FIN4210: Corporate Finance

1 Introduction

1. Corporate Finance

① Definition

The study of financial desition-making process at the corporate level

Specifically
- Capital budget decision : in what project should the firm invest in?
- Financing decision : how to finance?
- Payout decision : payout decision (Move the return to the shareholders)
- Other issues : agency problem & governance

由Manager决

→ Core goal : Maximize shareholders' wealth

= max stock price x # of shares outstanding 流通股

= max stock price when # of shares outstanding −

→ But, there are ownership & management separation

Solutions:
- Governance & Monitoring (软)
- Performance related compensation package (stock & futures) (硬)

L2 Portfolio Theory – Mathematical Preliminaries

1. Return-Risk Tradeoff

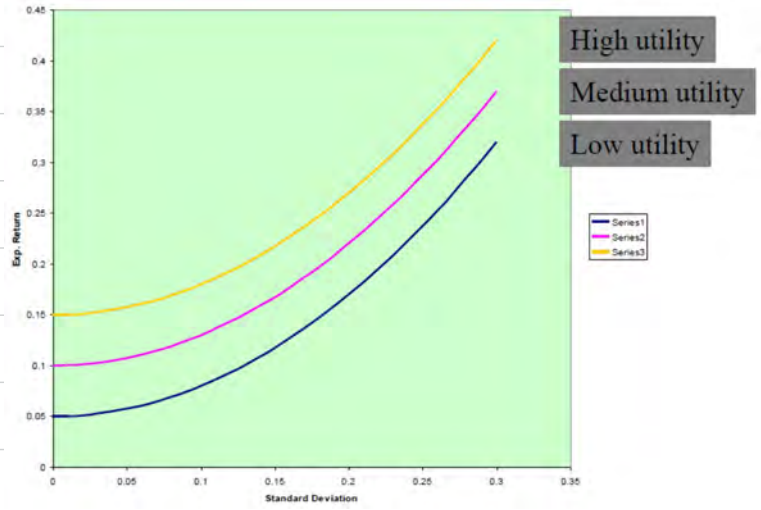
① Utility function

a. Motivation

(max Return, min Risk) → max Utility → Decision depends on $E(U(\cdot))$ (Midterm's content)

b. Indifference curve

$U_i = U(E(R_p), \sigma_p)$



c. Example

$U = E(R_p) - \frac{1}{2} A \sigma_p^2$ (Quadratic form)

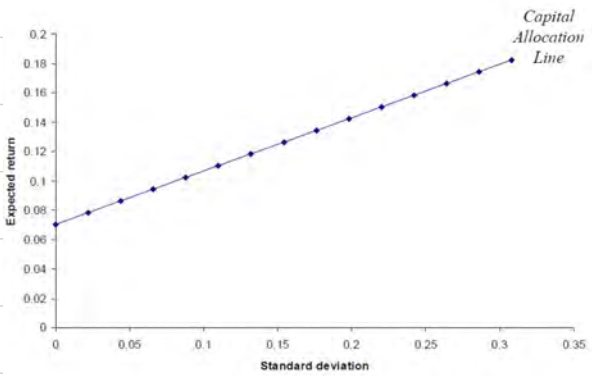
A: Risk aversion coefficient

2. Asset Allocation Across Portfolio & Risk-Free Asset

① Capital Allocation Line (CAL)

a. Definition

The combinations of portfolio & risk-free asset in a mean-std space



$Cov(r_f, r_p) = 0, \forall p \rightarrow \sigma_C = \sqrt{w^2\sigma_p^2 + (1-w)^2\sigma_f^2 + 2w(1-w)\rho\sigma_p\sigma_f} = w\sigma_p$

b. Properties

△ CAL is linear

$$\begin{cases} E(r_C) = w r_p + (1-w) r_f \\ \sigma_C = w \sigma_p \end{cases}$$

$$E(r_C) = r_f + \sigma_C \frac{E(r_p) - r_f}{\sigma_p}$$

Sharpe Ratio $= \frac{E(r_C) - r_f}{\sigma_C}$

Sharpe Ratio is the slope of CAL

Sharpe ratio is the ratio of Risk premium to Standard deviation

Buy: Sharpe Ratio ≥ CML

Sell: Sharpe Ratio ≤ CML

$y = b + x\,a$

△ CML ∈ CAL

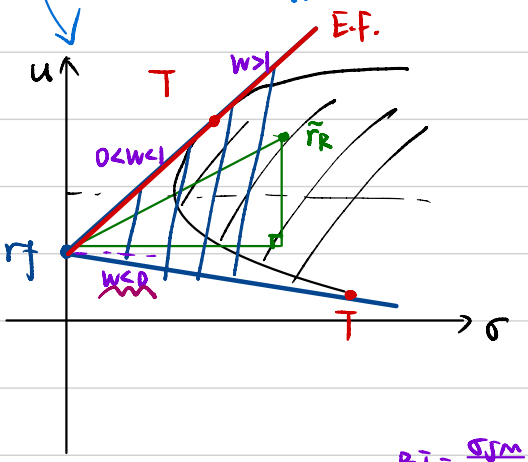
CML is a special case of CAL where the risky portfolio is the market portfolio. Weighted sum of every asset in the market

CML: $E(r_C) = r_f + \sigma_C \frac{E(r_M) - r_f}{\sigma_M}$

Recall

The def of CML : The tangent line connecting risk-free asset & market portfolio

The def of Efficient Frontier : The set of MV-efficient portfolios (risk-free + portfolio / portfolio) not MV-dominated by other portfolios



$$\beta_j = \frac{\sigma_{jM}}{\sigma_M^2}$$

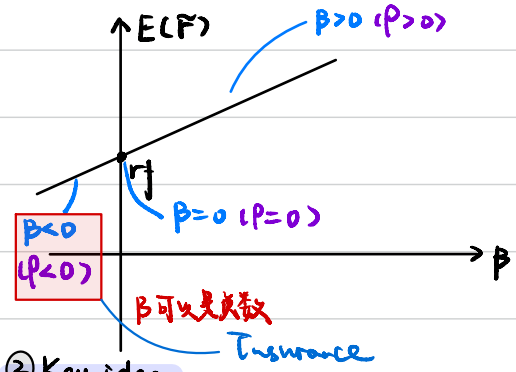
Compare CML & SML (Security Market Line):

CAPM Eqn①: $E(\tilde{r}_j) = r_f + \beta_j (E(\tilde{r}_M) - r_f)$ (risk premium) SML

CAPM Eqn②: $E(\tilde{r}_j) = r_f + \frac{E(\tilde{r}_M) - r_f}{\sigma_M} \rho_{jM} \sigma_j$ CML (when $\rho_{jM} = 1$)

Every security is on SML, while only efficient security is on CML.

SML



β > 1 : Cyclical stock

β < 1 : Defensive stock

② Key idea

Pick portfolio → Pick weights of portfolio & risk-free asset

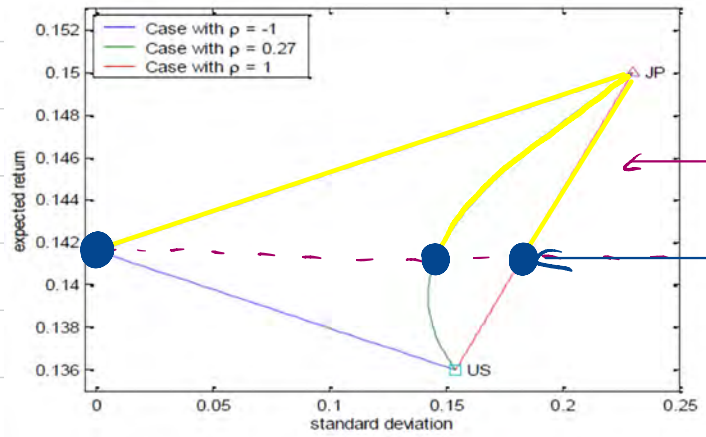
CAPM → Efficient portfolio

Utility / Preference → Optimal efficient portfolio

L3-4 Diversification and the Efficient Frontier

1. Mean-Variance plot

① Plot



Efficient Frontier

Minimum Variance Portfolio (MVP)

L5 CAPM

1. Introduction

① Individual asset's risk in the portfolio

σ_j^2 ⊗

$Cov\langle \sigma_i, \sigma_j \rangle, \forall i \in P$ ✓

Since $\sigma_p^2 = Cov\langle \sigma_p, \sigma_p \rangle = \begin{bmatrix} \sigma_1^2 & & \\ & \sigma_2^2 & \\ & & \sigma_n^2 \end{bmatrix}$, then more important.

i.e. 当一个新的asset加入至portfolio时，相比于其自身的 std/var，我们更关注于其对portfolio整体var的减少/增

② Assumptions

a. Mean-variance criterion

b. Homogeneous expectation: Everyone share the same information (实际：存在内幕消息)

c. Competitive market: Everyone is a price taker, he/she cannot change the price (实际：大户不是price taker)

d. Investors can freely borrow or lend freely at the risk free rate. (实际：贷款利率远高于risk-free rate)

e. No transaction costs and taxes. (实际：存在capital tax)

f. Single period investment horizon

→ CAPM is just an approximation

2. Variance of Portfolio

① Derivation

$\sigma_p^2 = Cov\langle R_p, R_p \rangle = Cov\langle \sum_{i=1}^{N} w_i R_i, R_p \rangle = \sum_{i=1}^{N} w_i Cov\langle R_i, R_p \rangle = \sum_{i=1}^{N} w_i \sigma_i \sigma_p \rho_{ip}$

→ $\sigma_p = \sum_{i=1}^{N} w_i (\rho_{ip} \sigma_i)$ Weighted average of $\langle \rho_{ip} \sigma_i \rangle$

r_p Return 本质上都是weighted average

σ_p Risk

② Individual risk

$\sigma_i = \underbrace{\rho_{im} \sigma_i}_{\text{Systematic}} + \underbrace{\langle 1 - \rho_{im} \rangle \sigma_i}_{\text{Unsystematic}}$

3. Equilibrium

① Consequence

$$\frac{E(r_i)-r_f}{\rho_{iM}\sigma_i} = \frac{E(r_j)-r_f}{\rho_{jM}\sigma_j} = \frac{E(r_M)-r_f}{\sigma_M}, \ \forall i, j.$$

注意：此时的sharpe ratio针对于portfolio中的individual asset时，用的是systematic risk

L6 Arbitrage Pricing Theory

1. Arbitrage

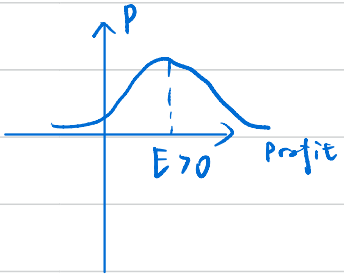
① Traditional definition

Type 1: 0 ; $\forall i, CF_i \geq 0; \exists j, CF_j > 0$

Type 2: >0 ; $\forall i, CF_i = 0$

② Modern definition on Wall Street

= Statistical arbitrage: A trading strategy that is expected to make a profit



2. Arbitrage Opportunity

① No arbitrage condition

Efficient market: The information of firms has been completely revealed on the stock price.

Three forms:
- Weak efficiency — Historical
- Semi-strong efficiency — Public
- Strong efficiency — Public + Private

② Arbitrage opportunity

Mispricing →
- Overpriced: Short
- Underpriced: Long

3. Arbitrage Portfolio Theory

① Motivation

a. CAPM performs badly in practice:
- Assumptions are too strong
- Market risk premium is hard to estimate (just by S&P500)

b. CAPM is a special case of APT.

② Assumptions

a. No arbitrage

b. A security's excess return is a linear function of factors.

c. Investors are risk-averse (risk↑, return↑)

(Do not rely on the existence of a "market portfolio")

③Formula

$R_i = \alpha_i + \sum_j b_{ij} f_j + \varepsilon_i$

- R_i: Excess return
- α_i: Constant term (超额收益)
- f_j: Factor
- b_{ij}: Sensitivity of factors
- ε_i: Idiosyncratic variation

收益 —联立方程组/回归→ 因子 (We can construct a zero-risk portfolio) ← no excess return

zero factor risk

④Fama-French 3 Factors

a. Factors

- Market : $f_{1,t} = r_{S\&P500,t} - r_{f,t}$ Financial market
- Size : $f_{2,t} = r_{small,t} - r_{S\&P500,t}$ ($r_{big,t}$) } > 0
- Book-to-market : $f_{3,t} = r_{high,t} - r_{low,t}$

f is a dependent variable of t

b. Motivation — Empirical work

Factor → Δbeta → ΔReturn

Find factor ← Observe

c. Factor mining

Assumption → Collect samples → 联立方程组 → Factor value

L7-10 Capital Structure

1. Introduction

① Status

The first topic in Corporate Finance. (How to do financing)

② Definition

Relative proportion of debt, equity and other securities

本质：t/D

③ Two major sources

a. Equity financing

- VC
- PE
- IPO
- SEO (Seasoned equity offering)

private → public

b. Debt financing

- Public : Bond　　Debt ≈ Bond
- Private

④ Objective

Make an optimal structure to maximize the market value

= max shareholders' profit

⑤ Market value

MV(Firm) = MV(Debt) + MV(Equity)

2. Cost of capital — Perfect market

① Motivation

Expected return = (Investor: Required rate of return / Firm: Cost of capital)

② Notation

- r_A = Cost of capital
- r_u: Unlevered equity return
- r_L: Levered equity return

(Cost of equity)

- r_d: Cost of debt = r_f (if payoff → debt)

③ WACC

$r_A = w_E r_E + w_D r_d = \frac{E}{E+D} r_E + \frac{D}{E+D} r_d$

→ ($r_u = r_A$ / $r_L = r_u + \frac{D}{E}(r_u - r_d)$)

$\frac{D}{E}$↑, r_L↑ 本质:  $\frac{D}{E}$↑, Total risk −, Risk per unit of equity↑, r_L↑

④ Beta

$\beta_A = \frac{D}{D+E}\beta_d + \frac{E}{D+E}\beta_L$

$R_A = \frac{D}{D+E} R_d + \frac{E}{D+E} R_L$

$R = r_f + \beta(R_M - R_f)$

$\beta_d = 0$ for beginning of debt financing: $R_{debt} = R_f \rightarrow \beta_d = 0$

R_A, β_A are both weighted averaged

⑤ MM theory

a. Perfect market (No friction)

Competitive market (Efficient market)

No taxes, transaction costs, issuance costs associated with security trading

No bankruptcy costs

No agency problem

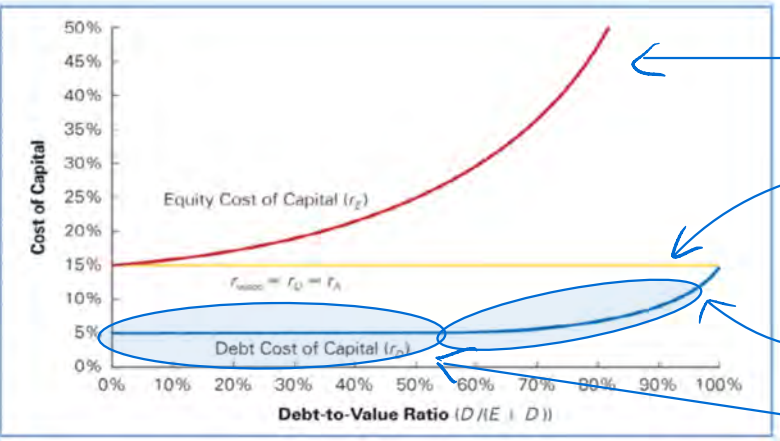
b. Content

In a perfect market,

MV(Firm) = PV(Cash Flows) = D + E , ∀ Capital Structure

Perfect: 怎麼切都不影響MV(firm)

Imperfect: 切法會影響MV(firm)



$\frac{D}{D+E}$↑, r_L↑

In perfect market, r_A -

r_d↑, when payoff < debt (debt 的時候有風險)

$r_d = r_f$ when payoff ≥ debt (i.e. D ≤ A certain value)

3. Cost of capital — With Taxes

① Frictions

Consideration of different frictions → Development of MM Theory

The first type of friction here that we consider is taxes

② Taxes & Firm value

Taxes ↑ , FV ↓ (本质是把value分给了政府)

③ Interest taxes shield

a. Definition

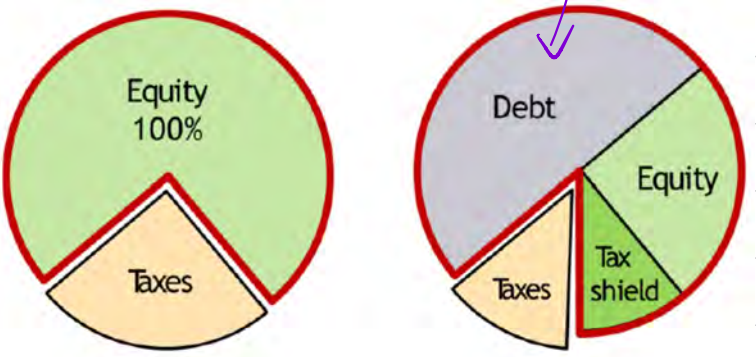
Interest taxes shield = Interest × Tax rate T_C

b. Relationship with the firm value

$V_L = V_U + PV$(Interest tax shield)

Leverage ↑, Firm value ↑

$\frac{D}{D+E}$ ↑, interest ↑, PV(Interest tax shield) ↑, V_L ↑



本质: FV = Equity + Debt

= Pie − Taxes → Related with debt: Debt ↑, Taxes ↓, FV ↑

c. Risk

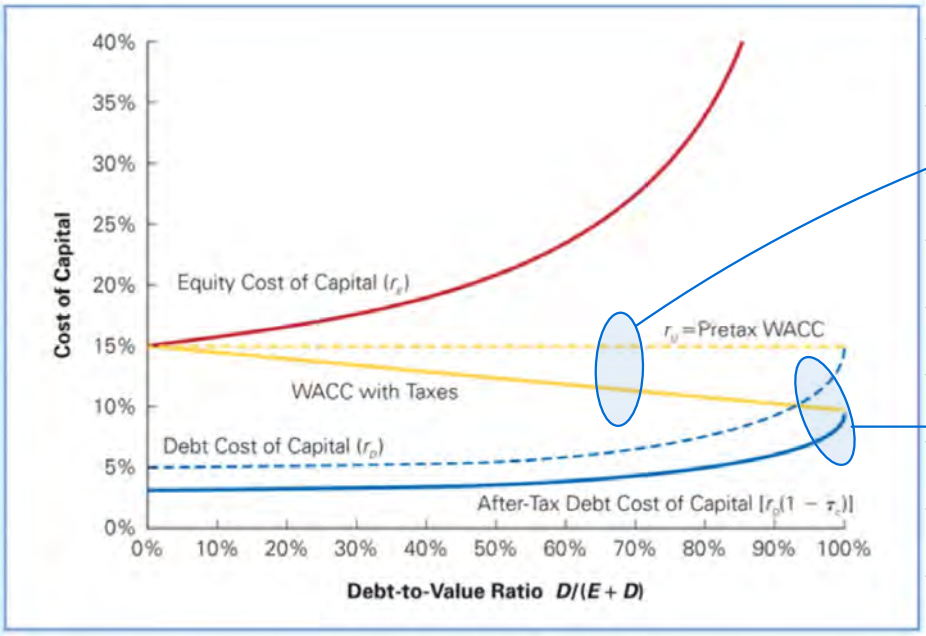
Risk of tax shield = Risk of debt

= Risk of interest payment =

④WACC

$r_A = w_e r_e + w_d r_d (1 - T_C)$ Effective after-tax cost of debt = $r_d \cdot (1 - T_C) < r_d$ (TS 减掉 debt financing 成本实际)

$= w_e r_e + w_d r_d - w_d r_d T_C$ Reduction due to Interest tax shield



$\frac{D}{D+E}$ ↑, r_{WACC} ↓, FV ↑
成本实际 PV(TS) ↑

r_d After-tax (effective) < r_d Before-tax

4. Cost of capital — With Taxes, Bankruptcy costs

① Financial distress ≠ Bankruptcy cost

When a firm has difficulty meeting its debt obligation

② Results of default / bankruptcy 两者是等价的

- Liquidation ← 价值小于负时
- Reorganization / Restructuring ← 价值为负时还有得挣扎

③ Bankruptcy costs

a. Direct cost (Easy to measure, small in magnitude)

Accounting experts, consultants, actioneers, court costs…

b. Indirect cost (Difficult to measure, large in magnitude)

Loss of customers, suppliers, employees, creditors

④ Bankruptcy cost & Firm value

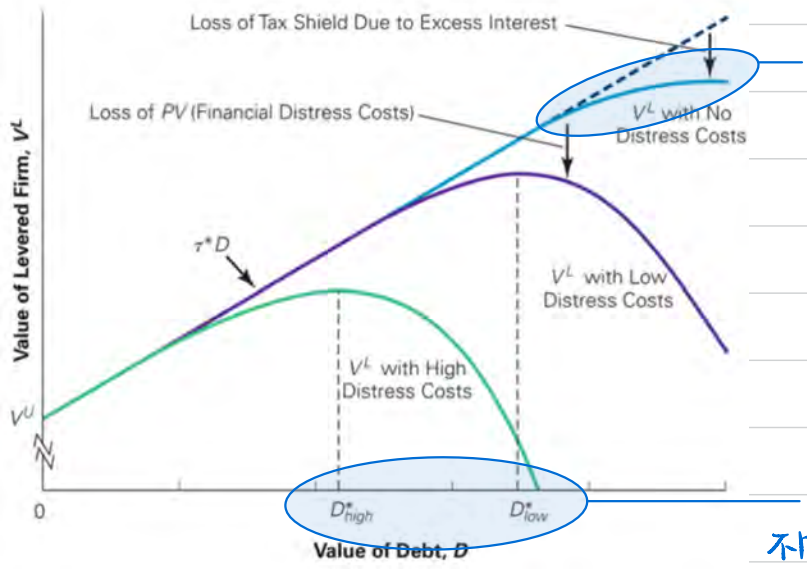
$V_L = V_U + PV(ITS) - PV(\text{Financial distress cost})$

The gap that shareholders need to compensate for debtholders when issuing debt initially

Tradeoff of debt financing for shareholders

What influences PV(Financial distress cost)?

- Cash flow volatility (Volatility ↑, PV ↑)
- Tangibility of assets (Tangibility ↑, Liquidity ↑, PV ↓)



$\frac{D}{D+E}$ ↑, PV(ITS) ↑, 下后面斜率会下降,

这是因为后面的单位debt的profitability下降.

不同价值时, optimal $\frac{D}{D+E}$ for tradeoff

5. Cost of capital — With Taxes, Bankruptcy costs, Agency Problem

① Agency problem

a. Types

Essence: Conflicts of interests between stakeholders. 本质是不同主体对应不同的NPV

- Equity holders vs Debt holders
- Managers vs Investors

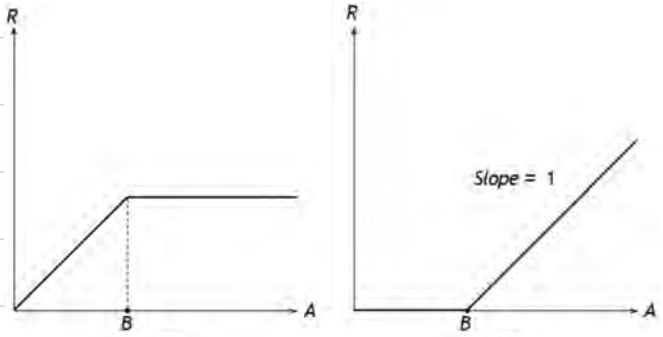
b. Equity holders vs Debt holders

⚠ Separation of priority right & control right

After the debt contract is signed
- E: Care more about (CF)
- D: Care more about Std(CF)

⚠ Limited liability of shareholders

Payoff diagram



c. Managers vs Investors

⚠ Management entrenchment (Managers are free to run the firm in the best interests of their own.)

② Agency cost of debt

a. Types

① Overinvestment (risk shifting)

When facing financial distress, a firm may choose to invest the project with NPV<0 ← 当投资后，payoff对于shareholders有利润率>0时

② Underinvestment (Debt overhang)

When facing financial distress, a firm may choose not to invest the project with NPV>0 ← 当投资后，profit对于shareholders还是<0时

b. Effect on firm value

$V_L = V_U + PV(IT_S) - PV(\text{Financial distress cost}) - PV(\text{Agency cost of debt})$

What influences PV(Agency cost)?

- Financial stress / Financial health (Financial health↑, Prob(Agency problem)↓, PV↓)

c. Another phenomenon: Leverage ratchet effect 杠杆棘轮效应 指的是一旦开始，原则上可以增加但不可以减少的情况

Once debt is in place,

Shareholders will not have incentive to decrease leverage but to increase leverage, which may decrease firm value

(Benefit < cost)

d. Ways for debt-holders to mitigate the effect of agency costs of debt

① Issuing short-term debt rather than long-term debt

② Making the loan debt covenants (protect the priority of debtholders)

③Agency benefits of debt

a. Types

△Alleviate concentration of ownership

Ownership & control rights are diluted, which will restrict the action of owners.

(Due to asymmetric info, when issuing new equity, the bid price of new shareholders would be lower than the ask price of the original owner, the original owner need to compensate for the price spread, that is, the original owner bears the cost of equity.)

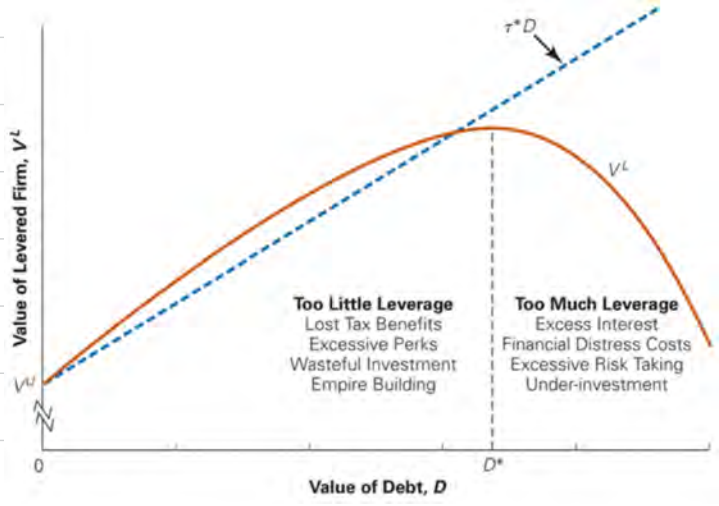
△Alleviate wasteful investment

Under financial distress, the future free CF of managers is lower, then the probability of wasteful investment decreases.

If free CF is high, (Managers will invest (NPV<0) project to make the firm larger e.g. Unprofitable M&A, unnecessary employment)
Managers will be overconfident in their capability and judgement.

b. Effect on firm value

$V_L = V_U + PV(ITS) - PV(\text{Financial distress cost}) - PV(\text{Agency cost of debt}) + PV(\text{Agency benefits of debt})$



Tradeoff:

Upside: (ITS, Agency benefits) — Downside: (Financial distress cost, Agency costs)

Debt financing

The optimal debt level:

- For R&D intensive, start-up firms: Keep a low debt level (Reason 1: CF is more limited and volatile; Reason 2: Most of assets are intangible.)
- For low growth, mature firms: Keep a high debt level

b. Cost of capital — With Taxes, Bankruptcy costs, Agency Problem, non-Competitive market

① Competitive market

In competitive market,

Security price = PV(Future CF)

It implies that investors share the same set of information

Competitive market = Efficient market ⊆ Perfect market

② Asymmetric information

Managers > Insiders > Outsiders

③ Consequence

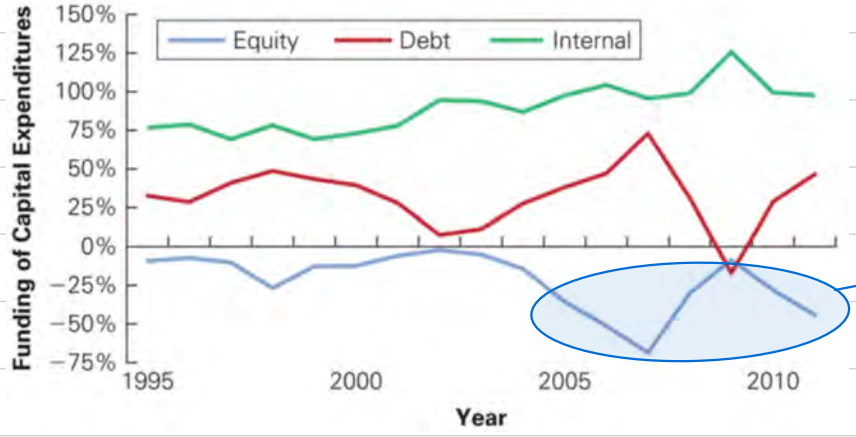
a. Moral hazard

Prior-info side. Benefit from priority to take different strategies

b. Adverse selection

Posterior-info side. Suffer from asymmetric info, acquire low-quality asset, so they will only pay a very low price. ⟶ Correct the asy info.

For underpriced firm, the preferred order of securities: Retained earnings > Debt > Equity (Picking order theory)



Asymmetric info effect

Negative: Underpriced firm will buy back their stocks

(Overpriced firm will sell their stocks)

④ Ways for underpriced firm to lower the equity financing cost

Reduce info asymmetry
- Info disclosure (Signal by "say")
- Payout policy (Signal by "action")

L11-12 Payout Policy

1. Payout policy

① Definition

The way a firm chooses to distribute free cash flow to equity holders

Free CF
- Retain
  - Invest in new project
  - Cash reserves
- Payout
  - Dividend
  - Repurchase

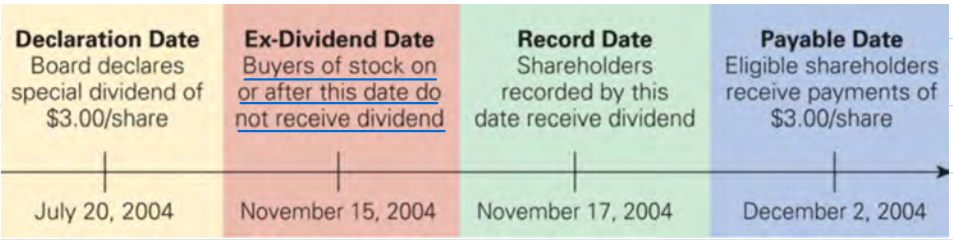
和下一节的不一样，指free to payout

② Dividend payout

a. Types

- Regular dividend
- Special dividend: One-time, much larger
- Stock split: = Stock dividend

b. Dates



宣布分红　开始记　记录日　分红日

Cum-Div Stock 带息股　　Ex-Div Stock 不带息股

③ Share repurchasement

a. Types

- Open market repurchase (95%)　　因为repurchase会使得股价上涨，所以股本会要求加价.
- Tender offer: Offer to buy shares at a pre-specified price with premium from the shareholders
- Target repurchase: Purchase shares directly from a major shareholder

2. Payout policy in Perfect Market

Assume the firm has $20M free CF to payout
expects to generate $48M per year (re = 0.12)
has 10M shares outstanding

Firm value: $V = \$20 + \frac{\$48M}{0.12} = \$420M$ (\$20: Free CF)

Stock price: $P = \frac{\$420M}{10M} = \$42$

① Dividend payout

a. Firm value & Stock price

Firm value: $V = \frac{\$48M}{0.12} = \$400M$

Stock price: $P = \frac{\$400M}{10M} = \$40$

But the total wealth of the firm (Equity holders) remains the same.

② Share repurchase

of shares repurchased $= \frac{20M}{42} = 0.476M$

→ # of shares outstanding $= 10 - 0.476 = 9.524M$

Firm value: $V = \frac{\$48M}{0.12} = \$400M$

Stock price: $P = \frac{\$400M}{9.524M} = \$42$

③ Investors' preference

Indifferent
- Div: Cash (\$2) + Stock (\$40)
- Rep: Stock (\$42)

④ MM Theory

In perfect market, the choice of dividend policy does not affect the firm value
- 在选择时：不影响
- 在执行时：影响

3. Payout Policy in Imperfect Market

① Frictions to be considered

a. Taxes

b. Cash management

c. Earnings management

d. Signaling

② Taxes

a. Overview

For payout policy: Taxes ⟶ Prob of payout ↓

For Div/Rep : Prefer Rep

b. Details

△1 For payout policy

Div: Div tax ⟶ Prob of payout ↓

Rep: Capital gain tax (Buy ×, Sell √)

△2 For Div/Rep

Div tax rate > Repurchase tax

⟶ Investors prefer Rep

⟶ Firms prefer Rep

c Dividend puzzle ☆ "Be able to explain Div puzzle = Prefer Div"

△1 Definition

Taxes suggest that firm should not pay out by dividend, while firms still pay out by dividend sometimes.

△2 Reasons

套利空间

ci) Regulation of SEC (证监会) Repurchase is a trading between insiders & outsiders. Fair price > Actual price

cii) Different preferences of investor clientele
- Div
  - Pro: Cash (Higher liquidity)
  - Con: Higher taxes
- Rep
  - Pro: Lower taxes
  - Con: Stock (Lower liquidity)

Dividend-Capture Theory:

Around the ex-dividend day, high-tax investors sell the stock and low-tax investors buy the stock. Then reverse those trades just after the ex-dividend date.

③ Cash management

a. Overview

- For payout policy : Cash ↑ ⟶ Prob of payout ↑
- For Div/Rep : Indifferent

b. Details

⚠ For payout policy

Cash ↑ , Prob of
- Empire building ↑ , Payout ↑
- Over-investment

⚠ For Div/Rep

Indifferent

④ Earnings management

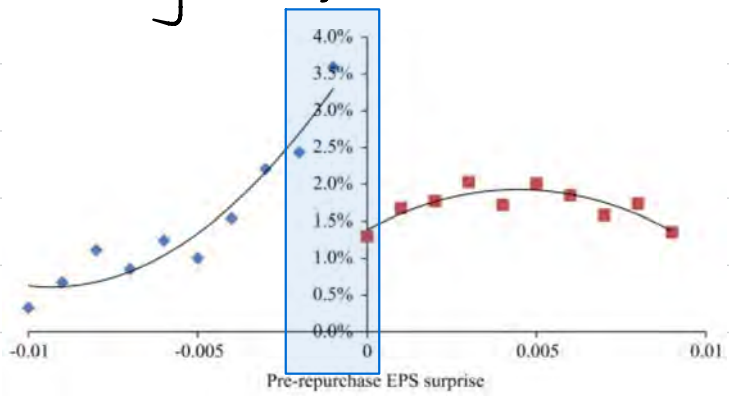
a. Overview

- For payout policy : Earnings ⟶ Prob of payout ≃ 一般是↑
- For Div/Rep : Prefer Rep

b. Details

⚠ For payout policy

- External contract incentives ⟶ Prob of payout ↑
- Management compensation contract incentives ⟶ Prob of payout ↑
- Regulatory motivations <Not too profitable> ⟶ Prob of payout ↓
- Financing motivations ⟶ Prob of payout ↑



⚠ For Div/Rep

Only Rep can increase EPS by decreasing # of shares outstanding

⟶ Prefer Rep

⑤ Signaling

a. Overview

- For payout policy: Signaling → Prob of payout ↑
- For Div/Rep: Prefer Div

b. Details

① For payout policy

Signaling (by action) →
- Div: Future div increases → Confident
- Rep: Current price is undervalued

Div is
- Consistent 持续的
- increased more frequently than decreased. (一般表现金流状况较差时才减少div)

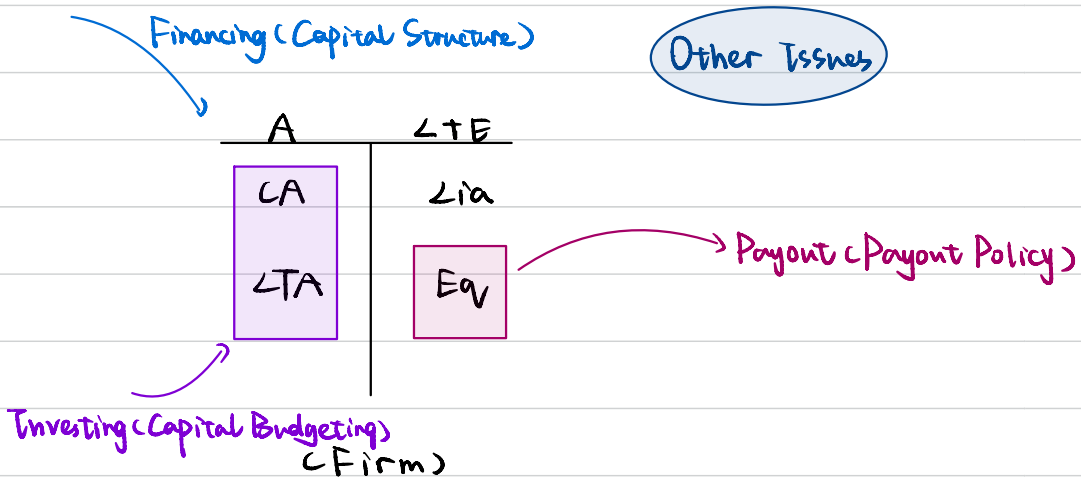
Rep is a good signal while Div↑ is not necessarily a good signal:
- Div↑, confidence for future CF↑, profitability ↑
- Div↑, which may mean ROE < r, profitability ↓

② For Div/Rep

- Div: Long term & less flexible
- Rep: One-time & more flexible easier to withdraw the contract

L13-15 Capital Budgeting

1. Review for outline of Corporate Finance



2. Capital Budgeting Overview

① Role in Corporate Finance

The most basic and fundamental subject

Investing是最能获利公司价值的部分

- Financing
- Investing — Long-term CF (More profitable)
- Operating — Short-term CF

② Definition

Decision over which fixed asset to buy

(= Strategic asset allocation)

③ Process

a. Determine CF

b. Determine rate of return

c. Apply an evaluation technique (NPV, IRR, PI, Payback period)

d. Determine whether to implement the project

3. Not considering Capital Structure: Determine CF

①CF Decomposition

Free CF = Operating CF − Net Capital Spending − ΔNWC

Cash flow from Assets

Cash Flow from Assets =

Operating CF	− Net Capital Spending	− Δ NWC
+ EBIT	+ Δ Net Fixed Assets	+ Δ Curr. Assets
− Taxes	+ Deprc.	− Δ Curr. Liab.
+ Deprc.		

Initial outlay — Capital expenditure & ΔNWC

In process — Operating CFs

Terminal — Capital expenditure & ΔNWC

②Incremental CF

a. Definition

CF directly caused by the project
- If the project is implemented, this CF will be part of the firm (1)
- If the project is not implemented, this CF will not be part of the firm (2)

b. Examples

⚠ Sunk costs: X

Already exist, have to pay no matter whether the project is implemented

e.g.: Consulting fee

⚠ Opportunity cost: √

⚠ Side effects: √

Synergistic or cannibalistic effects

e.g.: iPad air & iPad pro

③ Operating CF

a. Definition

Operating CF = Incremental earnings + Depreciation

$= (Rev - Cost - Dep)(1 - tax\ rate) + Dep$

EBIT

Why no interest? → When capital structure (financing structure) is fixed, interest is fixed.

b. Depreciation tax shield

⚠ Motivation

Existence of Dep → Deduction of Taxes

⚠ Computation

$DTS = Dep \cdot T$

c. Example

Suppose you are considering whether to upgrade your manufacturing plant and increase its capacity by purchasing a new piece of equipment. There are several equipments available on the market. You consult with a practitioner to compare the available equipment, and pin down the one that you would like to buy if you upgrade the plant. You pay the pracitioner $10,000. The equipment cost $1 million. You will also spend $50,000 on engineering costs to redesign the plant to accommodate the increased capacity. What are the initial earning consequences of the decision?

cost

Assume after we installed the machine, the additional capacity will generate incremental revenues of $500,000 per year for five years, but also incur $150,000 incremental costs per year. Also assume five year straight-line depreciation is used, marginal tax rate of 40%. What are the incremental earnings from year 0 to year 5 for the taking this update?

Year	0	1	2	3	4	5
Incremental Revenues		500	500	500	500	500
Incremental Costs	-50	-150	-150	-150	-150	-150
Depreciation		-200	-200	-200	-200	-200
EBIT	-50	150	150	150	150	150
Income Taxes @ 40%	20	-60	-60	-60	-60	-60
Incremental Earnings	-30	90	90	90	90	90
Add Back Depreciation		200	200	200	200	200
Initial Capital Exp.	-1,000					
Incremental Free CFs	-1,030	290	290	290	290	290

④ Net capital spending

a. Computation

Net capital spending = Δ Net fixed assets + Dep

⑤ ΔNWC

a. Net working capital

NWC = CA − CL

NWC↑ , ΔNWC > 0 , Free CF ↓

b. Example

Year	0	1	2	3
Net Working Capital	20,000	20,000	20,000	0
Change in NWC	20,000	0	0	- 20,000
Cash Flow Effect	-20,000	0	0	20,000

0 → 20000

4. Not considering Capital Structure — Step by step example

① Context

The cost of the new machine is **$140K**.

An infusion of **$4K** in net working capital will be needed at the time of installation.

The project will increase revenues by **$85K** per year, and operating costs will increase by **$30K** per year.

Simplified straight-line depreciation is used; asset's net book value will be deprec'd to 0.

Class life (useful life) is **5 years**, and the firm is planning to keep the project for **5 years**.

Anticipated salvage value at year 5 = **$50K**.

14% required ret.; **39%** marginal tax rate.

② Step 1: Evaluate CF

a. Initial layout

What is the Initial Cash Flow?

$-\Delta$ Net Fixed Assets		$-\$140K$
$-\Delta$ Net Working Capital	$\Rightarrow$	$-\$4K$
Cash Flow at $t = 0$		$-\$144K$

b. In process

We must calculate these Cash Flows for years 1-5:

Incremental Revenue		85K
− Incremental Costs		−30K
− Depreciation Exp. on Project		−28K ← 140K / 5
Incremental Earnings b/f Tax		27K
− Tax Exp. on Incremental EBT	$\Rightarrow$	−10,530
Incremental Net Income		16,470
+ Depreciation Exp. on Project		+28K
Annual Cash Flows		44,470

c. Termination

What is the Terminal Cash Flow?

Capital gain / loss 要算 Taxes

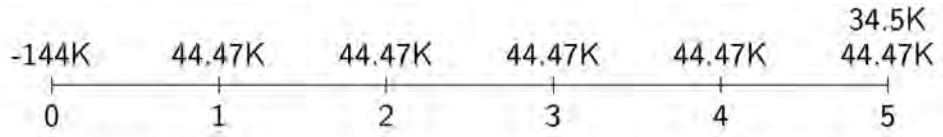
$-\Delta$ Net Fixed Assets		− 0
+ Gain/Loss on Sale of Asset		+ 50K ← Market value − Book value
− Tax Expense (on Gain)	$\Rightarrow$	− 19.5K
$-\Delta$ Net Working Capital		− (−4K)
Terminal Cash Flows		34.5K

Gain: Tax expense

Loss: Tax savings

有 + 和有 − : 以符号来算

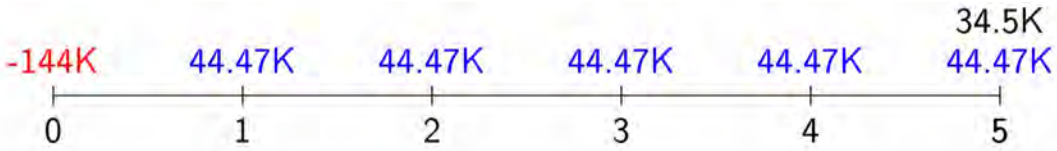
d. Result



- $CF(0) = -144,000$
- $CF(1\text{-}4) = 44,470$
- $CF(5) = 44,470 + 34,500 = 78,970$

③Step 2: Determine rate of return

④Step 3: Determine NPV



$$NPV = \underbrace{-144K}_{InitialOutlay} + \underbrace{\frac{44.47K}{.14} \times \left(1 - \frac{1}{(1.14)^5}\right)}_{AnnualCFs} + \underbrace{\frac{34.5K}{(1.14)^5}}_{\text{Terminal CF}}$$

$$NPV = 26,587.33$$

Accept or Reject this project? ✓

5. Considering Capital Structure — With assumptions

① Assumptions

a. $Risk_{project} = Risk_{firm}$

当此Project是主要业务时，才是合理的。

b. $\frac{D}{E}$ is constant

此时的debt称为Debt capacity

c. Taxes is the only imperfection.

② Method 1: WACC Method

a. Overview

FCF：Unlevered FCF

r ：Levered WACC $r_{WACC} = \frac{E}{D+E} r_E + \frac{D}{D+E} r_D (1 - T_C)$

b. Example

⚠ Context

Assume Avco is considering introducing a new line of packaging, the RFX Series:

- Avco expects usage of this new line to last four years, and expects an annual sale of $60 million per year Rev
- Manufacturing costs and operating expenses are expected to be $25 million and $9 million, respectively, per year. Cost
- Developing the new line will require one-time upfront R&D and marketing expenses of $6.67 million and a $24 million investment in equipment. Cost(t0) Capital Spending
- Avco expects no net working capital for the project
- Avco pays a corporate tax rate of 40% TC

⚠ Determine unlevered FCF

	Year	0	1	2	3	4
Incremental Earnings Forecast ($ million)						
1	Sales	—	60.00	60.00	60.00	60.00
2	Cost of Goods Sold	—	(25.00)	(25.00)	(25.00)	(25.00)
3	**Gross Profit**	—	35.00	35.00	35.00	35.00
4	Operating Expenses	(6.67)	(9.00)	(9.00)	(9.00)	(9.00)
5	Depreciation	—	(6.00)	(6.00)	(6.00)	(6.00)
6	**EBIT**	(6.67)	20.00	20.00	20.00	20.00
7	Income Tax at 40%	2.67	(8.00)	(8.00)	(8.00)	(8.00)
8	**Unlevered Net Income**	(4.00)	12.00	12.00	12.00	12.00
Free Cash Flow						
9	Plus: Depreciation	—	6.00	6.00	6.00	6.00
10	Less: Capital Expenditures	(24.00)	—	—	—	—
11	Less: Increases in NWC	—	—	—	—	—
12	**Free Cash Flow**	**(28.00)**	**18.00**	**18.00**	**18.00**	**18.00**

第1年Dep = 0

③ Compute levered WACC

- Now let's move on to calculate the discount rate (we adjust the leverage effect here: interest tax shield)
  - Avco's debt-equity ratio is equal to 1
  - Cost of debt is equal to 6%
  - Cost of equity is equal to 10%
  - Avco intends to keep a fixed 1:1 debt-equity ratio for the foreseeable future. Thus, the WACC is the same for the duration of the project:

$$r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$
$$= 0.5 \times 10\% + 0.5 \times 6\% \times (1 - 0.4) = 6.8\%$$

④ Compute NPV and make decision

- The value of the project, including the tax shield from debt (reflected in the discount rate), is calculated as the present value of its future free cash flows :

$$V_0^L = \frac{18}{1.068} + \frac{18}{1.068^2} + \frac{18}{1.068^3} + \frac{18}{1.068^4} = \$61.25 million$$

- NPV of the project is equal to $61.25 - 28 = 33.25$ million

Debt capacity = $61.25M × D/E = $30.625M

③Method 2: APV Method

a. Overview

FCF : Levered FCF $V^L = V^U + PV(ITS)$

r : Unlevered WACC

b. Example

⚠Context

- Assume Avco is considering introducing a new line of packaging, the RFX Series:
- Avco expects usage of this new line to last four years, and expects unlevered free cash flow is $18 million per year (calculated in the last lecture)
- Avco's debt-equity ratio is equal to 1
- Cost of debt is equal to 6%
- Cost of equity is equal to 10%
- Avco pays a corporate tax rate of 40%

⚠Determine levered FCF

- Unlevered cost of capital is calculated as:

$$r_u = \frac{E}{E+D} r_E + \frac{D}{E+D} r_d$$
$$= 0.5 \times 10\% + 0.5 \times 6\% = 8\%$$

- Accordingly, the project's unlevered value (without considering ITS) is calculated as:

$$V_0^U = \frac{18}{1.08} + \frac{18}{1.08^2} + \frac{18}{1.08^3} + \frac{18}{1.08^4} = \$59.62 million$$

→ V^U

- Now let's calculate the value of the tax shield:
  - ▷ Interest paid in year t is estimated based on the amount of debt outstanding at the end of the *prior year*:

Interest paid in year $t = r_D \times D_{t-1}$ (Cost of debt)

- Recall the expected debt capacity (in order to maintain the constant debt-equity ratio) we calculated from last lecture:

FV在 t=0~3 → PV(ITS) ITS → Int → D_{t-1} → FV_{t-1} (Debt Capacity)

	Year	0	1	2	3	4
Interest Tax Shield ($ million)						
1	**Debt Capacity, D_t (at d = 50%)**	30.62	23.71	16.32	8.43	—
2	Interest Paid (at r_D = 6%)		1.84	1.42	0.98	0.51
3	**Interest Tax Shield (at τ_c = 40%)**		**0.73**	**0.57**	**0.39**	**0.20**

如何计算Debt capacity: $8.43 = \frac{18}{1.08} \times \frac{1}{2}$

$16.73 = \left(\frac{18}{1.08} + \frac{18}{1.08^2}\right) \times \frac{1}{2}$

...

...

(1.08是levered risk)

$$PV(\text{interest tax shield}) = \frac{0.73}{1.08} + \frac{0.57}{1.08^2} + \frac{0.39}{1.08^3} + \frac{0.20}{1.08^4} = \$1.63 \text{ mill}$$

$$V^L = V^U + PV(\text{interest tax shield}) = 59.62 + 1.63 = \$61.25 \text{ mill}$$

⚠Compute unlevered WACC (上方已计算)

⚠Compute NPV and make decision (与WACC Method一样)

c. Pros & Cons compared with WACC Method

- WACC's Pro: Easier to compute when $\frac{D}{E}$ is fixed
- APV's Pro: Easier to include market imperfection and then compute its PV.

④ Method 3: The Flow-to-Equity Method

a. Motivation

When evaluation is based on shareholders.

b. Overview

- FCF: FCFE (Free cash flow to the equity holders) FCFE = FCF − (1−Tc) × Interest Payment + Net Borrowing
  Dt − Dt−1 (Change in Debt Capacity)
- r: Cost of equity

c. Example

⚠ Determine FCFE

	Year	0	1	2	3	4
Incremental Earnings Forecast ($ million)						
1	Sales	—	60.00	60.00	60.00	60.00
2	Cost of Goods Sold	—	(25.00)	(25.00)	(25.00)	(25.00)
3	**Gross Profit**	—	35.00	35.00	35.00	35.00
4	Operating Expenses	(6.67)	(9.00)	(9.00)	(9.00)	(9.00)
5	Depreciation	—	(6.00)	(6.00)	(6.00)	(6.00)
6	**EBIT**	(6.67)	20.00	20.00	20.00	20.00
7	Interest Expense	—	(1.84)	(1.42)	(0.98)	(0.51)
8	**Pretax Income**	(6.67)	18.16	18.58	19.02	19.49
9	Income Tax at 40%	2.67	(7.27)	(7.43)	(7.61)	(7.80)
10	**Net Income**	(4.00)	10.90	11.15	11.41	11.70
Free Cash Flow to Equity						
11	Plus: Depreciation	—	6.00	6.00	6.00	6.00
12	Less: Capital Expenditures	(24.00)	—	—	—	—
13	Less: Increases in NWC	—	—	—	—	—
14	Plus: Net Borrowing	30.62	(6.92)	(7.39)	(7.89)	(8.43)
15	**Free Cash Flow to Equity**	**2.62**	**9.98**	**9.76**	**9.52**	**9.27**

	Year	0	1	2	3	4
Interest Tax Shield ($ million)						
1	**Debt Capacity, D_t (at d = 50%)**	30.62	23.71	16.32	8.43	—
2	Interest Paid (at r_D = 6%)		1.84	1.42	0.98	0.51
3	**Interest Tax Shield (at τ_c = 40%)**		**0.73**	**0.57**	**0.39**	**0.20**

⚠ Compute cost of equity (也就是levered cost of equity) 不是unlevered re

⚠ Compute NPV and make decision

$$NPV(FCFE) = 2.62 + \frac{9.98}{1.10} + \frac{9.76}{1.10^2} + \frac{9.52}{1.10^3} + \frac{9.27}{1.10^4} = \$33.25 \text{ mill}$$

NPV(FCFE) = NPV(Project):

When investing a proj.
- Debt holders invest in a zero-NPV proj
- Equity holders invest in a proj-NPV proj.

6. Considering Capital Structure — Relax ass 1

① Assumption relaxed

Proj risk = Firm risk

② Idea

$r^L = r^u - \frac{D}{D+E}\, r_{crd}$，此时 $\frac{D}{D+E}$ 为 proj 的 Leverage ratio

where r^u = average of comparables' unlevered WACC

Comparables 一般非某团，都是主营某一业务的公司.

7. Considering Capital Structure — Relax ass 1, 2

① Assumption relaxed ⟶ Then, we prefer to use APV Method.

$\frac{D}{D+E}$ is constant.

② Two alternatives

- Constant interest coverage ratio
- Predetermined debt levels

③ Constant interest coverage ratio

a. Idea

$\text{Interest payment}_t = \underset{\Delta}{k} \cdot EBITDA_t$ (k is fixed ← Fixed interest coverage ratio)

b. Details

$V^L = V^u + PV[T_S]$

$= V^u + PV[k \cdot FCF \cdot \tau_c]$

$= V^u + k\tau_c\, PV[FCF]$

$= V^u + k\tau_c V^u$) $PV[FCF] = V^u$

$= (1 + k\tau_c) V^u$

总结 (Tax shield 体量与 FCF 体量同步，当 FCF 较大时，TS 也较大.

Cash management，防止由于 cash 过多导致的 Empire Building.

④Predetermined debt levels

a. Idea

Pre-specify the debt capacity for each period.

b. Details

- Example: assume now that Avco plans to borrow $30.62 million to run the project, and then will reduce the debt on a fixed schedule (not going to maintain constant debt-equity ratio):
  - $20 million after one year, to $10 million after two years, and to zero after three years

	Year	0	1	2	3	4
Interest Tax Shield ($ million)						
1	**Debt Capacity, D_t (fixed schedule)**	30.62	20.00	10.00	—	—
2	Interest Paid (at $r_D = 6\%$)		1.84	1.20	0.60	—
3	**Interest Tax Shield (at $\tau_c = 40\%$)**		**0.73**	**0.48**	**0.24**	—

非 Predetermined : $D_{t-1} \leftarrow FV_{t-1}$ (Expectation)

Predetermined : D_{t-1} planned (Constant)

8. Considering Capital Structure — Relax ass 3

① Asymmetric information

a. Equity financing

- True share price: $110 / share
- Actual share price: $100 / share

Wanna finance $110 M ⟶ Have to offer 1.1M shares ⟶ Bear $10M cost

- Gain: New shareholders
- Lose: Original shareholders

⟶ Project 为负NPV

b. Debt financing

⚠ Benchmark (Without AI)

	Year	0	1	2	3	4	5
1	Fair Loan	100.00	(5.00)	(5.00)	(5.00)	(5.00)	(105.00)
2	Interest Tax Shield		2.00	2.00	2.00	2.00	2.00
3	At $r_D = 5\%$:						
4	*NPV*(Loan Cash Flows)	0.00					
5	*PV*(Interest Tax Shield)	8.66					

Coupon rate = Discount rate = 5%

Investors expect True riskness

⟶ NPV of Financing $= 100 - \frac{5}{5\%}\left[1-\left(\frac{1}{1+5\%}\right)^5\right] - \frac{100}{(1+5\%)^5} = 0$

⚠ With AI

	Year	0	1	2	3	4	5
1	Fair Loan	100.00	(5.00)	(5.00)	(5.00)	(5.00)	(105.00)
2	Interest Tax Shield		2.00	2.00	2.00	2.00	2.00
3	At $r_D = 5\%$:						
4	*NPV*(Loan Cash Flows)	0.00					
5	*PV*(Interest Tax Shield)	8.66					
6	Actual Loan	100.00	(6.00)	(6.00)	(6.00)	(6.00)	(106.00)
7	Interest Tax Shield		2.40	2.40	2.40	2.40	2.40
8	At $r_D = 5\%$:						
9	*NPV*(Loan Cash Flows)	(4.33)					
10	*PV*(Interest Tax Shield)	10.39					

- Coupon rate = 6%
- Discount rate = 5%

⟶ NPV of Financing = Cost of higher interest payment + Benefit of larger PV(ITS) (= Δ in IT)

$= 100 - \frac{6}{5\%}\left[1-\left(\frac{1}{1+5\%}\right)^5\right] - \frac{100}{(1+5\%)^5} + (10.39 - 8.66)\,M$

$= -2.6\,M$

↑ 于 equity financing cost

② Other costs

- Direct approach
  - FCF
  - Risk
- Alternative approach: APV

9. More on Leverage Policy

① Motivation

Before, we relax Ass 2: $\frac{D}{D+E}$ fixed to
- Constant interest coverage ratio,
- Predetermined debt

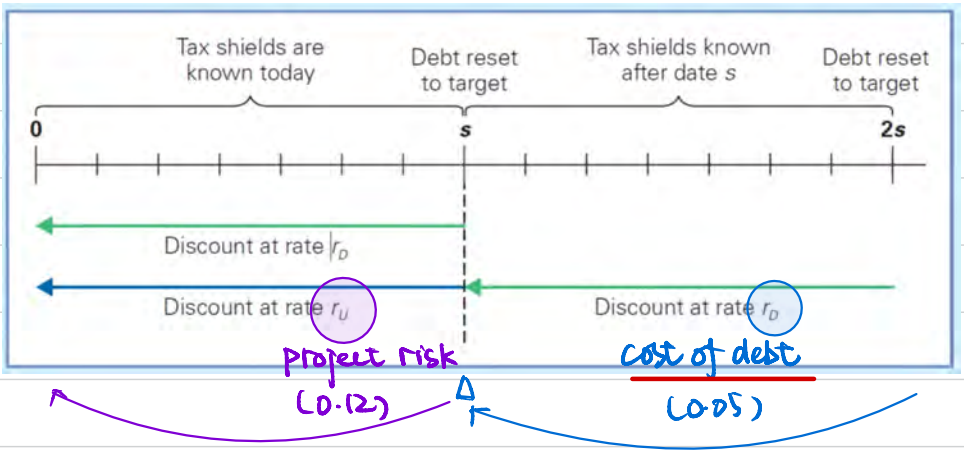
) 比较

to get closer to reality, now we consider "Periodically adjusted debt"

② Periodically adjusted debt

Known fixed debt level in the short run (for example, from this year to next year),

and adjust periodically to bring the leverage ratio back in line with the target rate

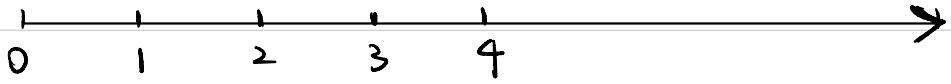


为TS的discount rate of TS = r_D? ☆

Risk of TS = Risk of Int
= Risk of Debt
= r_D

注释0，不知道s->2s的target ratio，不知道对应的debt capacity

注释s，知道2s时的target ratio，知道对应的debt capacity



$PV_1(TS_2) = \frac{6}{1.05}$

$PV_0(PV_1(TS_2)) = \frac{6}{1.05} \cdot \frac{1}{1.12}$ ⟶ $PV_0(TS)$

(相当于一次(1+r_D)，后面两次(1+r_U))

↳ According to APV, $V^L = V^U + PV(TS)$

- Adjust continuously: $r^L = r^U - \frac{D}{D+E} r_d t_c \frac{1+r_d}{1+r_d}$
- Adjust periodically: $r^L = r^U - \frac{D}{D+E} r_d t_c \frac{1+r_U}{1+r_d}$

Lib-18 M&A

1. Introduction

① Two areas of IB

- M & A : Assisting in the negotiation and structuring 卖公司
- Underwriting : Raising capital through selling stocks or bonds to investors (e.g. IPO) 卖证券

证券包销

② Another name

Takeover = M&A

③ Two parties

- Acquirer / Buyer
- Target / Seller

④ Types of mergers

a. Horizontal mergers : Same industry

b. Vertical mergers : Supplier & Demander

c. Conglomerate mergers : Unrelated industry

⑤ Method of payment

a. Stock

b. Cash

c. Mixture (Stock, cash, debt, options ...)

⑥ Acquisition premium

Premium Paid over Premerger Price	Announcement Price Reaction	
	Target	Acquirer
43%	15%	1%

Source: Data based on all U.S. deals from 1980 to 2005, as reported in *Handbook of Corporate Finance: Empirical Corporate Finance*, Vol. 2, Chapter 15, pp. 291–430, B. E. Eckbo, ed., Elsevier/North-Holland Handbook of Finance Series, 2008.

↓ when completed

↓ when announced

2. Pros & Cons of M&A

① Pros

a. Economic motivation

a. Economies of scale and scope: cost reduction (e.g, cut redundant resources) and increase profits, especially for horizontal M&A

b. Industry consolidation and market power: Monopoly gains – two rival firms merge with each other reduce competition (charge higher price!) and thereby increase profits

c. Vertical integration: coordination effect that makes products required at different stages of the production cycle

d. Expertise: an efficient way to purchase the talent

e. Tax savings: losses in one division can offset profits in another division. Thus a smaller tax payment

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→ PV(Tax savings) < Tax savings

→ as long as $\rho \neq 1$, payoff is diversified

b. Non-Economic motivation

(1) Reduce inefficiencies → Replace prev managers

(2) Liquidity-driven motives
Most common during crisis (2008-2009, COVID-19, etc)
Provide cash to either acquirer or (more often) target and alleviate financial distress
E.g., Chase – Bear Sterns in 2008, Expedia – Apollo in 2020

Cash-rich Acquirer → Inject → Cash-poor Target

(3) Valuation-driven motives
Undervaluation itself provides profit for deal
E.g., Verizon – Yahoo deal in 2017

Buy stocks → Buy the whole firm.

② Doubts

- Managerial motives when with a lot of cash on hand – agency problems

Unprofitable M&A
- 优：T较大
- 缺：NPV<0

- Diversifying risk → Conglomerate mergers → Bad for investors to do diversification
- Increasing EPS

$$\text{New EPS} = \frac{E_1 + E_2}{\text{\# of shares outstanding}}$$

$\downarrow$ ↑ T2一般不可持续

3. Merger Waves

① Phenomenon

M&A waves ← (High stock market valuation / condition; Low interest rate)

② Explanations

a. r_D low → Easy to do debt financing and then M&A (Cost is small)

Ⓧ: Stock price of the target firm is also high

b. PV(Synergy) is larger (Revenue is larger)

Ⓥ: (CF ↑ → PV ↑; r ↓)

Risk premium (price of risk): ↑ in Bad time; ↓ in Good time

4. Equity valuation

① Assumption

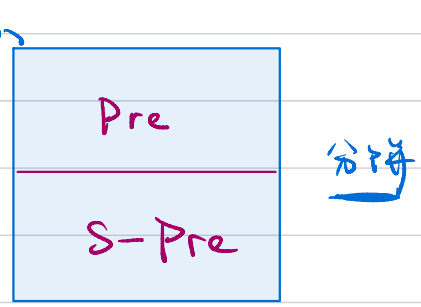
Perfect market

② Acquirers' perspective

(Premium + T)

NPV(M&A to A) = $-\underbrace{\text{Total Price}}_{\text{旧}} - A + \underbrace{A + T + S}_{\text{新}}$

= S − Premium



③ Targets' perspective

NPV(M&A to T) = Total Price − Pre-bid Market capitalization

= Premium

④ Stock Payment: Maximum of exchange ratio

For acquirer, the stock price after M&A should not be lower than that before:

$$\frac{A}{N_A} \le \frac{A+T+S}{N_A+x}$$ (x: Newly issued shares to Target)

$$\longrightarrow x \le N_A \frac{T+S}{A}$$

$$\longrightarrow \underbrace{\frac{x}{N_T}}_{\text{Exchange rate}} \le \frac{N_A}{N_T}\frac{T+S}{A}$$

⑤ Cash payment

Cash to pay = Exchange ratio × P_A = $P_T + \frac{S}{N_T}$

5. Merger Arbitrage

① Idea

Since after M&A is announced, there are some possibilities and it takes a long time

- Will complete
  - At initial price
  - At other price
- Will not complete

② Type

Not risk-free traditional arbitrage, but statistical arbitrage.

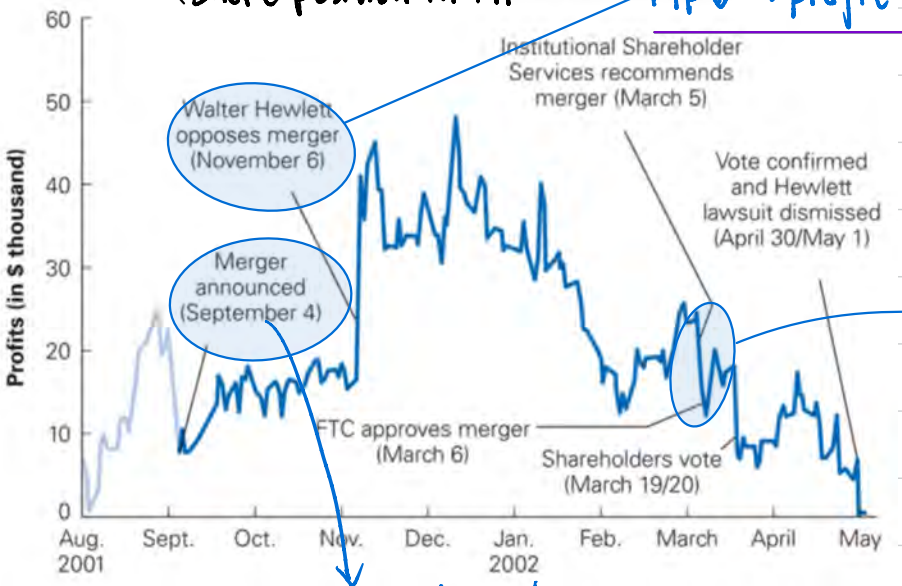
③ Example (HP & C)

portfolio
- Long position in C — Long Target
- Short position in HP — Short Acquirer

HP↓ → profit↑

C也大跌

但没有Acquirer跌得多



Info Δ↓ → profit↓

C↑ (15%)
HP↑ (1%)
→ profit↑

b. Details of Types of M&A

① Types

- Friendly (Most of the M&A)
- Hostile

② Proxy fight

a. Acquirer

- Become shareholders
- Convince shareholders to vote out the target's current board and support themselves

b. Target

1. Poison pills: Existing shareholders buy stock at a discount
2. Staggered board: Only $\frac{1}{3}$ of directors up for election.
3. White knights: Find a friendlier firm to rescue
4. Golden parachute: Extra package to the firm's management
5. Recapitalization: Change capital structure to be unattractive

7. Value Added by M&A

① Historical result

Value added (Acquirer (The side which paid effort) : X
Target : √

当然LBO. Toeholds make sense,
但由于Buyers发动竞争，打价格战，
故收益归于Target.

② Target side: Free-rider problem

Assume (current Target price before M&A = $45
potential Target price after M&A = $75

If the acquirer makes a tender offer of $60 per share,

(Tendering shareholders: Gain $15
Non-tendering shareholders: Gain $30 (Free-ride)

→ Result: no one want to accept the tender offer, the acquirer have to offer ≥ $75 per share
(M&A 收益全归 Target shareholders)

③ Acquirer side: Toeholds & LBO

a. Toehold

(Buy 10% shares in the market anonymous at $45 Made some compensation
Buy 41% shares publicly at $75

If a investor wanna buy more than 10% shares, he/she has to disclose the intention regulated by SEC

b. Leverage Buyout (LBO)

(Borrow money from bank
Pledge target shares as collateral

→ if M&A succeeds,

类似买房时的抵押(以购买物作为抵押物)

(Acquirer gains control right of Target
Target value stays the same

Assume (current Target value before M&A: $800M ($40 × 20M)
potential Target value after M&A: $1200M

如果失败$800M，
就会亏LBO的$800M.

acquirer does LBO for $400M (50% of $800M),
after LBO, acquirer successfully implement M&A, then

$1200M ($400M Debt
$800M Equity → (Without M&A : $40
With M&A, tender : $40
With M&A, not tender : $40

本质在于M&A后，LBO使得target share price不变，所以原来的shareholder原意卖股权

L19-21 Case Study：TBT项建模（详见PPT与excel模型）

L22 Corporate Governance

1. Introduction

① Two topics

- Board structure
- Executive compensation

2. Board structure

① Definition

- ▷ Board Size: smaller boards might be inefficient, because directors are too busy; but a larger board might dilute the incentive of the board to produce effort (free-riding problem), and there could be coordination problems.

  历史数据: 5-15人

- ▷ Independent vs executive directors, and outsiders vs insiders: The trade-off between insiders vs outsiders is a function of the importance of advising vs monitoring.

  - Insider: 更了解公司
  - Outsider: 决策更公正无偏

- ▷ CEO-chairman duality: If the CEO is also the chairman of the board, she might have too much power in the company. On the other hand, duality might be an optimal outcome to reward successful CEOs.

- ▷ Staggered boards: A staggered board could prevent hostile takeovers, but also slow down corporate governance changes.

  分期分级董事会制度: 每期都要换走部分的董事会成员.

- Independent directors cannot have a **material relationship** with the company over the prior three years.
- Material relationship is defined as:
  - ▷ Company employee or immediate family member of an executive
  - ▷ Someone (or someone's family member) who receives more than $120K in direct compensation from the company (other than for being a director).
  - ▷ Someone affiliated with the company's auditors
  - ▷ An executive officer of an outside company in which a company executive serves on the compensation committee
  - ▷ A current employee of an outside company which does business in excess of $1M or 2% gross revenue with the company.

② Board

a. Two roles

- Monitoring
- Advisory

b. Two types

- Unitary system
- Two-tiered system

③ Internal governance & External governance

Internal
- Board monitoring
- Compensation contracts
- Tournaments

External
- Regulation
- Market
- Media

To be specific →

- **SEC:** protects the investing public against fraud and stock price manipulation
- **Security analysts:** produce independent valuations of the firms they cover so that they can make recommendations to clients
- **Lenders:** carefully monitor firms to which they are exposed as creditors
- **Employees:** most likely to detect outright fraud because of their inside knowledge
- **Media:** produce separate attention and valuation of the firms they cover so that they can catch the audience's eyes

3. Executive Compensation

① Criteria

Cost = G

- For CEO : Profit_diligent ≥ Profit_not diligent
- For the firm : Profit_diligent CEO ≥ Profit_no CEO

→ Competitor firm's contract value R↑, Compensation↑
→ Cost of being diligent G↑, Δ Compensation $(W_H - W_L)$↑

② Downsides

a. Extra pay for managers

b. Stock price manipulation (如回购，积极信息的公开披露)

- have an incentive to manipulate the release of financial forecasts so that bad news comes out before options are granted (to drive the exercise price down) and good news comes out after options are granted

c. Manager myopic