features
  - **Tranching:** Redistributes cash flows to different bond classes or tranches, each with varying exposure to prepayment risk
  - **Sequential-Pay CMO:** Principal payments are made sequentially to each tranche until fully repaid before moving to the next tranche. Provides some protection against prepayment risk.



- Types of Tranches
  - **Z-Tranches/accretion bond/accrual bond:** Do not pay interest until a pre-set date, then both principal and accrued interest are paid, benefit other tranches, do not face reinvestment risk, usually >20 years
  - **Principal-Only (PO) Securities:** Pay only the principal repayments
  - **Interest-Only (IO) Securities:** Pay only the interest payments, have no face or par value, used to *hedge* interest rate risk

    - **Floating-Rate Tranches:** Interest rates linked to an index or reference rate, ofter have cap and floor rate, may include *inverse floaters*, used to hedge interest rate risk in portfolios
    - **Residual Tranches:** Collect remaining cash flow after all obligations to other tranches are met
    - **Planned Amortization Class (PAC) Tranches**: Offer greater predictability and stability of cash flows, make fixed payments if prepayment level is within a specific range, absorbing prepayment risk within a specified range, supported by *companion tranches*

Commercial Mortgage-Backed Securities (CMBS)

- Characteristics and Risks of CMBS
    - **Backing:** CMBS are backed by a pool of commercial mortgages on income-producing properties such as apartment buildings, office buildings, industrial properties, shopping centers, hotels, and healthcare facilities
    - **Repayment:** Made from leases and other revenue the property generates
- CMBS Structure
    - Call Protection
        - **Structural Call Protection:** Achieved through sequential-pay tranches where lower-rated tranches cannot be paid until higher-rated tranches are retired
        - **Loan-Level Call Protection:** Includes prepayment lockout periods, prepayment penalty points, and defeasance (purchasing a portfolio of government securities to replicate cash flows)
    - **Balloon Maturity Provision:** Many commercial loans backing CMBS are balloon loans requiring a substantial principal repayment at maturity.
        - This introduces **balloon risk** if the borrower fails to make the balloon payment, leading to potential **extension risk**
- CMBS Risks
    - **Concentration Risk:** CMBS pools often consist of fewer, higher-value mortgages, increasing the impact of individual defaults
    - Credit Risk Indicators
        - **Loan-to-Value Ratio (LTV):** Measures the loan amount relative to the property's value
        - **Debt Service Coverage Ratio (DSCR):** Net Operating Income (NOI) divided by debt service. Higher DSCR indicates better coverage of debt

obligations

Derivatives

Derivative Instrument and Derivative Market Features

Derivative Features

- Definition: A derivative is a financial instrument deriving its value from the performance of an underlying asset
- Underlying Asset: stocks, bonds, interest rates, commodities, and indices
- Purpose
  - Exchange future cash flows based on the underlying value
  - Can be used for hedging (risk management), speculation, or arbitrage
- Features of Derivative Instruments
  - Derivative contract
    - Legal agreement between counterparties specifying maturity and contract size
    - Buyer has a long position exposure, and the seller has a short position exposure
    - Contract size: Amount(s) used for calculation to price and value the derivative
  - Stand-alone vs. Embedded Derivatives
    - Stand-alone: Separate derivative contracts (e.g., stock or bond derivatives)
    - Embedded: Derivatives within an underlying asset (e.g., callable, puttable, or convertible bonds)
- Types of Derivatives
  - Firm Commitment
    - Forward contracts, futures contracts, swaps
    - Predetermined exchange at settlement
    - *Linear* in underlying price changes
  - Contingent Claim
    - Options, where one counterparty decides the settlement timing
    - *Non-linear* payoff and profit
- Uses and Benefits of Derivatives
  - Investment Strategies

        - Short selling for expected price declines
        - Portfolio diversification
        - Hedging commercial transaction exposures
        - Large exposure with small cash outlay
        - Lower transaction costs and higher liquidity than spot market
    - Hedging
        - Use of derivatives to offset or neutralize financial market exposures
- Risk
    - Counterparty credit risk: the likelihood that a counterparty is unable to meet its financial obligations under the contract

Derivative Underlyings

- Equities
    - **Reference Assets**: Individual stocks, groups of stocks, or stock indices
    - **Common Derivatives**: Options (most common for individual stocks), forwards, futures, and swaps (common for indices)
    - **Equity Swaps**: Allow investors to pay the return on one index and receive the return on another index or interest rate, useful for adjusting market or sector exposure
    - **Realized Volatility Contracts**: Manage risk or price dispersion separately from the price direction of equities
    - **Stock Options**: Used for employee compensation, providing incentives linked to corporate performance and reducing cash compensation
    - **Warrants**: Options allowing holders to purchase shares directly from the issuer at a fixed price
- Fixed-Income Instruments
    - **Bonds**: Common underlyings for options, forwards, futures, and swaps
    - **Interest Rate Derivatives**: Include interest rate swaps to convert fixed to floating rate exposures and vice versa
        - **Market Reference Rates (MRRs)**: Common underlyings in interest rate swaps, such as SOFR, €STR, and SONIA
- Currencies
    - **Purpose**: Hedge exposure to foreign exchange risk
    - **Common Derivatives**: Options, forwards, futures, and swaps based on sovereign bonds and exchange rates

    - **Usage Example**: Exporters may use forward contracts to sell foreign currency and purchase domestic currency, aligning with delivery contract terms for goods/services
- Commodities
    - **Types**: Soft commodities (agricultural products) and hard commodities (natural resources)
    - **Usage Example**: Airlines might purchase oil futures to hedge against rising fuel costs
- Credit
    - **Credit Derivatives**: Based on the default risk of single or groups of issuers
    - **Common Derivative**: Credit Default Swaps (CDS) to manage risk of borrower default separately from the bond market
    - **Usage Example**: Investors use CDS to change portfolio exposure to high-yield credit without trading underlying bonds
- Other Underlyings
    - **Examples**: Weather, cryptocurrencies, longevity
    - **Usage**: Less common, used to manage specific risks like longevity risk in insurance or pension plans

Derivative Markets

- Over-the-Counter (OTC) Derivative Markets
    - **Nature**: Formal organizations (e.g., NASDAQ) or informal networks
    - **Participants**: Derivatives end users and dealers (commercial or investment banks)
    - **Flexibility**: Customized contracts to match specific risk exposure profiles
    - **Market Makers**: Enter into offsetting bilateral transactions to transfer risk
    - **Risk**: Counterparty credit risk is significant
- Exchange-Traded Derivative (ETD) Markets
    - **Nature**: Futures, options, and other contracts traded on exchanges
    - **Standardization**: Contracts have standardized terms (size, type, quality, location of underlying, maturity date)
    - **Liquidity and Transparency**: High liquidity and transparency due to standardized terms
    - **Clearing and Settlement**: Efficient processes involving exchanges and financial intermediaries. ***Collateral*** deposits minimize counterparty risk

- Central Clearing
  - **Mandate**: Post-2008 financial crisis, a central clearing mandate for most OTC derivatives was instituted
  - **Central Counterparty (CCP)**: Assumes credit risk between counterparties
  - **Process**: Trades are executed on a swap execution facility (SEF), details are submitted to CCP, and trades are novated to CCP
  - **Benefits**: Combines flexibility of OTC markets with transparency, standardization, and risk reduction of ETD markets
  - **Risks**: Systemic credit risk centralization in CCPs

Forward Commitment and Contingent Claim Features and Instruments

Firm Commitment Derivatives: Forwards, Futures, and Swaps

- Forwards
  - **Definition**: OTC derivatives where two parties agree that one (buyer) will purchase an underlying from the other (seller) at a future date for a pre-agreed fixed price
  - **Nature**: OTC, customizable, significant counterparty risk
  - **Flexibility**: Customizable in size, underlying details, maturity, and credit terms
  - **Usage**: Hedging specific exposures
  - **Counterparty Risk**: Significant due to being OTC
  - **Long Position Payoff**:
    - If spot price (ST) > forward price (F0(T)), buyer gains: ST - F0(T)
    - If spot price (ST) < forward price (F0(T)), buyer loses: ST − F0(T)
    - **Settlement**: At maturity, based on the difference between the forward price and the underlying price
- Futures
  - **Definition**: Standardized forward contracts traded on futures exchanges
  - **Nature**: Exchange-traded, standardized, low counterparty risk due to clearinghouse
  - Features
    - **Standardization**: Sizes, dates, underlyings are standardized
    - **Liquidity and Protection**: Highly liquid with lower default risk due to exchange regulations and central clearinghouses

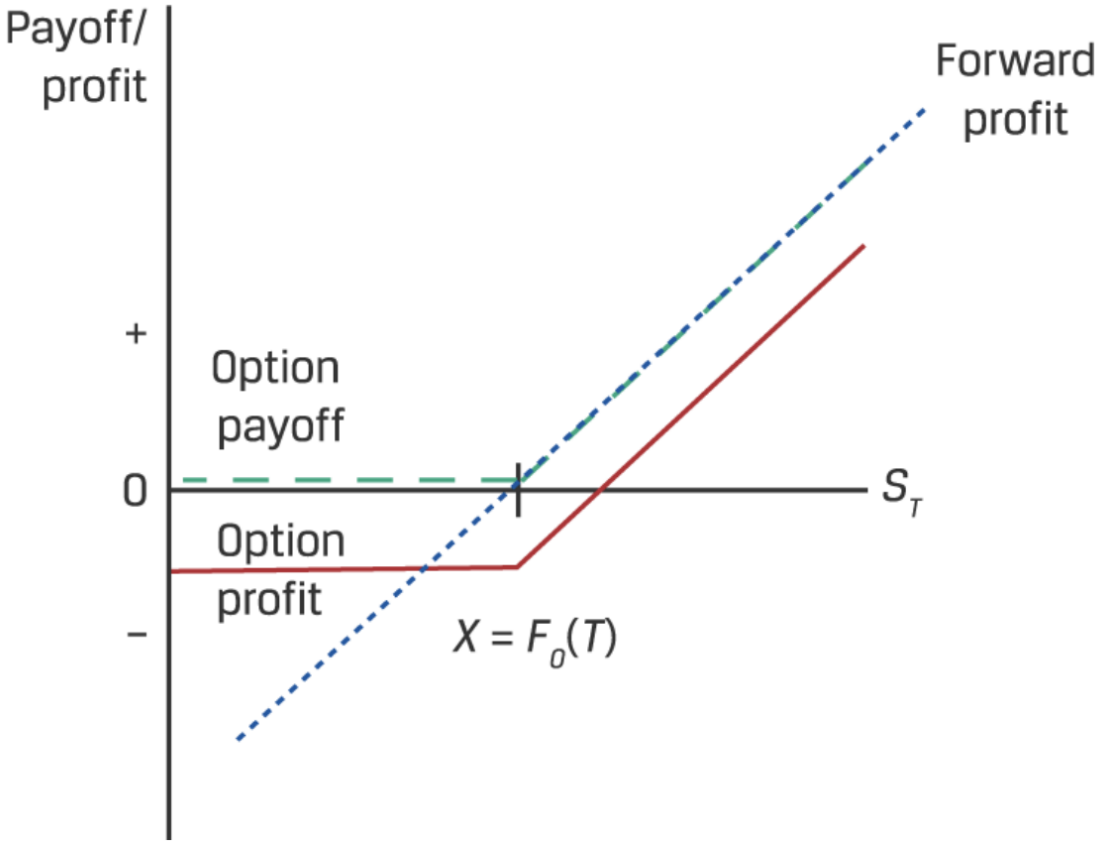
        - **Daily Settlement (Mark to Market)**: Gains and losses settled daily
    - Key Characteristics
        - **Long Exposure**: Buyer agrees to purchase the underlying at a later date at a pre-agreed price (futures price, f0(T))
        - **Short Exposure**: Seller agrees to sell the underlying asset in the future at the agreed-on price
        - Daily Settlement (MTM): Gains and losses are settled daily, impacting margin accounts.
            - Initial margin: Minimum sum deposited by both parties
            - Maintenance margin: Minimum balance required to be held in the account
- Swaps
    - **Definition**: A swap is a firm commitment where two counterparties exchange a series of cash flows in the future
    - **Nature**: OTC, customizable, involve periodic cash flow exchanges
    - **Structure**: Typically involves one set of cash flows that is variable (floating) and one set that is fixed
    - Key Characteristics
        - **Floating-Rate Payer**: Pays cash flows based on a market reference rate (MRR) that resets periodically
        - **Fixed-Rate Payer**: Pays fixed cash flows based on a pre-agreed rate (swap rate)
    - Swap Mechanics
        - No Initial Payment
        - Net Payments
        - **Notional Principal**: Used to calculate interest payments but is not exchanged
    - Valuation and Risk
        - **Mark-to-Market (MTM)**: The value of a swap changes over time, resulting in positive or negative MTM values
        - **Credit Risk**: Swap credit terms are negotiated between counterparties, ranging from uncollateralized exposure to margining similar to futures
        - **Central Clearing**: Some swaps are centrally cleared to standardize and reduce counterparty risk
- Options
    - Features

        - Buyer’s Right, Seller’s Obligation
        - **Payoff**: Option buyer's payoff is always zero or positive, never negative
    - Option Mechanics
        - Call Option
            - **Right to Buy** the underlying asset at a pre-agreed price (exercise price or strike price) at a future date
            - **Payoff**: $\max(0, ST - X)$
            - **Profit**: $\max(0, ST - X) - c_0$
            - Maturity Price (ST), Strike Price (X), Premium (c0)
        - Put Option
            - **Right to Sell** the underlying asset at a pre-agreed price (exercise price) at a future date
            - **Payoff**: $\max(0, X - ST)$
            - **Profit**: $\max(0, X - ST) - p_0$
        - Intrinsic Value: $\max(0, |X - ST|)$
        - **Time Value**: The additional value of an option before maturity due to the possibility of favorable price movements
    - Default risk
        - *Only short options can default*
- Credit Derivatives
    - **Definition**: Contracts based on the credit risk of a single debt issuer or a group of debt issuers
    - **Common Example**: Credit Default Swap (CDS)
    - Key Characteristics of CDS
        - CDS Mechanism
            - **Protection Buyer**: Pays a periodic fee (premium) to the protection seller
            - **Protection Seller**: Receives the premium and compensates the buyer if a credit event occurs
            - **Credit Event**: Triggers a contingent payment equal to the loss given default (LGD) for the CDS contract notional amount
        - Purpose of CDS
            - Hedging, Speculation
        - Credit Spread

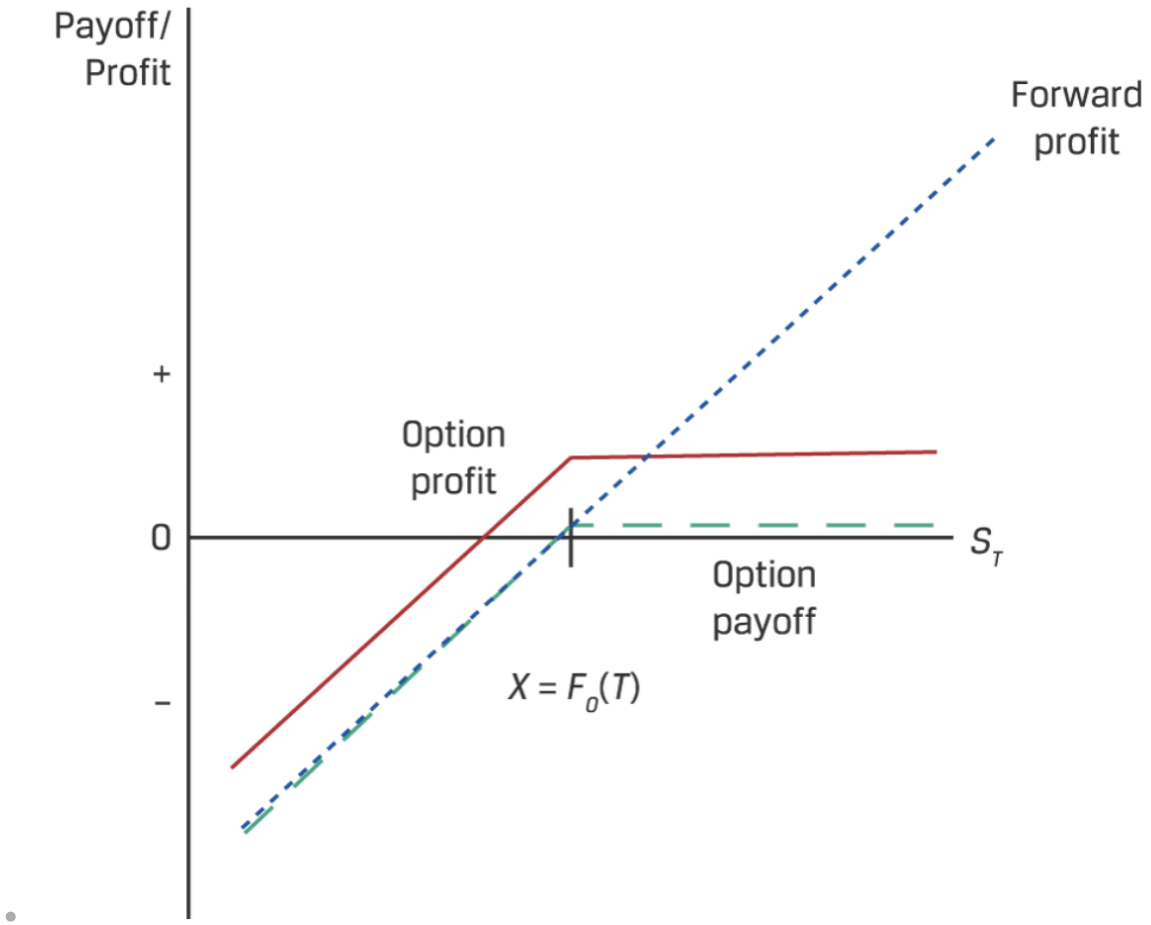
        - **Higher Spread**: Indicates higher perceived credit risk and lower bond prices
    - Similarities to Insurance
        - The protection buyer pays a premium to transfer risk to the protection seller
        - Sellers receive periodic payments and bear the risk of default

Forward Commitments vs. Contingent Claims

- Forward Commitments
    - **Definition**: Contracts where both parties are obligated to perform at the maturity date
    - Characteristics
        - Linear payoff profile, No upfront payment, Obligation to buy or sell
- Contingent Claims
    - **Definition**: Contracts where one party has the right, but not the obligation, to perform based on the underlying asset's price
    - Characteristics
        - Asymmetric payoff profile, Upfront premium payment, Right to exercise the option if favorable
- Comparison of Payoff Profiles
    - Long Forward vs. Long Call Option
        - Long Forward
            - Gains if the underlying price increases
            - Payoff = $ST - F0(T)$
            - No upfront cost, so payoff equals profit
        - Long Call Option
            - Gains if the underlying price increases above the strike price
            - Payoff = $\max[0, ST - F0(T)]$
            - Profit = $\max[0, ST - F0(T)] - c0$ (after deducting the option premium)



- Short Put vs. Long Forward
  - Short Put
    - Gains if the underlying price stays above the strike price
    - Profit = Premium



Derivative Benefits, Risks, and Issuer and Investor Uses

Benefits and Risks of Derivative Instruments

- Benefits of Derivatives
  - **Risk Management**: Hedging
  - **Price Discovery**: help in determining the future price of an asset. More volatility means more uncertainty.
  - **Lower Transaction Costs**: costs less than trading the asset
  - **Increased Liquidity**: have more liquidity than the underlying markets
  - **Leveraged Exposure**: control a large position with a small amount of money through options or futures
  - **Creating Unique Exposures**: to assets or risks that are not available in the cash market
  - **Transaction Costs:** Commodity derivatives eliminate the need to transport, insure, and store a physical asset in order to take a position in its underlying price

    - **Upfront Cash Requirements**
    - **Short Positions**
- Risks of Derivatives
    - **Leverage Risk**: allow for leveraged positions, small price movements in the underlying asset can lead to significant losses
    - **Lack of Transparency**
    - **Counterparty Risk**
    - **Market Risk**: risk of losses due to adverse price movements
    - **Liquidity Risk**: may not be possible to enter or exit a position without significantly affecting the price of the derivative
    - **Complexity Risk**: require a deep understanding to use effectively and safely
    - **Basis Risk**: Potential divergence between the expected value of a derivative versus an underlying or hedged transaction
        - **Example**: A futures contract based on a different but related asset might not perfectly hedge the risk

Issuer Use of Derivatives

- Hedge Designation Types
    - Cash Flow Hedge
        - Absorbs the variable cash flow of a floating-rate asset or liability
        - Convert floating-rate to fixed-rate
    - Fair Value Hedge
        - Offsets fluctuations in the fair value of an asset or liability
        - Convert fixed-rate to floating-rate
        - Method: pay floating-rate, receive fixed-rate
    - Net Investment Hedge
        - Offsets the foreign exchange risk of the equity of a foreign operation
        - **Example**: Using a currency swap or currency forward to hedge the FX risk

Investor Use of Derivatives

- **Purpose**: Replicate strategies, hedge portfolios, or modify/add exposures beyond cash market alternatives
- Examples
    - **Replicating Strategies**: Using futures to gain exposure to gold without physical purchase

- **Hedging**: Using FX hedges to minimize currency volatility when investing overseas
- **Modifying Exposures**: Using options to gain leveraged exposure or to create specific payoff profiles

Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives

Arbitrage and Derivative Pricing

- Types of Arbitrage Opportunities
  - Identical Assets with Different Prices
  - Present Value and Future Price Discrepancy
- Forward Pricing with No-Arbitrage Condition
  - **Formula**: $F_0(T) = S_0(1 + r)^T$
  - With continuous compounding: $F_0(T) = S_0 e^{rT}$
- Perfectly Hedged Position
  - Derivative and underlying asset yield a return = risk-free rate

Replication

- **Definition**: Replication is creating the same cash flows as a derivative using a combination of the underlying asset and borrowing or lending cash
- Risk-Free Trade Replication
  - Scenario
    - Spot price of gold (S0) = USD 1,783.28
    - Future price of gold (F0(T)) = USD 1,792.13
    - Risk-free rate (r) = 2%
  - Long Asset Commitment
    - Borrow USD 178,328 at 2% to buy 100 ounces of gold, Sell gold in three months at future spot price (ST), Repay loan: USD 179,213
  - Short Forward
    - Enter a forward contract to sell the asset at the forward price (F0(T))
  - Result
    - The risk-free profit is a positive amount and is the same (i.e., risk free) regardless of the price of the underlying

Costs and Benefits Associated with Owning the Underlying

- Cost of Carry
  - **Definition**: The net cost of holding an asset, including *both costs and benefits*
  - **Costs**: Opportunity cost (interest rate), storage, insurance, transportation
  - **Benefits**: Dividends, interest income, convenience yield (for commodities)
- Adjusted Relationship with Costs and Benefits
  - $F0(T) = [S0 - PV0(I) + PV0(C)](1 + r)^T$
    - **PV0**: Present value of costs (C) or benefits (I) at time 0.
    - **Storage and Insurance Costs**: Increase the forward price as the holder needs to be compensated for these expenses
    - **Dividends and Interest Income**: Reduce the forward price since the holder gains these benefits
    - **Convenience Yield**: Non-cash benefits of holding a physical commodity, reducing the forward price
  - Cost越大，forward price越高；benefit越多，forward price越低

Pricing and Valuation of Forward Contracts and for an Underlying with Varying Maturities

Pricing and Valuation of Forward Contracts

- Valuation at Maturity
  - If the spot price at maturity (ST) is higher than the forward price (F0(T)), the buyer gains and the seller loses, and vice versa
- Valuation During the Life of the Contract
  - Formula for the value at any time t (where t < T):
    $Vt(T) = St - F0(T)(1 + r)^{-(T-t)}$
- FX Forwards
  - **Example**:
    - If the spot price is 1.3335 AUD/USD, and interest rates are 0.05% (AUD) and 0.20% (USD): $F0, AUD/USD(T) = 1.3335 \times e^{(0.0005-0.002)\times 0.5} = 1.3325$
- Applications
  - Equities: Adjust forward price for dividends
  - Commodities: Include storage and insurance costs in the forward price
  - FX Forwards: Adjust for interest rate differences between two currencies

Pricing and Valuation of Interest Rate Forward Contracts

- Interest Rate Forward Contracts
  - To borrow or lend at a predetermined interest rate
  - Different interest rates exist for different times-to-maturity, known as the term structure
- Spot Rates and Discount Factors
  - **Spot Rates (Zero Rates)**: The interest rates for immediate transactions or zero-coupon bonds
  - **Discount Factors**: The present value of one currency unit to be received in the future
    - Calculated as: $DF_i = \frac{1}{(1+z_i)^i}$where z_i is the zero rate for period i
- Forward Rate Agreements (FRAs)
  - **FRA**: An agreement to borrow/lend at a specific rate for a future period
- Applications
  - **Calculating Zero Rates**: Use YTM and bond prices to find zero rates through bootstrapping
    - $DFi = \frac{1}{(1+z_i)^i}$; $DF_i = PV_i \div \text{Par Value}$
  - **Determining Implied Forward Rates**: Use zero rates to find future interest rates ensuring no-arbitrage conditions.
    - 先折现到现在，算z_A和z_B, 再算$IFR_{A,B}$
  - **Using FRAs**: Lock in future interest rates to hedge against rate changes.

Pricing and Valuation of Futures Contracts

Pricing of Futures Contracts at Inception

- Forward and Futures Contracts
  - Forward Contract
    - The forward price remains fixed until maturity
    - MTM value changes based on the difference between the current spot price and the present value of the forward price
    - No daily settlements, resulting in counterparty credit risk over the contract duration
  - Futures Contract
    - Futures prices fluctuate daily based on market conditions

        - Daily settlement mechanism resets MTM value to zero, reducing counterparty credit risk
        - Requires margin deposits to maintain the margin balance
    - Cumulative Realized MTM Gain/Loss
        - Despite daily fluctuations and settlements, the cumulative realized MTM gain or loss on a futures contract is approximately the same as for a comparable forward contract
- Futures Pricing
    - Mark-to-Market (MTM) Process
        - Daily settlement mechanism resets MTM value to zero

Interest Rate Forward and Futures Price Differences

- Key concepts
    - **Futures Contracts**: Trade on an exchange, with prices adjusted daily to reflect market movements, results in linear payoff profiles
    - **Forward Contracts**: Private agreements settled at maturity, with no daily adjustments, discounting feature introduces ***convexity bias***
    - **Convexity Bias**: Affects forward and futures contracts differently due to their distinct settlement conventions and discounting mechanisms.
- Example
    - A futures contract and a forward rate agreement (FRA) both based on a three-month market reference rate (MRR) of 2.21% for $1,000,000 notional
        - Futures Contract
            - **Contract Value Calculation**:
              $\text{Value} = \$1,000,000 \times \left(1 + \frac{2.21\%}{4}\right) = \$1,005,525$
            - **Basis Point Value (BPV)**: $\text{BPV} = \$1,000,000 \times 0.01\% \times \left(\frac{1}{4}\right) = \$25$
        - Forward Rate Agreement (FRA)
            - **Net Payment Calculation**:
              $\text{Net Payment} = (\text{MRR}_{B-A} - \text{IFR}_{A,B-A}) \times \text{Notional Principal} \times \text{Period}$
            - Net Payment=(2.22%−2.21%)×$1,000,000×(41)=$25
            - Cash Settlement (PV):
              \text{Cash Settlement (PV)}=\frac{\$25}{1+\frac{0.0222}{4}}=\$2
- Convexity bias
    - **Convexity Bias**: The FRA settlement considers the present value of the final cash flow discounted at the MRR, which results in a convex payoff profile

compared to the linear profile of futures contracts
    - The convexity bias between interest rate futures and interest rate forwards causes the percentage price change to be greater (in absolute value) when MRR *falls* than when it *rises* for a forward contract
        - **For a decrease in r**: The discount factor increases more because $(1+r)^{-n}$ grows rapidly as r decreases.
- Correlation with Interest Rate
    - If future price positively correlated with r: long future > long forward, because holders can reinvest future contract profits at higher interest rates
    - If future price negatively correlated with r: short future > short forward, because falling prices lead to future profits reinvested in rising r; rising prices lead to future loss realized in falling r.

Pricing and Valuation of Interest Rates and Other Swaps

Interest Rate Swaps vs. Forward Contracts

- Differences
    - Frequency of Cash Flows
        - **Forward contract**: a single exchange of cash flows at a future date
        - **Swap Contracts**: a series of periodic cash flow exchanges over time
    - Fixed vs. Floating Rates
        - **Forward Rate Agreements (FRAs)**: exchange a fixed rate for a floating rate
        - **Interest Rate Swaps**: exchange fixed-rate payments for floating-rate payments periodically
    - Fixed Rate Consistency
        - **FRAs**: a single future cash flow with different fixed rates for each period
        - **Swaps**: The fixed rate remains constant throughout the life of the swap
- Benefits of Swaps Over Forwards
    - **Matching Cash Flows**: Swaps can align with the periodic cash flows of underlying assets or liabilities, making them easier to manage
    - **Administrative Efficiency**: Managing one swap is simpler than managing multiple forward contracts
    - **Market Efficiency**: Swaps are often more liquid and can serve as benchmarks for other financial instruments

Swap Values and Prices

- Swap Prices (Par Swap Rate)
  - **Definition**: The par swap rate is the fixed rate that makes the present value (PV) of all future fixed payments equal to the PV of all future floating payments
  - **Calculation**: $100 = \frac{\text{PMT}}{(1+z_1)} + \frac{\text{PMT}}{(1+z_2)^2} + \cdots + \frac{\text{PMT}+100}{(1+z_N)^N}$
    - Where z_i are the zero rates
  - Price is constant over time
- Swap Values
  - \text{Periodic settlement value}=(MRR−sN)×\text{Notional amount}×P
    - sN: Fixed swap rate
  - Mark-to-Market (MTM) Value of Swaps
    - **Swap MTM Value**: The value of a swap at any point equals the current settlement value plus the PV of all remaining future settlements
    - **Formula**:
      $\text{MTM Value} = \sum \text{PV}(\text{Floating payments}) - \sum \text{PV}(\text{Fixed payments})$
  - Value change over time as market interest rates change
- Changes in Interest Rates
  - Effect of Forward Rate Changes
    - Rise in Expected Forward Rates
      - Increases the PV of floating payments
      - Fixed-rate receiver realizes an MTM gain; Fixed-rate payer realizes an MTM loss
- Swap Duration Management
  - **Increase Duration**: Enter a receive-fixed swap (similar to a long bond position, more sensitive to interest rate decrease, fixed payments become more valuable)
  - **Reduce Duration**: Enter a pay-fixed swap (similar to a short bond position, less sensitive to interest rate increase, loss is less with increased r)

Pricing and Valuation of Options

Key Features of Options

- **Exercise (Intrinsic) Value**: The value if the option were exercised immediately

- **Moneyness**: The relationship between the underlying asset's price and the option's exercise price
  - **In the Money (ITM)**: 赚钱 A call option (underlying price > exercise price), or a put option (the underlying price < exercise price).
  - **At the Money (ATM)**: 不赚不亏 The underlying price equals the exercise price
  - **Out of the Money (OTM)**: 不使用 A call option where the underlying price is below the exercise price, or a put option where the underlying price is above the exercise price.
- **Time Value**: The potential for the option's value to increase before expiration due to the volatility and passage of time
- No-Arbitrage Bounds for Option Pricing
  - **Call Option**
    - **Lower Bound**: $\max(0, S_0 - \frac{X}{(1+r)^T})$
      - The present value of the exercise price (X) is discounted at the risk-free rate.
    - **Upper Bound**: The underlying price
  - **Put Option**
    - **Lower Bound**: $\max(0, \frac{X}{(1+r)^T} - S_0)$
    - **Upper Bound**: The exercise price
- Replication of Option Contracts
  - **Call Option Replication**: A combination of a long position in the underlying asset and borrowing
  - **Put Option Replication**: A combination of a short position in the underlying asset and lending
  - Requires *adjustment over time* as the likelihood of exercise changes
- Factors Affecting Option Value
  - **Underlying Price (S)**: A higher underlying price increases the value of a call option and decreases the value of a put option.
  - **Exercise Price (X)**: A higher exercise price decreases the value of a call option and increases the value of a put option.
  - **Time to Maturity (T)**: Generally increases the value of *both* call and put options due to greater uncertainty.
  - **Risk-Free Rate (r)**: A higher risk-free rate increases the value of call options and decreases the value of put options. Reason: PV of exercise price is higher is lower

- **Volatility (σ)**: Higher volatility increases the value of both call and put options due to the higher potential for profitable movements
- **Income/Costs on Underlying**: Higher income (e.g., dividends) on the underlying decreases the value of call options and increases the value of put options. Reason: stock price often drops by the amount of the dividend when it is paid

Option Replication Using Put–Call Parity

- Put-Call Parity
  - If the relationship does not hold, arbitrage opportunities exist
  - $c_0 + X(1+r)^{-T} = p_0 + S_0$
    - c_0 = Price of the European call option
    - p_0 = Price of the European put option
    - X = Exercise price of the options
    - r = Risk-free interest rate
    - T = Time to expiration
    - S_0 = Current price of the underlying asset
  - Rationale: Call Option + Risk-free Bond = Put Option + Underlying Asset
  - Calculation: 4知3，求未知的那个
- Protective Put
  - = Long Underlying Asset + Long Put Option + Short Risk-free Bond
  - Inception Position: $S_0 + p_0 - X(1+r)^{-T}$
  - Ending Position: S_T or X whichever is larger (卖出asset时价格越高越好，X是兜底卖价，赎回Risk-free Bond的价格是X)
- Fiduciary Call
  - = Long Risk-free Bond + Long Call Option + Short Underlying Asset
  - Inception Position: $c_0 + X(1+r)^{-T} - S_0$
  - Ending Position: S_T or X whichever is larger (以X为价格卖出bond，并赎回asset，X是asset的封顶买价)
- Covered Call
  - = Long Underlying Asset + Short Call Option
  - Inception Position: $S_0 - c_0$

Put-Call Forward Parity

- The put–call forward parity can be expressed as:
  $F_0(T)(1+r)^{-T} + p_0 = c_0 + X(1+r)^{-T}$
  - $F_0(T)(1+r)^{-T} = S_0$, $F_0(T)$ is the forward price
- Synthetic Protective Put:
  - = Long Forward Contract + Long Put Option with Exercise Price X - Short Bond with Face Value $F_0(T)$
- Fiduciary Call:
  - = Long Bond with Face Value $F_0(T)$ + Long Call Option - Short Asset

Firm Value

- Key concepts
  - **Firm's Market Value (V0):** The total value of the firm's assets
  - **Debt (D):** The amount the firm owes to debtholders, payable at maturity (time T)
  - **Equity (E0):** The residual value after paying off the debt, which goes to the shareholders
- Possible Outcomes at Debt Maturity
  - Solvency (VT > D): 能还上债，shareholders get VT-D
  - Insolvency (VT < D): 还不上债，Debt-holder得到VT，shareholders得到0
  - Profit profile
    - Debt-holder: min(VT, D)
    - Share-holder: max(VT-D, 0)
- Comparing with options
  - Debt-holders position
    - **Long Risk-Free Bond (D)**: make sure repayment if the firm is solvent
    - **Sold Put Option**: compensates share-holders if the firm's value falls below the debt
  - Share-holders position
    - **Long Position in Firm's Assets (VT):** Owning the firm's assets
    - **Purchased Put Option:** Protects against the firm's value dropping below the debt
- Put-Call Parity
  - Firm's value (V0) as: $V_0 = c_0 + PV(D) - p_0$
    - c_0: Value of the call option (shareholders' position)
    - $PV(D)$: Present value of the debt (risk-free bond)
    - p_0: Value of the put option (credit spread or risk premium)

Valuing a Derivative Using a One-Period Binomial Model

One-Period Binomial Model

- **Assumptions**:
  - The underlying asset's price can move to one of two possible prices over a single period: up or down.
  - The asset will either increase by a factor of R_u (up return) or decrease by a factor of R_d (down return).
- **Key Concepts**:
  - **Hedge Ratio**: This ratio determines the *proportion of the option* to the underlying security needed to create a risk-free portfolio.
  - **Risk-Free Portfolio**: By combining the option and the underlying asset in the right proportion, a portfolio is created that *must earn the risk-free rate of return*.
  - **Risk-Neutral Probabilities**: captures the probability of the price of the underlying increasing. Used to price the option and *do not require the actual probabilities or expected return of the underlying asset*.
- **Valuation**:
  - The option's price is calculated using the ***expected payoff of the option, discounted at the risk-free rate, using risk-neutral probabilities***.

Binomial Model

- Steps to Value a European Call Option
  - **Determine the Up and Down Factors**:
    - Assume the underlying asset's current price is S_0.
    - After one period, the price can either increase to $S_u = S_0 \times R^u$ or decrease to $S_d = S_0 \times R^d$.
  - **Calculate the Possible Payoffs**:
    - If the price increases to S_u, the payoff of the call option (with strike price X) is $max(S_u - X, 0)$.
    - If the price decreases to S_d, the payoff of the call option is $max(S_d - X, 0)$.
  - **Calculate the Hedge Ratio**:
    - The hedge ratio Δ is the proportion of the change in the option's value to the change in the underlying asset's price
  - **Determine the Present Value of the Risk-Free Portfolio**:

        - Equals the present value of the portfolio's future value, discounted at the risk-free rate r.
    - **Solve for the Option Price**:
        - Using the hedge ratio and the known present value, solve for the current option price.

Risk-Neutral Pricing

- **Risk-Neutral Probability**: This is the probability of an upward or downward move in the underlying asset's price, adjusted for the risk-free rate.
- **Binomial Model Formula**: The value of an option today (c_0) can be calculated using: $c_0 = \frac{\pi c_u + (1-\pi)c_d}{(1+r)^T}$
    - π is the risk-neutral probability of an up move.
    - c_u and c_d are the option values if the underlying price moves up or down
- **Risk-Neutral Probability Formula**: $\pi = \frac{(1+r)-R_d}{R_u-R_d}$

Alternative Investment

Alternative Investment Features, Methods, and Structures

Alternative Investment Features

- Features
    - Require specialized knowledge for valuation
    - Typically have low correlation with traditional asset classes
    - Are often illiquid with long investment horizons and large capital outlays
- Categories
    - Private Capital
        - Private Equity (usually *mature* life cycle stage or for firms in *decline*)
            - **Venture Capital**: Early-stage investments in startups or new ventures
        - **Private Debt**: Loans or bonds provided to companies outside public markets
            - **Venture Debt**: to early-stage firms with little or no cash flow
            - **Distressed Debt**: bankruptcy that can benefit from restructuring
    - Real Assets

        - **Real Estate**: Includes commercial, residential, and industrial properties. Publicly traded forms include REITs and mortgage-backed securities
        - **Infrastructure**: Long-lived assets for public use, often developed through public-private partnerships (PPP)
            - Concession agreement 特许协议
        - **Natural Resources**: Farmland, timberland, and land for exploration of minerals or energy. Also includes commodities like plant, animal, energy, and mineral products.
        - **Collectibles**: Fine art, wine, rare coins, and other rare assets.
        - **Digital Assets**: Cryptocurrencies, tokens, and digital collectibles. Cryptocurrencies have their own blockchains, while tokens are built on existing blockchains.
    - Hedge Funds
        - Private investment vehicles that use leverage, derivatives, short selling, and other strategies. They often have a different risk and return profile compared to traditional investments.
        - **Fund of Funds**: A portfolio of hedge funds
- Methods
    - Fund investment
        - **Definition**: Investors contribute capital to a fund, which identifies, selects, and manages investments on their behalf
        - **Advantages**: Suitable for less experienced investors, provides diversified exposure, managed by professionals
        - **Disadvantages**: Pre-commitment of funds, Higher fees, limited control, less transparency
    - Co-Investment
        - **Definition**: Investors participate in specific investments alongside a fund, gaining direct exposure to the assets
        - **Advantages**: Greater control, lower fees, learning opportunities
        - **Disadvantages**: Requires some experience and additional oversight
        - Benefits to Managers
            - Accelerate investment timing
            - Expand the scope of new investments
            - Increase diversification of the fund’s portfolio
    - Direct Investment

        - **Definition**: Large, sophisticated investors directly invest in assets without intermediaries
        - **Advantages**: Full control, tailored investment strategies, no intermediary fees
        - **Disadvantages**: Requires significant resources, expertise, and oversight capabilities
        - Commonly used for private equity, real estate, infrastructure, and natural resources
- Structures
    - Ownership Structures
        - Limited Partnerships (LP)
            - **General Partner (GP)**: Manages the fund, makes decisions, and operates under an agreed standard of care
            - **Limited Partners (LPs)**: Passive investors with no management role, owning a fractional interest based on their investment
            - LPs must meet certain net worth or institutional requirements
            - LPA and side letter
        - Specialized Structures
            - **Public–Private Partnerships (PPP)**: Agreements between public and private sectors for infrastructure projects
            - **Master Limited Partnerships (MLP)**: More liquid, often publicly traded partnerships
            - **Real Estate Investment Trusts (REITs)**: Publicly traded real estate investments
    - Compensation Structures
        - Management Fees
            - Typically 1%–2% of assets under management (AUM) for hedge funds and REITs
            - Private equity funds often charge fees based on *committed capital* rather than AUM to avoid premature capital deployment
        - Performance Fees (Carried Interest)
            - **Basis**: Percentage of periodic fund returns
            - **Hurdle Rates**: Minimum return that must be exceeded before performance fees are earned
                - **Hard Hurdle Rate**: Fees only on returns above the hurdle rate

        - **Soft Hurdle Rate**: Fees on the entire return once the hurdle rate is exceeded
    - GP return (rGP): $\mathrm{rGP} = \max[0, p(r - rh)]$
        - r: Single-period fund return
        - rh: Hard hurdle rate
        - p: Performance fee
- Performance Fee Modifications
    - **Catch-Up Clauses**: Allow GPs to receive accelerated fees once the hurdle rate is exceeded
    - **High-Water Marks**: The year-end AUM net of fees必须超过这个才会赚取 performance fee，不然只能收取管理费。且***collect an incentive fee on gains above this high-water mark but net of the hurdle rate of return***
    - **Clawback Provisions**: Allow LPs to reclaim fees if later losses occur
- Waterfall Structures
    - **Deal-by-Deal (American) Waterfalls**: GPs receive performance fees on a per-deal basis
    - **Whole-of-Fund (European) Waterfalls**: GPs receive performance fees only after LPs have received their initial investment and the hurdle rate on the entire fund

Alternative Investment Performance and Returns

Performance

- Performance Appraisal
    - Investment Life Cycle
        - **Capital Commitment**: Initial negative returns due to fees and expenses
        - **Capital Deployment**: Continued negative returns as funds are deployed and expenses incurred
        - **Capital Distribution**: Positive returns from asset appreciation and income generation
        - **J-Curve Effect**: Initial negative returns followed by positive returns as investments mature
    - **Internal Rate of Return (IRR)**: Key metric for assessing long-term investments, accounting for the timing and magnitude of cash flows

    - **Multiple of Invested Capital (MOIC)**: Measures total value of realized investments and residual asset values relative to initial investment
        - $MOIC = \frac{\text{Realized value + Unrealized value of investment}}{\text{Total amount if invested capital}}$
- Use of Borrowed Funds
    - Leveraged Return $(r_L) = r + \frac{V_b}{V_c}(r - r_b)$
    - Higher leverage increases risk, especially in declining markets
    - **Prime brokers**: hedge fund借钱的来源。A broker that provides services that commonly include custody, administration, lending, short borrowing, and trading
- Valuation
    - Fair Value Hierarchy
        - **Level 1**: Quoted prices in active markets (e.g., public equity securities)
        - **Level 2**: Observable inputs other than quoted prices (e.g., OTC derivatives)
        - **Level 3**: Unobservable inputs for assets with little market activity (e.g., private equity or real estate)
- Fees
    - **Management Fees**: Typically higher and based on committed capital or AUM
    - **Performance Fees**: Based on fund returns, with hurdles and catch-up clauses
    - **Fee Variability**: Investors' returns can vary significantly based on their entry timing and fund phase
    - 计算MOIC时**分母**要减去fee和expenses哦！

Returns

- Fee Structures
    - **Management Fees**: Typically a percentage of assets under management (AUM).
    - **Performance Fees**: Based on a percentage of returns, often with hurdle rates and high-water marks.
    - **Customized Arrangements**:
        - Fees based on liquidity terms, asset size, and investor participation.
        - **Founders shares**: Lower fees for early investors.
        - "Either/or" fees: Managers choose between lower management fees or higher performance fees.
- Investor Redemption
    - **Redemption Fees**: Discourage redemptions and offset transaction costs.

    - **Notice Periods**: (typically 30-90 days)Time required before investors can redeem shares.
    - **Lockup Periods**: Minimum holding periods before withdrawals are allowed.
    - **Gates**: Limits on redemptions to manage liquidity.
- Return Calculations
    - **General Partner's Return**
        - **Formula**: $R_{GP} = (P_1 \times r_m) + \max[0, (P_1 - P_0) \times p]$
            - r_m: Management fee (%)
            - P_0, P_1: beginning and ending of period assets
            - p: GP performance fee (%), total return
            - 管理费是基于P1而不是P0
        - **Investor's Periodic Return**: $r_i = \frac{P_1 - P_0 - R_{GP}}{P_0}$
- Relative Alternative Investment Returns and Survivorship Bias
    - **Benchmark Comparisons**: Vary based on life cycle phase and investment type
    - **Survivorship Bias**: Overestimates average returns by excluding failed funds
    - **Backfill Bias**: Includes successful funds' prior performance, overstating returns

Investments in Private Capital: Equity and Debt

Private Equity

- Private Equity Strategies
    - **Leveraged Buyouts (LBOs)**: Buying companies using a lot of debt, with the company's assets often used as collateral
        - **Management Buyout (MBO)**: Current management buys the company
        - **Management Buy-In (MBI)**: New management team takes over the company
    - **Venture Capital (VC)**: Investing in early-stage companies with high growth potential
    - **Growth Capital**: Investing in mature companies to help them expand or restructure
- Private Equity vs. Public Equity
    - **Similarities**: Both provide direct ownership and voting rights in a company
    - Differences

        - **Private Equity**: More control over the company, higher risks, and potential returns
        - **Public Equity**: Less control, more regulated, easier to buy and sell
- Private Equity Investment Types
    - **Direct Investments**: Investing in a specific company or co-investing with a lead sponsor
    - **Indirect Investments**: Investing through a fund that holds multiple private equity investments (fund-of-funds)
- Stages of Venture Capital
    - **Pre-seed**: Funding at the idea stage (often from friends and family, NOT VC)
    - **Seed**: Funding for product development and marketing (Founders and Angel)
    - **Early-stage**: Funding before a company starts full operations or sales
    - **Later-stage**: Funding after sales have started but before going public (IPO)
    - **Mezzanine-stage**: Funding to prepare a company for going public or being sold
- Private Equity Exit Strategies
    - **Trade Sale**: Selling the company to another company (often a competitor)
        - **Pros**: Quick exit, potential for higher price
        - **Cons**: Limited buyers, potential opposition from management
    - **Public Listing**: Going public through an IPO or other listing
        - **Pros**: Can achieve a high sale price, increased company visibility
        - **Cons**: High costs, market volatility, not a fit for every company
    - Other Strategies
        - **Recapitalization**: Taking on debt to pay investors without selling the company
        - **Secondary Sale**: Selling the company to another PE firm
        - **Write-off/Liquidation**: Selling off assets when an investment goes bad
- Risk and Return in PE
    - **Higher Returns**: Due to direct management influence and the use of leverage
    - **Higher Risks**: Illiquidity (hard to sell quickly), leverage (more debt means more risk), and performance measurement challenges

Private Debt

- Categories of Private Debt
    - **Direct Lending**: Direct loans to companies. Senior and secured

    - **Mezzanine Loans**: Subordinated debt that ranks below senior debt but above equity. Often includes options to convert debt into equity
    - **Venture Debt**: Loans to start-ups or early-stage companies. Used to avoid diluting ownership.
    - **Distressed Debt**: Buying the debt of companies in financial trouble, with the aim of turning around the company or profiting from its recovery.
- Special Types of Private Debt
    - **Leveraged Loans**: Loans funded by borrowing, increasing potential returns
    - **Unitranche Debt**: Combines senior and junior debt into one loan with a mixed interest rate
    - **Specialty Loans**: Niche loans, such as litigation finance
- Risk and Return
    - **Higher Returns**: Due to the illiquidity premium
    - **Higher Risks**: Includes default risk and illiquidity
    - **Interest Rates**: Often variable, tied to a reference rate (e.g., SOFR + a margin)

Diversification Benefits of Private Capital

- Vintage Year
    - **Definition**: The year a private equity fund makes its first investment
    - **Importance**: Performance can vary significantly depending on the economic conditions during the vintage year
    - **Investment Period**: First 5 years, where capital is invested
    - **Harvesting Period**: Remaining years, where investments are exited, and returns are distributed
- Economic Cycles and Vintage Performance
    - **Expanding Phase**: Funds that start in a recovery phase may perform better
    - **Contracting Phase**: Funds that start in a downturn may perform well by investing in distressed companies
- Diversification Benefits
    - **Correlations with Public Markets**: Private capital has moderate correlations with public market indexes (0.63 to 0.83), meaning it can provide some diversification benefits
        - VC has 0.6 correlation
        - PE and PD have 0.8 correlation

Real Estate and Infrastructure

Real Estate

- Real Estate Investments
  - **Equity Investments**:
    - Involves ownership of property.
    - Returns come from **rental income** and **property value appreciation**.
  - **Debt Investments**:
    - Involves lending for mortgages.
    - Can be securitized into Mortgage-Backed Securities (MBS).
- **Real Estate Investment Structures**
  - **Direct Investment**:
    - **Ownership**: Investors purchase and manage properties directly.
    - **Advantages**: Full control, tax benefits, and diversification potential.
    - **Disadvantages**: High complexity, need for specialized knowledge, significant capital needs, and concentration risk.
  - **Indirect Investment**:
    - **Structures**: Involves pooling funds in vehicles like REITs (Real Estate Investment Trusts) or limited partnerships.
    - **REITs**: Popular for income-producing real estate; offers transparency and liquidity compared to direct investments.
- REITs (Real Estate Investment Trusts)
  - **Equity REITs**: Own and manage properties directly.
  - **Mortgage REITs**: Invest in real estate debt like mortgages.
  - **Hybrid REITs**: Combine both equity and debt investments.
- **Free and Clear**: When a property title is transferred without any outstanding mortgage or lien, it's considered free and clear ownership

Infrastructure

- **Key Characteristics**
  - **Capital-Intensive and Long-Lived**: Infrastructure projects require significant investment and have long life spans.
  - **Public Use**: Infrastructure provides essential services to the public.
- **Cash Flow**: Generated through:
  - **Availability Payments**: Payments for making the facility available.

    - **Usage-Based Payments**: Tolls, fees, etc.
    - **Take-or-Pay Arrangements**: Buyers must pay for a minimum amount of service, regardless of actual use.
- **Infrastructure Investment Categories**
    - **Economic Infrastructure**:
        - **Transportation Assets**: Roads, bridges, tunnels, airports, seaports, railways.
        - **ICT Assets**: Telecommunication towers, data centers.
        - **Utility and Energy Assets**: Power generation, electrical grids, water and gas distribution, waste treatment.
    - **Social Infrastructure**:
        - **Educational Assets**: Schools, universities.
        - **Health Care Assets**: Hospitals, clinics.
        - **Social Housing**: Affordable housing.
        - **Correctional Facilities**: Prisons, jails.
        - **Government Buildings**: Municipal buildings, administrative offices.
- **Stages of Infrastructure Development**
    - **Greenfield Investments**: Building new infrastructure; high risk and potential return.
    - **Brownfield Investments**: Expanding or upgrading existing infrastructure; moderate risk and return.
    - **Secondary-Stage Investments**: Fully operational assets; lower risk, immediate cash flow.
- **Forms of Infrastructure Investment**
    - **Direct Investment**:
        - **Control**: Investors manage the asset directly.
        - **Risks**: Includes concentration risk and liquidity risk.
        - **Common Investors**: Pension funds, sovereign wealth funds, often in consortiums.
    - **Indirect Investment**:
        - **Infrastructure Funds**: Similar to private equity, can be open or closed-end.
        - **Publicly Traded Securities**: Infrastructure ETFs, MLPs (Master Limited Partnerships).
        - **Advantages**: Liquidity, diversification, transparency.

- **Debt Financing**: Can be private or publicly traded bonds.

Natural Resources

- Types of Resources
  - **Soft Commodities**: Plants and animals (e.g., grains, livestock).
  - **Hard Commodities**: Energy (e.g., oil, gas) and minerals (e.g., coal, iron).
  - **Investment Forms**: Farmland, timberland, raw land with rights for exploration, mining, and energy production.
- **Investment Vehicles**: Direct & Indirect Ownership
- **Types of Land Investments**
  - **Raw Land**: Land with exploration or mining rights.
    - Owners: mostly institutional
  - **Farmland**: Land used for growing crops or raising livestock.
    - Owners: Mostly individuals
  - **Timberland**: Land with forests for timber production.
    - Owners: Mostly institutional
- Timberland Investment Management Organizations (TIMOs)
  - **Role**: Manage timberland investments for institutional investors, using expertise in forest management to analyze, acquire, and manage timberland holdings.
  - **Investment Approach**: TIMOs often work with indirect investment vehicles like partnerships or private REITs to diversify and manage risks.

Commodity

- **Commodity Investment Features**
  - **No Cash Flows**: Commodities don’t generate cash flows like dividends or interest. Instead, investors seek to profit from price appreciation.
  - **Costs Involved**: Investors incur costs for storage, transportation, and insurance (referred to as "cost of carry").
  - **Government Influence**: Many governments control natural resources, especially in emerging markets (e.g., oil, gas, mining).
  - **Environmental Impact**: Global policies are pushing towards renewable energy, increasing demand for certain minerals like lithium and cobalt.
- **Commodity Sectors**
  - **Energy**: Oil, natural gas, coal.

    - **Base Metals**: Copper, aluminum, nickel.
    - **Precious Metals**: Gold, silver, platinum.
    - **Agriculture**: Grains, livestock, coffee.
- **Investment Forms**
    - **Direct Investment**: Owning physical commodities, which involves high costs and is less common due to lack of liquidity and transparency.
    - **Derivatives**: The most common form, including futures, forwards, and options. They are liquid, traded on exchanges, and allow for price discovery.
    - **Exchange-Traded Products (ETPs)**: ETFs or ETNs that invest in commodities or commodity futures, providing easy access through standard brokerage accounts.
    - **Commodity Trading Advisers (CTAs)**: Managed futures funds that use derivative contracts to profit from trends in commodity prices.
    - **Specialized Funds**: For instance, private energy partnerships or mutual funds focusing on specific sectors like oil and gas.
- **Commodity Pricing**
    - **Forward vs. Spot Prices**: The relationship between the forward price and spot price depends on the "cost of carry" (storage, insurance) and the "convenience yield" (benefits of holding the physical commodity).
    - **Backwardation**: Occurs when the spot price is higher than the forward price. This happens when the convenience yield is high (e.g., during low inventory levels).
    - **Contango**: Occurs when the forward price is higher than the spot price. This is common when the cost of carry is higher than the convenience yield.
- **Key Concepts**
    - **Convenience Yield**: The non-monetary benefit of holding a physical commodity, such as ensuring continuous access, cannot be negative.
    - **Backwardation**: Indicates a *downward-sloping* futures curve, often seen in *tight supply* markets, forward price < spot price.
    - **Contango**: Indicates an *upward-sloping* futures curve, common when *storage costs are high and inventory is abundant*.

Commodity Pricing vs. Farmland/Timberland Pricing

- **Commodities**:
    - Priced in real-time on *public exchanges* (e.g., every second).

    - Prices are influenced by *short-term supply and demand*, including production levels, inventory, and consumer demand.
    - Commodity prices are *highly volatile* due to quick market reactions.
- **Farmland/Timberland**:
  - *Priced infrequently*, often based on appraisals rather than actual transactions.
  - Returns come from *long-term cycles* (e.g., crop seasons for farmland, growth cycles for timberland).
  - *Less volatility* compared to commodities but harder to sell quickly (*illiquid*).

Commodity Supply and Demand

- **Slow Supply Adjustment**:
    - Producers cannot quickly ramp up production. For example:
    - As a result, when demand changes rapidly, supply often lags, leading to price volatility.

Volatility in Consumer Price Inflation vs. Commodity Prices

- **Consumer Price Inflation**:
  - Less volatile because it's calculated from a broad range of goods and services, including housing, which changes prices slowly.
  - Commodity prices (especially energy and food) are more volatile and can spike or drop sharply due to immediate supply and demand shifts.

Performance of Asset Classes as Inflation Changes

- **Commodities**:
    - Perform well during rising inflation due to their direct impact on the cost of goods and services (especially energy and food).
    - Perform poorly when inflation is falling, as demand for raw materials decreases.
- **Farmland/Timberland**:
  - Show more stable returns across different inflation environments.
  - Less sensitive to inflation changes compared to commodities.

Inflation Hedging and Portfolio Diversification

- **Inflation Hedge**:
    - **Commodities**: *Strong hedge against inflation* due to direct involvement in price increases (e.g., energy and food).
    - **Farmland/Timberland**: Not as effective in hedging against inflation, but they don't perform poorly during low inflation.
- **Portfolio Diversification**:

- **Commodities**: Offer diversification but have higher correlations with global stocks due to their exposure to economic cycles.
- **Farmland/Timberland**: Provide low correlations with traditional assets, making them good for diversification.

Hedge Funds

Key Features of Hedge Funds

- **Private Investment Vehicles**: Hedge funds are private, typically open only to institutional and accredited investors.
- **Flexible Strategies**: They use a combination of leverage, derivatives, short selling, and other advanced strategies to generate returns.
- **Objective**: Often aim for high absolute returns or risk-adjusted returns, which can make benchmarking against traditional indices challenging.
- **Low Correlation**: Hedge funds typically have low correlation with traditional assets, offering diversification benefits.
  Differences Between Hedge Funds and Other Asset Classes
- **Compared to Mutual Funds**:
  - **Regulation**: Hedge funds are lightly regulated, while mutual funds are highly regulated.
  - **Fees**: Hedge funds often have performance-based fees, while mutual funds have fixed fees.
  - **Manager Investment**: Hedge fund managers usually invest in their own funds, unlike mutual fund managers.
  - **Investment Freedom**: Hedge fund managers have more freedom in trading decisions.
- **Compared to Private Equity**:
  - **Time Horizon**: Hedge funds typically have a *shorter time horizon* compared to private equity investments.
  - **Liquidity**: Hedge funds generally *invest in more liquid assets*, while private equity involves longer-term commitments in less liquid assets.
- **Compared to ETFs**:
  - **Access**: ETFs are exchange-traded and accessible to all investors, while hedge funds are *private and restricted*.

- **Fees**: Hedge funds have *higher fees and complex fee structures* compared to the low fees of ETFs.
- **Regulation**: ETFs are highly regulated, whereas hedge funds are *lightly regulated*.

Common Hedge Fund Strategies

- **Equity Hedge**: Involves long and short positions in equities. Examples include:
  - **Long/Short Equity**: Buying undervalued stocks and shorting overvalued ones.
  - **Market Neutral**: Balancing long and short positions to achieve near-zero market exposure.
- **Event-Driven**: Focus on specific corporate events like mergers, acquisitions, or bankruptcies.
  - **Merger Arbitrage**: Profit from the price spread between the target company and acquiring company during a merger.
  - **Distressed/Restructuring**: Invest in companies near bankruptcy with potential for significant upside.
- **Relative Value**: Exploit *price discrepancies* between related securities.
  - **Convertible Bond Arbitrage**: Arbitrage between a convertible bond and its underlying stock.
- **Opportunistic**: Take advantage of macroeconomic trends or market-wide events.
  - **Global Macro**: Positions based on macroeconomic predictions.
  - **Managed Futures (CTAs)**: Trend-following strategies using futures contracts.
- **Multi-Strategy**: Combine multiple strategies to diversify and optimize returns.

Risk and Return Characteristics

- **Leverage**: Hedge funds often use leverage to amplify returns, but this also increases risk.
- **Lockup Periods**: Investors in hedge funds may face lockup periods where they cannot redeem their investments.
- **Transparency**: Hedge funds are less transparent compared to mutual funds or ETFs, often leading to higher regulatory risks.

Hedge Fund Structures

- **Private Investment Partnerships**: Hedge funds are typically set up as private investment partnerships, often in tax-advantaged offshore locations. They are limited to accredited investors.
- **Legal Structure**: Hedge funds are often organized as limited partnerships or limited liability companies, with a general partner managing the fund.
- **Fee Structure**: Common fee structures include "two and twenty" (2% management fee and 20% of profits). Some funds use different structures like "1 or 30" (1% management fee or 30% of alpha).

Direct Hedge Fund Investment Forms

- **Master-Feeder Structure**:
  - **Onshore and Offshore Feeder Funds**: These feed into a *master fund* that manages the investments. This structure is used for *tax efficiency* and to pool funds from various sources.
  - **Benefits**: *Economies of scale*, ease of accepting global investments, and possible *avoidance of regional regulations*.
- **Separately Managed Accounts (SMAs)**:
  - **Customization**: Investors *retain control* over the investment vehicle, with specific mandates and better transparency.
  - **Downsides**: More complex operations, potential conflicts of interest, and reduced manager motivation if fees are low.

Indirect Hedge Fund Investment Forms

- **Fund of Hedge Funds**:
  - **Diversification**: Pooling funds to invest in a portfolio of hedge funds, offering diversification across strategies and regions. ***GP*** choose HF to invest.
  - **Higher Fees**: Investors may face additional fees on top of those charged by individual hedge funds, but gain access to funds otherwise unavailable.
- **Hedge Fund ETFs**:
  - **Replicate Hedge Fund Strategies**: These ETFs aim to mimic hedge fund returns using liquid assets, but they might not match pure hedge fund performance due to regulatory constraints and lower leverage.

Hedge Fund Return Characteristics

- **Focus on Alpha**: Hedge funds primarily aim to generate alpha (returns from manager skill) rather than relying on market beta (broad market returns). They focus

on exploiting market inefficiencies.

- **Sources of Returns**:
  - **Market Beta**: Returns correlated with overall market movements.
  - **Strategy Beta**: Returns linked to specific hedge fund strategies across markets.
  - **Alpha**: Returns generated by the hedge fund manager's unique skills and strategies.

Risks and Biases in Hedge Fund Indexes

- **Selection Bias**: Hedge funds self-report their performance, which may lead to an overrepresentation of successful funds in indexes.
- **Survivorship Bias**: Poorly performing or closed funds are often excluded from indexes, which can inflate the perceived performance.
- **Backfill Bias**: Successful funds that start reporting later may have their past performance added to the index, skewing historical data.
- **Lack of Standardization**: Inconsistent data sources and allocation methods can distort performance comparisons.

Hedge Fund Investment Risks and Returns

- **Complexity in Benchmarking**: Hedge funds' flexible strategies and minimal disclosure make it difficult to benchmark their performance.
- **Long-Term Performance**: Historically, hedge funds have provided higher returns than stocks or bonds with lower volatility, offering diversification benefits.
- **Correlation with Traditional Assets**:
  - Hedge funds typically have *moderate* correlation with equities and *low* correlation with bonds, making them valuable for diversification.

Diversification Benefits of Hedge Funds

- **Market-Neutral Strategies**: Initially, hedge funds aimed for market-neutral strategies, balancing long and short positions to reduce market risk.
- **Evolution of Strategies**: Hedge funds now employ complex strategies across various asset classes, providing different levels of diversification and risk-adjusted returns.
- **Institutional Interest**: Despite high fees, institutions value hedge funds for their ability to diversify and mitigate risk, especially post-2008 financial crisis.

Introduction to Digital Assets

Introduction to Digital Assets

- **Digital Assets**: Assets created, stored, and transmitted electronically with associated ownership or use rights. Includes cryptocurrencies, tokens, and digital collectables.
- **Blockchain Technology**: A distributed ledger technology (DLT) that underpins digital assets, ensuring authenticity through advanced encryption.
- **Cryptocurrencies vs. Tokens**: Cryptocurrencies have their own blockchain, while tokens are built on an existing blockchain.

Key Concepts

- **DLT Networks**:
  - **Permissionless**: Open to anyone, like Bitcoin.
  - **Permissioned**: Access is restricted, often used in enterprise settings.
- **Consensus Protocols**:
  - **Proof of Work (PoW)**: Requires solving complex mathematical problems to validate transactions.
  - **Proof of Stake (PoS)**: Validators are chosen based on the number of tokens they hold and are willing to "stake" as collateral.

Digital Assets as an Alternative Investment

- **Diversification**: Digital assets offer potential diversification benefits due to historically low correlations with traditional asset classes.
- **Risks**: Higher risks due to volatility, regulatory uncertainty, and the lack of inherent value compared to traditional assets.

Types of Digital Assets

- **Cryptocurrencies**: Digital currencies like Bitcoin, altcoins (including stablecoins and meme coins).
- **Tokens**: Include non-fungible tokens (NFTs), security tokens, utility tokens, and governance tokens.

Investment Forms

- **Direct Ownership**: Purchasing and holding cryptocurrencies or other digital assets directly on the blockchain.
- **Indirect Investment**: Investing in exchange-traded products (ETFs), hedge funds, trusts, futures, and thematic stocks related to digital assets.
- **Asset-Backed Tokens**: Digital claims on physical or financial assets collateralized by these underlying assets.
- **Decentralized Finance (DeFi)**: An ecosystem of financial applications built on blockchain using open-source code and smart contracts.

Performance and Market Dynamics

- **Price Drivers**: Driven by market demand, limited supply, and expectations of future appreciation rather than intrinsic value or cash flow.
- **Historical Performance**: Bitcoin, the first widely traded digital asset, has shown high returns, high volatility, and low correlations with traditional asset classes.

Distributed Ledger Technology (DLT) 分布式账本技术 Overview

- **DLT**: A decentralized database shared among entities in a network. Each participant has a matching copy of the ledger, making it a verified record of all transactions.
- **Key Features**:
  - **Consensus Mechanism**: Process where nodes in the network agree on the ledger's state, ensuring accuracy and security.
  - **Cryptography**: Encryption technique used to secure data and verify identities, maintaining the integrity of the ledger.
  - **Smart Contracts**: Self-executing contracts with terms directly written into code, enabling automatic actions like transferring collateral in case of default.

Types of DLT Networks

- **Permissionless Networks 无权限网络**:
  - Open to anyone; no central authority.
  - Example: Bitcoin.
  - Pros: Decentralization, transparency.
  - Cons: Slower, less cost-effective.
- **Permissioned Networks 有权限网络**:
  - Restricted access; controlled by a central authority.
  - Pros: Faster, more cost-effective.

- Cons: Less decentralized.

Blockchain Technology

- **Blockchain**: A type of DLT where transactions are recorded in blocks and linked together sequentially (chained). It's secure due to cryptographic methods.
- **Adding a Transaction**:
  1. Transaction is proposed.
  2. Nodes validate the transaction using a consensus protocol.
  3. Once validated, it's added to the blockchain.

Consensus Protocols

- **Proof of Work (PoW) 工作量证明**:
  - **Mechanism**: Miners solve complex puzzles to validate transactions.
  - **Energy Usage**: High due to computational intensity.
  - **Security**: High, as it's difficult to manipulate due to the 51% attack threshold.
- **Proof of Stake (PoS) 权益证明**:
  - **Mechanism**: Validators pledge (stake) their assets to validate blocks.
  - **Energy Usage**: Lower compared to PoW.
  - **Security**: Based on the collective stake of validators.

Types of Digital Assets

- **Cryptocurrencies**: Digital currencies like Bitcoin, altcoins, and stablecoins, used for value transfer without intermediaries.
- **Tokens 代币**:
  - **Non-Fungible Tokens (NFTs) 非同质化代币**: Unique tokens representing ownership of digital or physical assets.
  - **Security Tokens**: Digital representations of traditional securities, streamlining post-trade processes.
  - **Utility Tokens**: Used within a network to pay for services or network fees.
  - **Governance Tokens**: Used to vote on decisions within a permissionless network.

Potential Applications of DLT in Finance

- **Financial Services**: DLT can improve the efficiency of financial services like post-trade clearing, settlement, and compliance through tokenization.

- **Smart Contracts**: Automate complex financial transactions, reducing the need for intermediaries.

Digital Asset Investment

- **Market Value of Digital Assets**
  - The value of digital assets is mainly driven by what people think their future price will be, not by earnings or profits.
  - Speculation plays a big role in determining the price of digital assets.
- **Legal Protection**
  - Digital assets do not have the same legal protections as traditional financial assets like stocks or bonds.
- **Ownership and Exchange**
  - Transactions of digital assets on permissionless networks are recorded on decentralized ledgers, meaning no single entity controls the record-keeping.
- **Types of Stablecoins**
  - **Collateralized Stablecoins**: Backed by real assets (like dollars or gold) to maintain a stable value. Example: Tether (USDT).
  - **Algorithmic Stablecoins**: Use algorithms to manage the supply of coins to keep the value stable, but they are riskier. Example: TerraUSD (UST).
  - **Asset-backed Tokens**: Represent ownership of real-world assets that are tokenized on the blockchain, offering a bridge between digital and physical assets.
- **Key Differences from Traditional Financial Assets**
  - **Inherent Value**: Digital assets usually do not have inherent value based on cash flow; they are valued based on future price expectations.
  - **Transaction Validation**: Digital assets use decentralized ledgers and cryptography, unlike traditional assets, which rely on central intermediaries.
  - **Medium of Exchange**: Digital assets are rarely used directly for everyday transactions and are not widely accepted as legal tender.

Digital Asset Investment Forms

1. **Investment Forms**
   - **Direct Investment**: Involves directly buying and owning digital assets like cryptocurrencies. This is done through cryptocurrency exchanges and stored in digital wallets.

- **Indirect Investment**: Involves investing in financial products that derive their value from digital assets, such as cryptocurrency ETFs, coin trusts, and hedge funds.

2. Types of Cryptocurrency Exchanges

- **Centralized Exchanges**: Privately held platforms that offer trading, liquidity, and price transparency. These exchanges are popular but can be vulnerable to hacks and are sometimes regulated.
- **Decentralized Exchanges**: Operate without central control and are more secure against attacks. However, they are harder to regulate and may allow for illegal activities.

3. Direct Investment Risks

- **Fraud**: Includes scams, pump and dump schemes, and theft.
- **Market Manipulation**: Large holders ("whales") can influence prices due to their significant control over the market.
- **Loss of Access**: Losing the private key to your digital wallet means losing access to your digital assets permanently.

4. Indirect Investment Vehicles

- **Cryptocurrency Coin Trusts**: Allow investors to trade shares in a trust holding large amounts of cryptocurrency, with no need for a digital wallet.
- **Cryptocurrency Futures**: Agreements to buy or sell cryptocurrencies at a set price in the future. These are typically cash-settled.
- **Cryptocurrency ETFs**: Funds that track the value of cryptocurrencies through futures and other financial instruments, offering exposure without directly holding the digital asset.
- **Cryptocurrency Stocks**: Stocks of companies involved in the digital asset space, like exchanges or payment providers.
- **Hedge Funds**: Specialized funds that invest in cryptocurrencies using various strategies like long/short positions.

5. Asset-Backed Tokens

- **Definition**: Digital tokens that represent ownership of physical assets like gold or real estate.
- **Benefits**: Increase liquidity, allow for fractional ownership, and provide transparency in transactions.
- **Regulation**: Typically classified as securities and regulated accordingly.

6. Decentralized Finance (DeFi)

- **Definition**: A marketplace of decentralized applications (dApps) that operate on blockchain networks without central control.
- **Functions**: Includes lending, trading, investment, settlement, and more, all performed in a decentralized manner.
- **Advantages**: Potential for faster, more secure transactions with reduced risks and costs.
- **Current State**: Still in development, with most dApps focused on leveraging digital assets for investment and speculation.

Ethical and Professional Standards

Introduction

Code of Ethics - 伦理规范
Standards of Conduct - 职业行为准则，对专业人士的“最低要求”，红线

- 遵守道德准则时的阻碍：高估自己的道德水准 / 低估外部环境带来的影响

Investment management profession - 投资管理行业
Investment company - 投资公司

Professional Conduct Program

- Disciplinary Review Committee (DRC) - 推进落实PCP，确保Code and Standards实施
- 启动调查的动因
    - 每年度的自我披露 Professional Conduct Statement (PCS) - 续会员的时候填写

    - 他人举报 - 并不是所有人都有资格被举报（考生，会员，持证人），所有人都可以去举报
    - 媒体舆论揭露
    - 监考人员的violation report - 考试中作弊（考试非常严格）
- 调查结果的处理
    - 没有纪律处分
    - 警告信 Cautionary letter
    - 纪律处罚 Discipline
- 不服调查结果：听证会裁决 Hearing Panel

“Applicable law” is the law that governs the member’s or candidate’s conduct.

Recommended Procedures

- Stay informed
- Review procedures
- Maintain current files

Follow the stricter standard when local laws and CFA standards differ

Standards of Professional Conduct:

1. **Professionalism**:
    - **Knowledge of the Law**: Understand and comply with laws and regulations.
        - 遵纪守法，掌握专业相关的法律法规
        - “知道”或“应当知道”的法律法规
        - 业务涉及的国家（不是公司所在的国家）
        - 按照最为严格的法律执行
            - 当GIPS跟CFA行为准则有冲突时，遵守CFA
            - 关于Record的保留，CFA参考数字是7年，如果有法律规定，遵守当地法律规定
        - 只要最终**脱离（Dissociation）**，就没有违反准则
            - 划清界限就行，没有要求必须向政府部门举报
            - 脱离的具体操作
                - 报告中除名（如果是剽窃来的报告）
                - 要求调离现有工作
                - 拒绝接受新的客户

        - 辞职
    - 不作为（Inaction）等同于继续违反
- 具体行为
    - 发现他人违法：直接沟通➡️ 报告上级➡️ 确保脱离➡️ 辞职兜底
    - 怀疑他人违法：咨询公司内部法律部门、外部专业机构，不能因为咨询而免责

- **Independence and Objectivity**: Avoid conflicts of interest and undue influences.
    - 保持独立性和客观性
    - 分析师角度 - 上市公司给的礼物
        - **贵重礼物**不能收 - 不会“收买灵魂”的礼物
        - 关键在第三方觉得你的独立性和客观性的影响
    - 基金经理角度 - 客户给的礼物
        - 额外的报酬 - 已经完成投资，奖励性质的礼物
        - 无需区分是否贵重，接受前需要披露给雇主和利益相关方，并获得雇主的书面同意
            - 其他客户没有收到不公平对待
            - 不能未获得同意就收礼，临时起意的邀约，收完礼物再走程序也行
    - 面对威胁
        - 严词拒绝，刚正不阿
        - 放入“Restricted Lists”，只陈述事实，不发表观点
    - 常见场景
        - 研究部门、投行部门 - Fire-wall
        - 小公司付费出报告 - Disclose，Flat fee
        - 挑选托管方 - 不能受贿也不能行贿，都违反
        - 业绩归因、业绩统计、评级机构
        - 差旅费 - 原则上自己（雇主报销）、特殊情况下可以接受“普通安排” - 偏远地区，不得不接受的安排
- **Misrepresentation**: Do not make false statements or present misleading information.
    - 吹牛
        - 吹嘘业绩 - 不能保证投资收益率（除非是特定投资品种、确实有担保结构设计）
        - 吹嘘资质 - CFA持证情况、学历学位

        - 吹嘘服务 - 提供服务清单
        - 非故意的错误 - 一旦发现要主动修正，不改正则是故意违反条例
    - 遗漏
        - 量化模型中 - 遗漏重要的因子、情形，模型得到的是opinion，不是fact
        - 业绩归因分析 - 要将composite中所有portfolio统计在内
    - 不当引用
        - 剽窃 - 他人的文章、观点、材料、图标，需要明确“引用”，自己略加修改的总结也需要引用
        - 完整引用 - 引用他人模型时，没有引用该模型“成立条件”
        - 共识性内容Common knowledge
            - 允许直接引用或者用自己的语言描述
            - 统计局公布的宏观数据可以直接使用，无需说明来源
            - 盈利机构（财经杂志）发布的数据必须引用
            - 杂志A引用了作者B的话
                - 必须先验证B有没有说这个话
                - either直接引用B，or引用A和B
        - 第三方研究报告
            - 必须先审慎分析报告是否公允且合理
            - 如决定使用，必须对外披露该引用
            - 若最终报告有误导性陈述，即使披露了也违例，不能免责
        - 离职人员的报告
            - 公司名义产出的报告 - 无需引用
            - 个人名义产出的报告 - 必须引用
    - 业绩基准的选择
        - Benchmark必须与投资风格匹配
            - 并不是所有投资都有benchmark，比如追求绝对收益的Hedge Fund
        - 业绩估值方法必须科学可靠
            - 特别针对流动性差的投资品种（房地产）
- **Misconduct**: Avoid behavior that damages the reputation of the profession.
    - 渎职
        - 不当行为是否影响自己的专业胜任能力
            - 私人不当行为不一定违反准则
        - 违法不一定渎职，渎职不一定违法
    - 欺诈

        - 任何情况下，都不能欺诈或者不诚信
            - 不能滥用本条款，特别是个人之间的恩怨
        - 个人破产
            - 因为欺诈、职业行为不当 - 违反准则
            - 因为个人其他原因 - 不违反准则

2. **Integrity of Capital Markets**:
    - **Material Nonpublic Information**: Do not use or disclose nonpublic information that could affect investment decisions.
        - 重大非公开消息 - 当持有时
            - 自己不能交易 - 不能买股票、不能买受益于股价上涨的衍生品、不能买具有标的股票的基金
            - 防止他人交易 - 促进消息公开
            - 如何判断是否是内幕消息（MNI）
                - 是否Material
                    - 消息来源可靠
                    - 对股价有清晰影响
                - 是否Nonpublic
            - 两个例外情况
                - Market Maker - 被动交易
                - Risk-arbitrage Trading - 最好停止，如果不停止，提交交易记录
            - 竞争对手公司的预测 - 是noise，不是内幕消息
            - 对于只公开给部分投资者的消息要谨慎（告诉分析师不代表公开信息），可以用内幕消息进行尽责调查，但不能写进报告影响他人决策。建立防火墙来杜绝内幕消息交换。当有内幕消息流出时，把那家公司放进受限名单。
        - **Mosaic Theory**: an analyst may use material public information and nonmaterial nonpublic information in creating a larger picture. 可以使用公开的重要信息和非公开的不重要信息来得出结论。可以自由使用信息，不会违约，但需要披露信息源，确保结论不来自于内幕消息。
    - **Market Manipulation**: Do not engage in practices that distort prices or artificially inflate trading volume.
        - Info-based - 使用假消息
        - Transaction-based - 利用虚假交易来扭曲价格
            - 大量买入/卖出来影响股价
        - 例外情况：

        - **期货交易所**为了**增加流动性**，与**会员**达成**书面协议**来限定**最低交易量**，协议必须**披露**
        - 避税目的 - 不用交资本利得税的方法：年末卖掉股票，抵消unrealized loss，年初buy back
        - 本身就是通过频繁买卖，靠价差获利的行业
3. **Duties to Clients**:
    - **Loyalty, Prudence, and Care**: Act in the best interest of clients.
        - Fiduciary Duty受托责任 - 利用自己的专业能力，为客户谋求最优交易策略，降低交易成本
        - 谁是客户
            - 个人投资者
            - 受益人Beneficiaries - 养老金的委托人（settlor，比如公司的管理者）找到受托人（trustee，比如基金投资经理），投资经理应将最终的受益人（养老金的受益者）作为客户，以客户利益为重
                - 判断好谁是受益人，不一定是公司的管理层，而是公司的股东。投票给获益最大的代理人（佣金少，服务好）。
            - 认可既定投资策略（mandate）的投资者 - 购买共同基金的人数众多，无法一一满足每个人的需要，应以承诺的投资策略为准绳，对承诺负责
            - 社会公众 - 证券分析师写A公司的研报，客户是读报告的人，而不是A公司
        - Soft Dollar 软美元制度
            - 投资经理用客户的钱购买第三方服务
                - 挑选第三方的标准 - 物美价廉，并且适合客户
            - 第三方机构为了招揽业务，会承诺中标后提供“非金钱好处”
                - 投资经理收到这些好处，比如免费的投研服务，就是“软美元”
            - 软美元是客户的财产
                - 必须有利于投资经理为客户提供更好的服务
                - 任性客户直接制定directed brokerage - 评估后提醒客户
        - Proxy Voting 代理投票制度
            - 基金管理人出席上市公司股东大会
                - 投票时应站在基金份额持有人（受益人）角度
            - 决定自己是否要去投票
                - 对受益人有利就参加，没有明显获利可以不去
            - 代理投票制度需要披露给客户

- **Fair Dealing**: Treat all clients fairly and equitably.
  - 公平不等于同等
    - 客观上“做不到”
      - 群发邮件，不可以先打电话给大客户
    - 合理的“差别化对待”
      - VIP - 购买了尊享款的服务，不可以损害其他客户
      - “差别化服务”的政策要披露
    - 限制知情人数，缩短决策和发布之间的时间
  - 常见场景
    - 对之前的投资建议作出修改 - 同一时间通知所有客户
    - 出现超额认购时
      - 自己（包括配偶）不能参与“hot issue”
      - 若付费用户中包含自己的家人（非配偶）- 一视同仁
      - 分配方式 - 按照申购数量order size或者按比例，不能按照客户规模account size
- **Suitability**: Ensure investments are appropriate for the client’s objectives and constraints.
  - 充分了解客户的信息和需求
  - 写下客户的IPS (Investment Policy Statement)
    - 及时在发生重大变化时更新，至少做到每年更新
  - 只要符合IPS，就满足准则IIIC
    - 先修改IPS，再进行投资
    - 客户提出unsolicited invest requires - 先修改IPS
  - 站在整个投资组合的角度判断，而非单个产品
  - 共同基金经理只要服从mandate就行，遵守对外宣称的投资策略
- **Performance Presentation**: Present investment performance information accurately.
  - 所有类似策略的组合必须放在一起
    - 加权平均
    - 关闭的组合不能剔除，必须要包含
    - 模拟业绩可以使用，但必须告知，且不能和真实数据混用
  - 方式 - 无条件提供完整信息
    - Complete report
    - Brief + detail
  - 鼓励使用GIPS，但没有强制要求

    - 历史数据应当标明，不能蛊惑客户说他们未来也能获得这样的收益
    - 改变计算方法应该告知客户
  - **Preservation of Confidentiality**: Keep client information confidential unless disclosure is required by law.
    - 无论现有客户、潜在客户、历史客户，都要保密
4. **Duties to Employers**:
  - **Loyalty**: Act in the best interests of your employer.
    - 开副业之前必须通知雇主，并知会要开展的服务和回报
    - 即使要离职，也应该最大化雇主的利益
    - 在真正离职前不能带走现有客户或者潜在客户
    - 在前公司获得的技能和经验不算机密，简单的客户姓名信息也不算机密，除非得到公司允许，以公司名义进行的交易记录要么删除要么交还给公司
    - 可以联系前客户，只要是使用公开信息且不违反竞业协议，不能从前公司带走客户记录
    - 不能在社交媒体上公布保密信息，不能私用公司的资源
  - **Additional Compensation Arrangements**: Obtain written consent from all parties before accepting additional compensation.
    - 获得雇主同意之后才能接受外部补偿
  - **Responsibilities of Supervisors**
    - 告诉自己的属下不能泄露消息，需要核实消息源。监督交易活动，调查可疑交易。
    - 记录下属的交易活动，认真对待下属提出的意见，教育下属正确的规定
    - 如果发现即将接手的工作有潜在问题，应该先拒绝offer
5. **Investment Analysis, Recommendations, and Actions**:
  - **Diligence and Reasonable Basis**: Ensure thoroughness in research and analysis.
    - 付出充分的努力来支持建议
    - 二手或者第三方研究 - 必须确定这些信息和机构是否可靠，必须验证数据来源和准确性
    - 定量导向的研究 - 需要了解模型的参数和使用的参数、数据来源和时间范围，模型测试包含广泛的假设
    - 审查外部顾问
    - 团队共同的分析 - 只要认为共识意见有合理充分的基础，就不需要与报告脱离

- **Communication with Clients and Prospective Clients**: Disclose the basis of investment decisions and risks involved.
    - 通报投资过程 - 充分描述投资决策过程
        - 正面和负面影响的因素
            - 利率上调和下调的应对方式都应该描述
            - 策略在各种不同形势下的可能表现
        - 重大风险和限制
            - 杠杆的使用
    - 形式
        - 书面报告、面对面交谈、电话交谈、媒体广播、互联网
        - 慎用社交媒体（可能不是对所有客户开放）
    - 区分事实和意见
        - 谨慎宣传，历史不能说成未来，模型不能说成现实
        - 自己计算的Asset不能说成现实
- **Record Retention**: Maintain records to support investment actions and decisions.
    - 保留记录
        - 能证明其研究范围和行动或结论的记录
        - 纸质或电子版
    - 记录是公司财产
        - 离职时不能未经同意就带走
        - 在新公司必须重建记录，不能靠记忆或者从前雇主的来源
    - 符合当地要求
        - 在没有监管指导或者公司要求时，至少**7年**

6. **Conflicts of Interest**:
    - **Disclosure of Conflicts**: Fully disclose potential conflicts of interest.
        - 向雇主披露
            - 提供足够信息，便于雇主评估冲突的影响
            - 如果雇主有明确禁止的冲突 - 遵守这些限制
            - 无意中发生的冲突 - 及时报告
        - 向客户披露
            - 发行人与成员
            - 费用安排
        - 跨部门冲突
            - 卖方分析师 vs 公司发行商、市场营销部门

        - 买方分析师 vs 银行、券商
    - 股票持有冲突
        - 自己持有的 推荐给客户的股票 的份额
        - 个人交易报告
    - 担任董事的冲突
        - 对客户的职责 vs 对公司股东的职责
        - 持有公司证券
        - 接受公司MNI的机会 - 应与投资人员隔离
- **Priority of Transactions**: Transactions for clients and employers should take precedence over personal transactions.
    - 避免潜在冲突
        - 交易不会损害客户利益
        - 不会因客户交易而个人获利
        - 符合法规要求
    - 客户优先
        - 客户交易优先于个人交易 - 不能建老鼠仓
        - 个人投资不应对客户投资产生不利影响
    - MNI
        - 包括进行交易、推荐过程、采取投资行动的所有人
        - 不能向他人传达信息
    - 定期上报
        - 披露员工的受益持股 - 每年向公司披露个人持股，公司应当保密处理
        - 提交交易确认的副本 - 个人交易的确认书、所有账户的报表副本
        - 预先批准程序 - 识别个人交易可能造成的冲突，上报给公司
        - 属下犯错，上级也有责任
- **Referral Fees**: Disclose any referral fees received from recommending products or services.
    - 必须告知客户或潜在客户因其推荐的任何服务而获得的任何利益
    - 披露报酬或利益的性质
        - 固定费用 or 百分比基础
        - 一次性 or 持续性收益
        - 基于绩效的利益
        - 软美元，以及估计的美元价值
    - 事后披露并不能阻止violation，应该直接拒收

7. **Responsibilities as a CFA Institute Member or CFA Candidate**:

- **Conduct as Participants in CFA Institute Programs**: Follow all CFA Institute rules and regulations.
- **Reference to CFA Institute, the CFA Designation, and the CFA Program**: Present CFA status accurately and do not misrepresent it.
    - 能说自己通过了CFA level 2，但不能写“XX，CFA level 2”，因为没有这个称号，当enroll program时可以说自己是level 2 candidate
    - 不允许暗示或声明CFA持有人能取得优越表现的陈述
    - 没有提交专业行为声明、停止支付会费会导致不能使用CFA称号，必须交钱并完成恢复程序才有资格使用CFA称号

GIPS

- 适用GIPS的情形
    - 具有投资管理业务的公司
        - 规范业绩计算和业绩披露
        - 公司层面，不是个人 （可以是一个分支机构、分公司、办事处）
    - 自愿遵守 - 不是强制的
    - 全面遵守
        - Firm-wide basis - 不能只是某只基金、某个投资组合、某个composite
        - GIPS的**所有条款**需要全部被遵守 - 除非与当地法律冲突，要披露
    - GIPS与当地法律相冲突 - 遵守法律，并披露冲突点
- Composite
    - 避免cherry-picking
        - 具有相似风格的portfolio全部都要纳入composite
        - 已经终止的也要纳入
    - 以fair value披露，而不是face value
    - Portfolio的分类及业绩披露
        - Fee-paying discretionary的portfolio MUST 纳入某个composite中
        - Non-fee-paying discretionary的portfolio MAY纳入某个composite中
            - 相关规则要事先制定pre-establish
        - Non-discretionary的portfolio MUST NOT 纳入某个composite中 （基金公司没有主导权的基金，业绩跟公司没关系）
- Verification
    - 自愿原则 - 没有验证照样可以宣称遵守GIPS
    - 独立第三方才能提供验证服务

- Firm-wide basis, 不能针对某个composite进行验证

Equations