

1 Introduction

1.1 Goals and governance of the corporation

Investment decisions (capital expenditure CAPEX decisions) & financing decisions

- Investment decision = purchase of real assets: to invest tangible/intangible assets (e.g. R&D)
- Financing decision = sale of financial assets: decide sources and amount of financing

Real assets v.s. financial assets

- Real assets: used to produce goods and services
- Financial assets: financial claims to the income generated by the firm's real assets (shareholders 因为投资了 real assets , 所以他们有 claim 去索要这些 real assets 产生的钱)
 - Equity financing
 - Debt financing
 - Capital structure decision

[**Securities:** financial assets that can be purchased and traded by investors in public markets. (**bank loan** is not except resell to public investors)]

Corporation (private + public)

Definition: distinct, permanent legal entity owned by shareholders

- **Incorporate** means indirect ownership of real assets via financial assets (share of the new corporation)

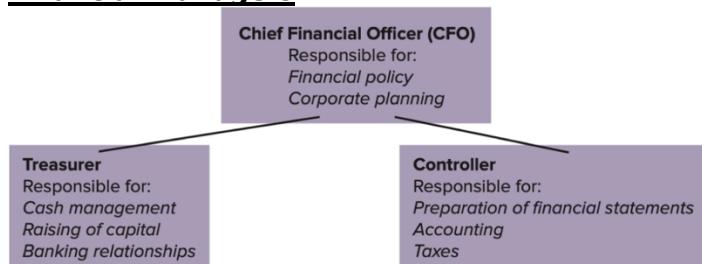
Business organization

Ownership:		
Sole trader	Unlimited liability	No taxes
Partnership	Unlimited liability	No taxes
Limited partnership (Advantage of (tax + liability))	Limited liability (LP), unlimited liability (GP)	No taxes
limited liability partnerships (LLP) /limited liability companies (LLC)	Limited liability for all partners	No taxes
Separation of ownership and management:		
Professional corporation	Limited liability	Taxes, can be sued, cannot vote

Separation of ownership and management:

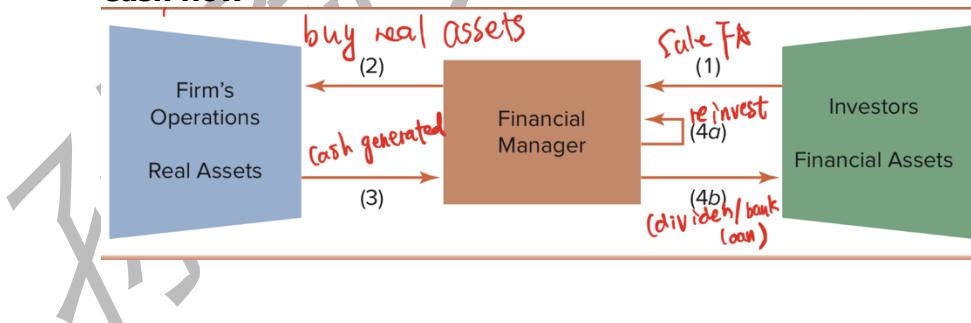


Financial managers



- CFO: supervises all financial functions and set financial strategy
- Treasurer: responsible for financing, cash management, relationships with banks and other financial institutions
- Controller: responsible for budgeting, accounting and taxes

Cash flow



Goals of the corporation

Shareholder wants managers to maximize the **market value** of the corporation (not **profits, which damage long-term value**)

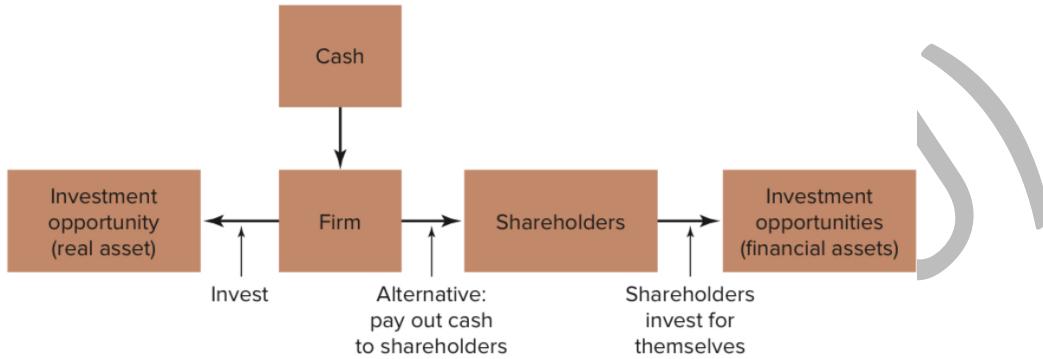
[Market value = equity share number * equity value]

Opportunity costs of capital / hurdle rate

- The minimum acceptable rate of return on investment projects

- Set by the return rate for investor to invest the cash for themselves in the financial markets

A general principle: a corporation should direct cash to investments that *add market value*, compared with investments shareholder could make on their own. (direct to real assets, if return on real assets > return on financial assets)



Future rate of return on investment projects will be calculated (Chapter 8,9). Opportunity cost of capital for shareholders' safe investment (debt securities) could be checked; for risky investment (e.g. stocks) has to be estimated (Chapter 11)

Agency problems

Definition: Managers (agents) make their own interest while stockholders want them to make interest for the corporation

Agency costs: Value lost from (agency problems + the cost of mitigating agency problems)

Stakeholders: people who share a pie in the corporation (e.g. workers, managers, stockholders)

Executive compensation

Package = a fixed base salary + annual award tied to earnings + other measures (stocks, options)

Well-designed compensation can alleviate agency problems but the not-well-designed even rewards manager when value is destroyed

Corporate governance (breaks down or works properly)

Good corporate governance (alleviate agency problems)

1. Well-designed management compensation packages
2. Legal requirement
 - Laws, regulation, institutions
3. Board of directors
 - Elected by shareholders, represents their interests
 - Appoint CEO/CFO
 - Approve important financial decisions
 - Passive supporters of top management
 - Independent with management

4. Activist shareholders
 - Shareholders monitor management more actively
 - **Blockholders:** own over 5% shares
 - Shareholders' leaving will drop the stock price
5. Takeovers
6. Transparent information for investors
 - Corporations can generate extra scrutiny from the falling stock price if its information (profitability, prospects) is transparent

Ethics of maximizing value

Ethical issues in discussions for finance

- **Short-selling:** expects securities to decrease, borrow securities, selling for cash, then buy the securities when their price is low to pay off securities
- **Corporate raiders:** buy companies, takes them apart, sell them bits > they pay for the total package
- **Tax avoidance**

1.2 Financial markets & institutions

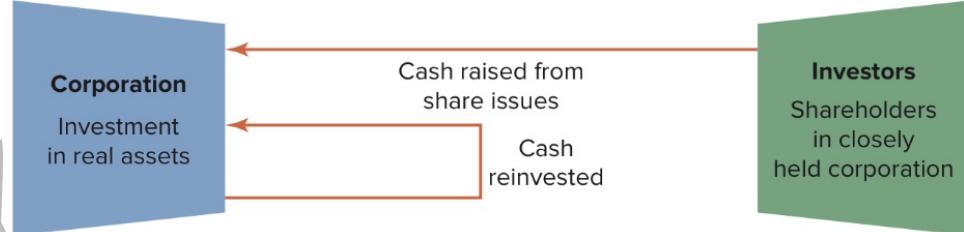
The importance of financial markets and institutions

Businesses must go to *financial markets and institutions* for the financing they need to grow, a modern financing system will offer financing concerning the 1. company's age, 2. growth rate, and 3. the nature of the company.

The flowing of savings to corporations

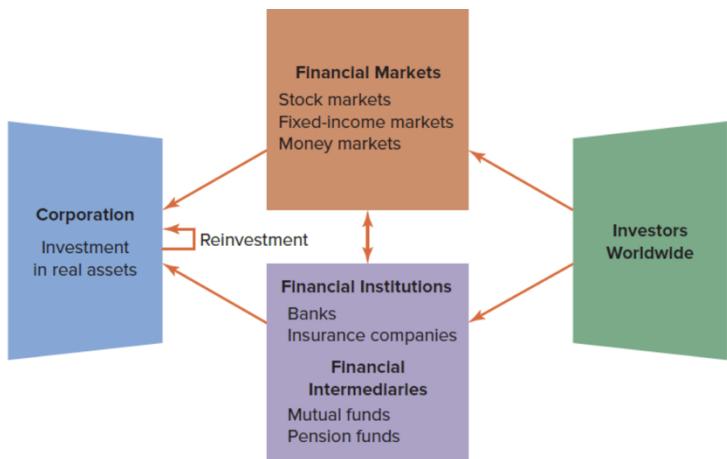
The money that corporations invest in real assets comes **ultimately** from saving by investors.

For small, closely held corporations:



[Cash reinvested]: cash could have been paid to shareholders for their own consumption.

For large corporations:



Financial market: where securities are issued and traded

1. [primary market]: the market for the sale of new securities by corporations.
[NYSE(New York Stock Exchange)]: a organized exchange where corporations issue shares. (where IPO occurs)
2. [secondary market]: the market in which previously issued securities are traded among investors.
3. [stock market / equity market]: stockholders own common equity of the company
4. [Fixed-income markets]: the market for debt securities
5. [Capital market]: markets for long-term debt and equity finance
6. [money market]: market for short-term financing (e.g. commercial paper, which is debt with maturity no more than 270 days)
7. The foreign exchange market
Markets for corporations engaging in international trade transferring money back and forth between *dollars and other currencies*. Trade over the counter.
[OTC (over the counter): non-centralized market]
8. The commodities market
Dozens of commodities exchanged in organized exchanges
9. The market for options and other derivatives
Derivatives are securities whose payoffs depend on the prices of other securities or commodities. (e.g. options: payoff depends on the IBM share on future date; future contract: payoff depends on price of commodities)

Financial intermediary: an organization raising money for corporations, individuals, other organizations from investors

[difference between financial intermediary & manufacturing corporations]: 1. they raise money from different ways 2. they invest that money on financial assets (corporations on real assets)

1. **Mutual fund:** investment company (no taxes, selling shares to its investors, investors pay personal tax), pools savings from investors and invests in a portfolio of securities
 - o **Open-end:** issue shares and pay back share when investors enter and exit
 - o **Close-end:** fixed-number of shares, and investors need to buy from others

[Pros]: low-cost diversification and professional management



2. **Hedge fund:** private investment fund that pursues complex, high-risk investment strategies

[difference between mutual fund]: 1. restrict to knowledgeable investors 2. charge investors performance-related fees 3. manage less money but take big position and large impact.
3. **Pension fund:** a percentage of a man's paycheck is contributed to the pension fund (e.g. %5), the amount available for retirement depends = (accumulated contribution + return)

[defined-contribution plan v.s. defined-benefit plan]:

- DC:** investors let the employees themselves choose the strategy and they take the risk.
- DB:** the firm promises to pay employees a fixed amount of money after retirement, firms take risk.

Financial institutions

A financial institution not only invest in securities, but also lend money directly to individuals, businesses, other organizations



1. **Commercial banks:** provides debt financing for corporations, provides for depositors to park money safely and withdraw it as needed

[they are major sources of loan for corporations]
2. **Investment banks:**
 - o advises, assists banks to obtain finance
 - o underwrite stock offerings by purchasing new shares from corporations and resell to investors
 - o advice takeovers, mergers, acquisitions
 - o run trading desks for foreign exchange, commodities
 - o invest own money in start-ups, other ventures.

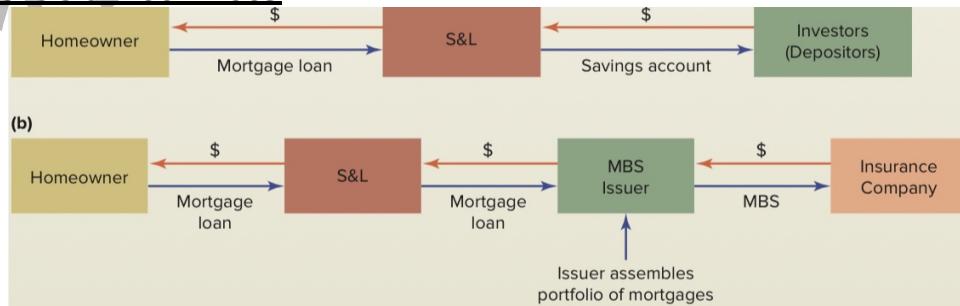
3. Insurance companies

- More important than banks in financing: always make long-term loan with corporations
- Money source: sale of insurance policies
- Must charge enough to 1. cover selling and administrative costs 2. pay policyholders' claims 3. pay stockholders' profit

Functions of financing market and intermediaries

- 1. Transporting cash across time:** transport current income to future when needed (pension fund, insurance policy), (transfer money to future rainy day when needed by depositing) (transport future expenditure today when needed by loan)
- 2. Risk transfer and diversification:** Financial markets and intermediaries allow investor to reduce and reallocate risk.
 - **Insurance company:** average out your risk
 - **ETFs:** exchange-traded funds are portfolio of stock which matches market indexes (which is different from closed-end funds, as CEFs are not indexes, but more complex portfolios)
 - **Commodities markets:** future contract
- 3. Liquidity:** the ability to turn the investment back into cash when needed (illiquid loan to liquid deposit)
 - Deposits
 - Shares of public companies
 - Foreign exchange markets
- 4. The payment mechanism**
Checking accounts, credit card, electronic transfers allow individuals and firms to send and receive quickly over long distances
- 5. Information provided by financial markets**
 - Commodity prices (use it to determine whether to lock in prices)
 - Interest rate (for bond etc.)
 - Company values: stock prices sometimes summarize the situation of the company
 - Opportunity cost of capital: expected rate of return of financial assets with the same level of risk.

The crisis of 2007-2009



1.3 Accounting and finance

Balance sheet

Features:

- Marketable securities belong to current asset
- Net assets = shareholders' equity
- Net working capital = current asset - current liability

Common-size balance sheet: all items are expressed as a percentage of total assets

Assets	End of Fiscal		Liabilities and Shareholders' Equity		End of Fiscal	
	2017	2016			2017	2016
Current assets			Current liabilities			
Cash and marketable securities	8.1%	5.9%	Debt due for repayment		6.2%	2.9%
Receivables	4.4%	4.7%	Accounts payable		16.3%	16.3%
Inventories	28.6%	29.2%	Other current liabilities		13.9%	13.7%
Other current assets	1.4%	1.4%	Total current liabilities		36.4%	32.9%
Total current assets	42.5%	41.3%				
Fixed assets			Long-term debt		54.5%	52.0%
Tangible fixed assets			Other long-term liabilities		5.9%	5.0%
Property, plant, and equipment	93.0%	94.1%	Total liabilities		96.7%	89.9%
Less accumulated depreciation	43.4%	43.1%				
Net tangible fixed assets	49.6%	51.0%	Shareholders' equity:			
Intangible asset (goodwill)	5.1%	4.9%	Common stock and other paid-in capital		21.8%	21.0%
Other assets	2.8%	2.9%	Retained earnings		89.7%	82.7%
			Treasury stock		-108.2%	-93.5%
			Total shareholders' equity		3.3%	10.1%
Total assets	100.0%	100.0%	Total liabilities and shareholders' equity		100.0%	100.0%

Book value and market value

- Book values are base on original/historical values; market values measure current values of assets and liabilities.
- Stock price = market value of shareholders' equity/the number of outstanding shares [which are stocks currently held by shareholders]

The income statement

Common-size income sheet

	\$ Million	% of Sales
Net sales	100,904	100.0%
Cost of goods sold	66,548	66.0%
Selling, general & administrative expenses	17,864	17.7%
Depreciation	1,811	1.8%
Earnings before interest and income taxes (EBIT)	14,681	14.5%
Interest expense	983	1.0%
Taxable income	13,698	13.6%
Taxes	5,068	5.0%
Net income	8,630	8.6%
Allocation of net income		
Dividends	4,212	4.2%
Addition to retained earnings	4,418	4.4%

EBIT: earnings before interest and income taxes

Income v.s. cash flow

- **Depreciation:** to calculate the cash produced by the company, we need to profits (income) + depreciation (non-cash payment) - the expenditure on new capital equipment (cash payment).
- **Accrual accounting & cash accounting:** revenue, expense are recognized when sales are made, rather than when the cash outflow/inflow.

Period:	1	2
Cost of goods sold (income statement)	0	60
+ Investment in inventories (balance sheet)	60	-60
= Cash paid out	60	0

Period:	2	3
Sales (income statement)	100	0
- Investment in receivables (balance sheet)	100	-100
= Cash received	0	+100

The statement of cash flows (cash receipt and cash payment over a period of time)

- Cash flow of operations
Net income + depreciation + total change of working capital (except cash) + stock-based compensation expense (原本算在 expense 里，现在也要 add back 回来)
- Cash flow of investment (e.g. plant and equipment)
- Cash flow of financing activities (e.g. sale of new debt or stock)

Free cash flow (FCF):

= interest paid to creditors + cash available for shareholders (不是指一定要分给 shareholders , 而是指能够分的) - cash to pay for new investment
= cash available for distribution for investors - pays for investment

Accounting practice and malpractice

- **Revenue recognition:** recognize sales in advance
- **Cookie-jar reserves:** use in-case reserves in bad years
- **Off-balance sheet assets and liabilities:** accounting misbehaviors

Taxes

Corporate tax

Taxable income: expenses, interest paid to debt holders are deductible, but dividend is not deductible.

Personal tax

Marginal tax rate: additional taxes owed per dollar of additional income

Average tax rate: total taxes / total income

(U.S. still taxes on investment earnings (e.g. dividend, capital gain (股票卖出和原价之间的差价所得 called capital gain))

1.4 Measuring corporation performance

Financial ratios

Market capitalization:

= share price * number of shares outstanding

Performance measures

- **Market value added** = $market\ value - book\ value$
- **Market-to-book ratio** = $\frac{market\ value\ of\ equity}{book\ value\ of\ equity}$

[Attention]:

- i. firm repurchase will decrease the book values? (因为对 firm 来说, cash 下降, equity 下降)
- ii. Market value added may be large because of firm's large scale, market-to-book ratio is more revealing

[Disadvantages of market value]:

- i. It's expectation about future performance
- ii. It may be affected by outer risks and noise, thus may not truly reflect management's performance
- iii. It can only reflect as a whole, not within the company of different departments

Profitability measures

- **Economics value added (EVA/residual income)**
= $profit\ (after\ deducting\ all\ costs,\ including\ cost\ of\ capital) = interest * tax + net\ income - cost\ of\ capital$
 - Total capitalization/long-term capital = long-term debt + shareholders' equity
 - Cost of capital = total capitalization * WACC
 - WACC (weighted average cost of capital): average all kinds of capital * percentage of cost of capital
- **Return on assets (ROA)**
= $\frac{after\ tax\ operating\ income}{total\ assets}$
- **Return on capital (ROC)**
= $\frac{after\ tax\ operating\ income}{total\ capitalization}$

[After tax operating income = net income + after-tax interest (因为 interest 不属于 operating 里面的)]
- **Return on equity (ROE)**
= $\frac{net\ income}{equity}$

Efficiency measures

- **Asset turnover** (how hard the firm's assets are working)

$$= \frac{\text{sales}}{\text{total assets}}$$

- **Receivables turnover**

$$= \frac{\text{sales}}{\text{receivables at start of year}}$$

- **Average collection period** (average length of time to for customers to pay the bill) (days)

$$= \frac{\text{receivables at start of year}}{\text{average daily sales}}$$

- **Inventory turnover**

$$= \frac{\text{cost of goods sold}}{\text{inventory at start of year}}$$

- **Average Days in inventory** (sufficient inventory to maintain operation for x days) (days)

$$= \frac{\text{inventory at the start of the year}}{\text{daily cost of goods sold}}$$

- **Profit margin**

$$= \frac{\text{net income}}{\text{sales}}$$

- **Operating profit margin**

$$= \frac{\text{after-tax operating income}}{\text{sales}}$$

Leverage measures

- **Long-term debt ratio**

$$= \frac{\text{long-term debt}}{\text{long-term debt} + \text{equity}}$$

- **Long-term debt-equity ratio**

$$= \frac{\text{long-term debt}}{\text{equity}}$$

- **Debt-to-equity ratio**

$$= \frac{\text{total liabilities}}{\text{equity}}$$

- **Total debt ratio**

$$= \frac{\text{total liabilities}}{\text{total assets}}$$

- **Times interest earned**

$$= \frac{\text{EBIT}}{\text{interest payments}}$$

How much earnings can cover the interest (moderate as 2 or 3, higher will be considered as conservative)

- **Cash coverage ratio**

$$= \frac{EBIT + \text{depreciation}}{\text{interest payments}}$$

How much cash can cover the interest

Liquidity measures

- **Net working capital to assets**

$$= \frac{\text{net working capital}}{\text{total assets}}$$

- **Current ratio**

$$= \frac{\text{current assets}}{\text{current liabilities}}$$

- **Quick ratio**

$$= \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$$

- **Cash ratio**

$$= \frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}}$$

The Du Pont system

$$\begin{aligned}\text{Return on assets} &= \frac{\text{after-tax operating income}}{\text{assets}} \\ &= \frac{\text{sales}}{\text{assets}} * \frac{\text{after - tax operating income}}{\text{sales}} \\ &= \text{asset turnover} * \text{operating profit margin}\end{aligned}$$

2 Value

2.1 the time value of money

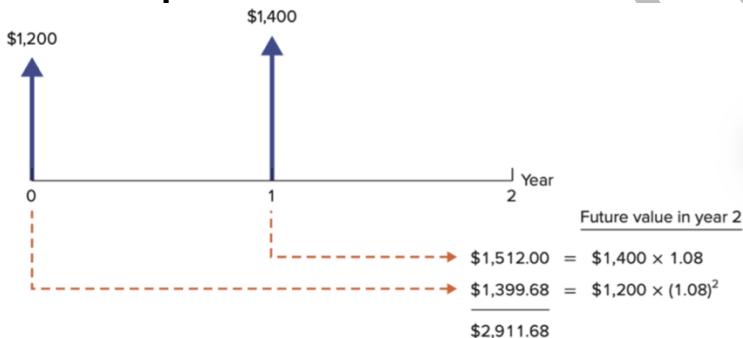
Compound interest, future values and present values

- Compound interest: interest earned on interest
- Simple interest: interest only earned on original investment
- Future value (FV): the amount (original + earning interest)
- Present value (PV): how much we invest today to produce future value
- Discount cash flow (DCF): calculate PV by discounting future cash flow
- Discount rate: interest rate used in DCF

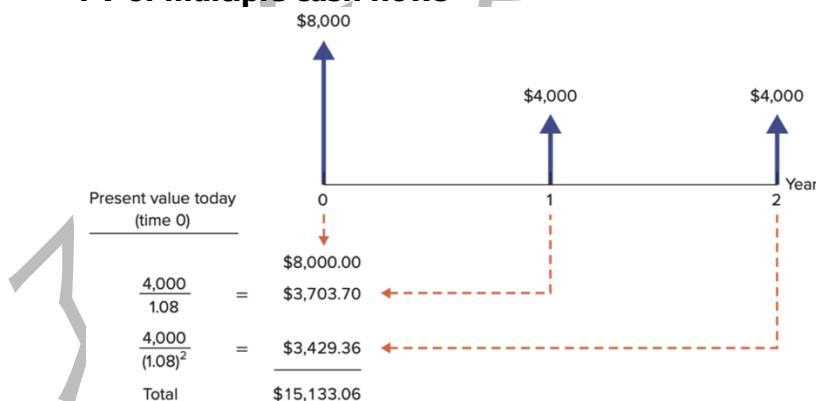
$$PV = \frac{FV \text{ after } t \text{ periods}}{(1+r)^t}, \text{ discount factor: } \frac{1}{(1+r)^t}$$

Multiple cash flow

• FV of multiple cash flows



• PV of multiple cash flows



Financial calculators



n is the number of periods

i: interest rate

PMT (payment): the amount of recurring payment

Rule: the fifth can be calculated if given the other known four.

Spreadsheet

$$FV = FV(i, n, pmt, PV)$$

$$PV = PV(i, n, pmt, FV)$$

SPREADSHEET 5.1 Using a spreadsheet to find the future value of \$24

	A	B	C
1	Finding the future value of \$24 using a spreadsheet		
2	INPUTS		
3	Interest rate	0.08	
4	Periods	393	
5	Payment	0	
6	Present value (PV)	-24	
7			Formula in cell B8
8	Future value	\$327,904,327,346,904	=FV(B3,B4,B5,B6)
9			
10	Notice that we enter the present value in cell B6 as a negative number,		
11	because the "purchase price" is a cash outflow. The interest rate in cell B3		
12	is entered as a decimal, not a percentage.		
13			
14			

Attention:

- Interest rate is decimal not percentage
- Money inflow is positive, money outflow if negative

Perpetuity and annuity

Perpetuity: stream of cash payments that never ends

- Cash payments (C) = interest rate (I) * present value (PV) (original value)
- present value (PV) = Cash payments (C) / interest rate (I) = $1/r$

【一次性投入，然后待在 perpetuity 体系里面，每年拿钱】

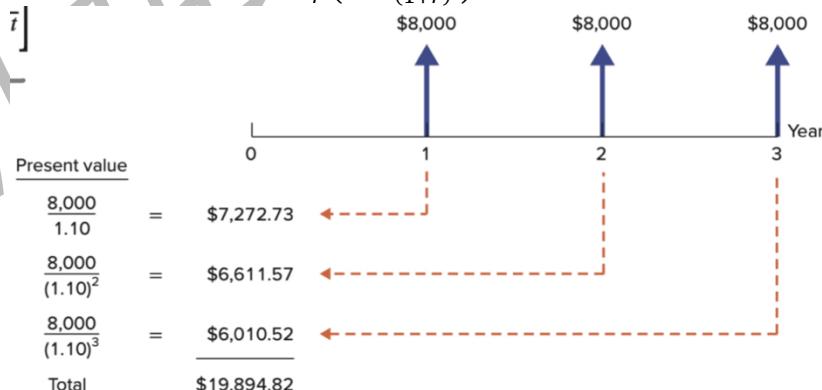
Annuity: cash flows at regular intervals with finite maturity

【每年都定期 inflow/outflow 钱，待在 interest 体系里】

1. PV of annuity

PV of t-year period = payment(PMT) * annuity factor

$$\text{Annuity factor: } \frac{1}{r} \left(1 - \frac{1}{(1+r)^t}\right)$$

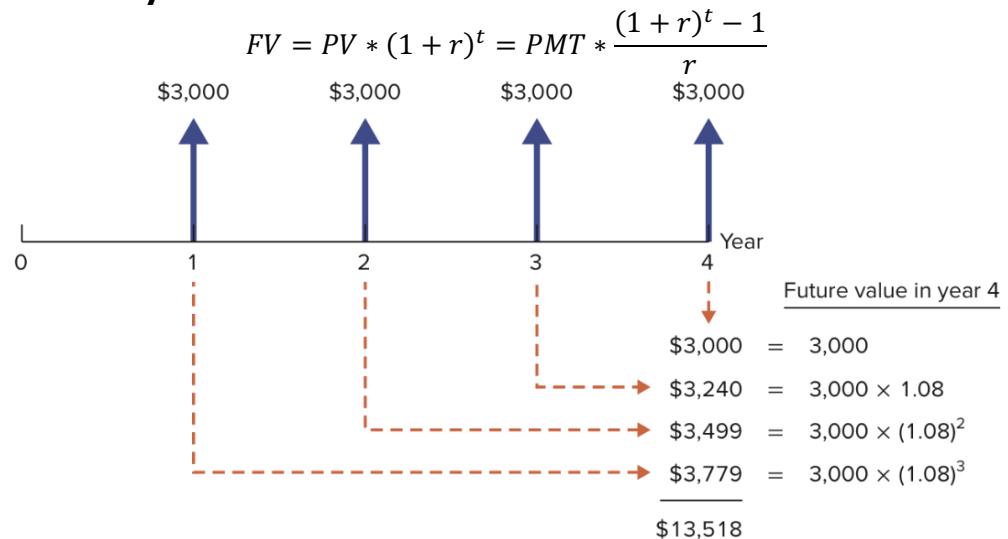


Application

- **Saving for retirement** (save at first, then get annually for consumption)
- **Home mortgages**

Annual payment = interest paid + amortization
 (Bank first lend you money, and you repay annually afterwards)

2. FV of annuity

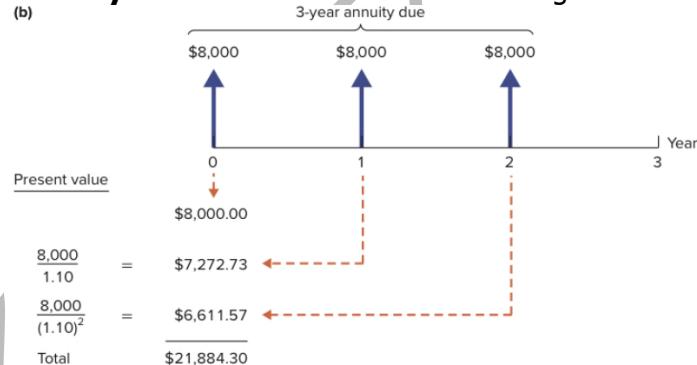


Application

- **Saving for retirement** (save annually and get the set total in final year)

Annual interest rates

Annuity due: stream of cash flow starting **immediately**



PV of annuity due = PV of ordinary annuity * (1+r)

FV of annuity due = FV of ordinary annuity * (1+r)

Effective annual interest rate

Effective annual interest rates: annualized using compound interest (because there are interest rates for days, months, years)

- $(1 + \text{monthly rate})^{12} - 1$

Annual percentage rate (APR): annualized using simple interest

- $\text{month} * \text{monthly simple interest rate}$

Effective annual interest rate & APR

- Effective annual interest rate = $\left(1 + \frac{APR}{m}\right)^m - 1$

Inflation and the time value of money

Real v.s. Nominal cash flow

CPI is used to measure inflation

[Nominal 和 Real 的区别就来自于 inflation 的影响]

- **Nominal dollar:** actual number of dollars of the day
- **Real dollar:** amount of purchasing power

Inflation and interest rate

- **Nominal interest rate:** rate actual money invested grows
- **Real interest rate:** rate of purchasing power grows

$$\text{real interest rate} = \frac{1 + \text{nominal interest rate}}{1 + \text{inflation rate}} - 1$$

$$\text{real interest rate} \approx \text{nominal interest rate} - \text{inflation rate}$$

Valuing real cash payments

Rule:

Nominal dollar cash flows must be discounted by the nominal interest rate;
real cash flows must be discounted by the real interest rate. And we can get
the same result for present value of cash flows.

PV = nominal dollars (future not present) / nominal interest rate = real dollars
(today) / real interest rate

2.2 valuing bonds

Bonds and the bond market

Bond/notes/debentures

Definition: Security, obligate issuer to make specified payments to the bondholder

Characteristics:

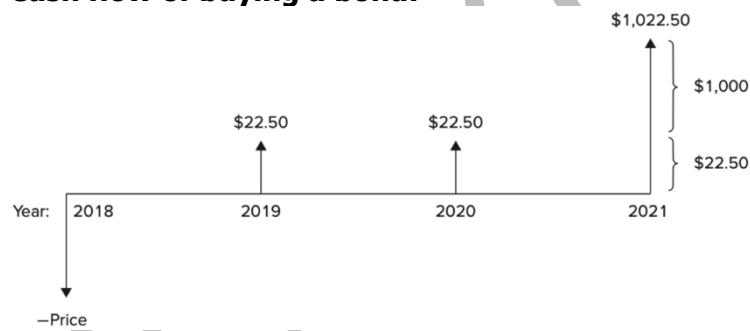
- face value/principal/par value: payment at the maturity of bond
- Coupon: interest payment to the bondholder.

Bond market

Maturity	Coupon %	Bid %	Asked %	Change in Asked %	Asked yield to maturity (%)
15-Feb-2020	1.375	98.3281	98.3438	-0.0078	2.228
15-Feb-2021	2.25	99.5781	99.5938	0.0313	2.391
15-Feb-2025	7.625	130.6719	130.6875	0.1094	2.770
15-Feb-2029	5.25	121.8516	121.9141	0.2344	2.908
15-Feb-2036	4.5	120.9063	120.9688	0.5313	2.986
15-Feb-2041	4.75	127.2422	127.3047	0.6641	3.084
15-Feb-2048	3	97.2656	97.2969	0.7266	3.140

- **Face value:** 1000
- **Coupon:** x% of face value to be paid to the bondholder
- **Bid:** the selling price
- **Asked:** the buying price
- **Asked yield to maturity:** the rate of return if hold until maturity
- **Feature:** If the present value < face value: selling at a discount; present value > face value: selling at a premium

Cash flow of buying a bond:



Bond price and interest rate

Present value of the bond (which is also the bond price)

Maturity	Coupon %	Bid %	Asked %	Change in Asked %	Asked yield to maturity (%)
15-Feb-2020	1.375	98.3281	98.3438	-0.0078	2.228
15-Feb-2021	2.25	99.5781	99.5938	0.0313	2.391

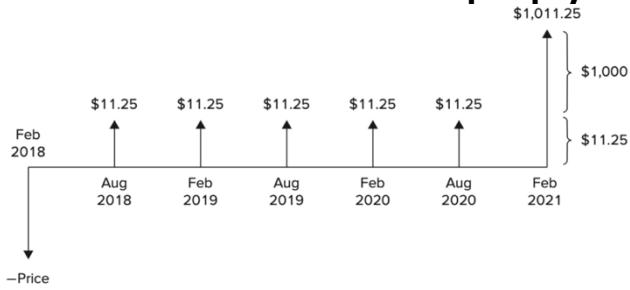
$$\begin{aligned}
 PV &= \frac{\$22.50}{(1 + r)} + \frac{\$22.50}{(1 + r)^2} + \frac{\$1,022.50}{(1 + r)^3} \\
 &= \frac{\$22.50}{(1.02391)} + \frac{\$22.50}{(1.02391)^2} + \frac{\$1,022.50}{(1.02391)^3} = \$995.96
 \end{aligned}$$

Financial calculator

n	i	PV	PMT	FV
Inputs	3	2.391	22.50	1000
Compute			-995.96	

- Consists of PMT 22.5 and FV 1000 as the final payment

Present value under semiannual coupon payments



$$\begin{aligned}
 PV &= \frac{\$11.25}{(1.011955)} + \frac{\$11.25}{(1.011955)^2} + \frac{\$11.25}{(1.011955)^3} + \frac{\$11.25}{(1.011955)^4} \\
 &\quad + \frac{\$11.25}{(1.011955)^5} + \frac{\$1,011.25}{(1.011955)^6} \\
 &= \$995.94
 \end{aligned}$$

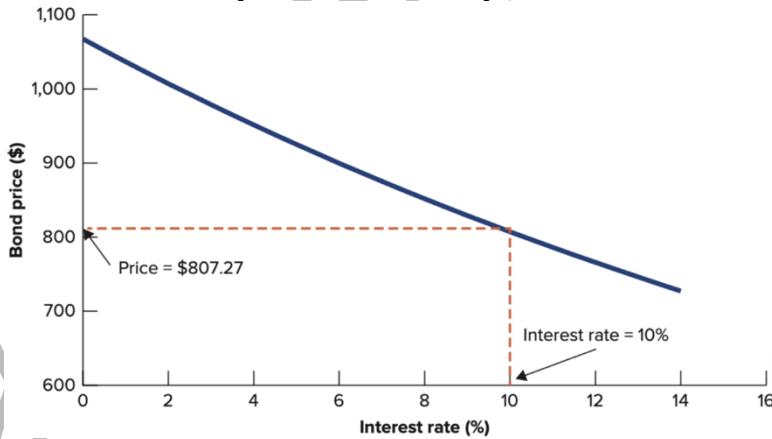
Bond price with interest rate & coupon rate

- a. If market interest rate = coupon rate, bonds sell for its face value
- b. If the market interest rate < coupon rate, bonds sell for more than face value
- c. If the market interest rate > coupon rate, bonds sell for less than face value

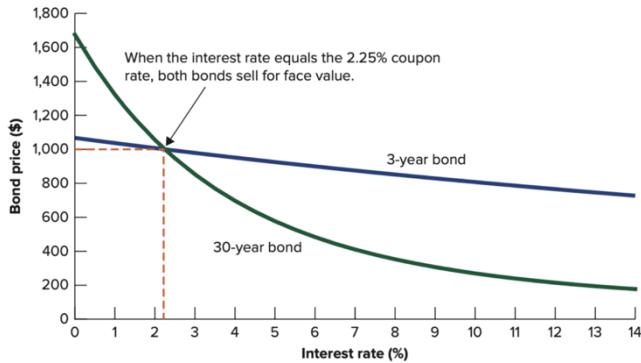
$$PV \text{ at } 2.25\% = \frac{\$22.50}{(1.0225)} + \frac{\$22.50}{(1.0225)^2} + \frac{\$1,022.50}{(1.0225)^3} = \$1,000.00$$

[Attention]: the change of interest rate impacts present value of bond, but not the payments themselves.

Interrelationship between bond price and interest rate



Interrelationship between short-term and long-term bond



Explanation: if you buy 3-year and interest increases, then you only have to take a loss for several year, which is far less than 30 years.

Yield to maturity

(The **YTM** is merely a snapshot of the return on a bond)

Current yield (for bondholder) = $\frac{\text{annual coupon payment}}{\text{bond price (asked price)}}$ (ignores bond price changes (i.e. capital gain/loss), don't measure the total rate of return)

Yield to maturity (anticipated value)

Take account of both income and bond price change

Definition1: it's the discount rate which let the bond price = PV

Definition2: it's the rate of return every year if hold it to maturity

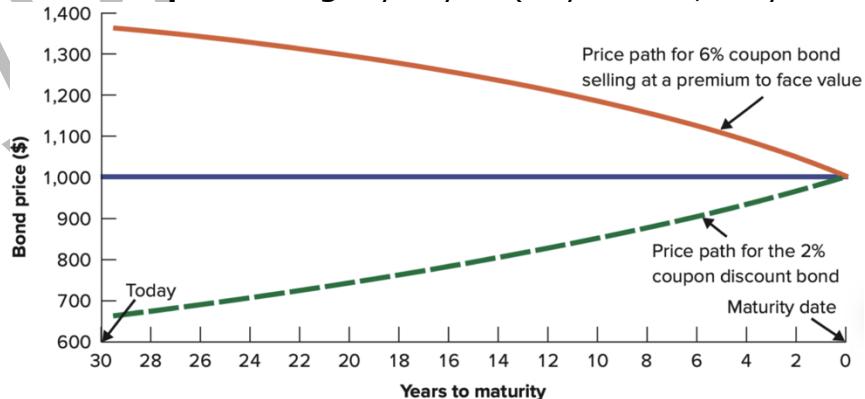
Rate of return during a particular period

Rate of return = coupon income / investment + price change / investment

After buying the bond:

- If interest rate decreases, bond price increases, then rate of return > YTM
- If interest rate increases, bond price decreases, then rate of return < YTM

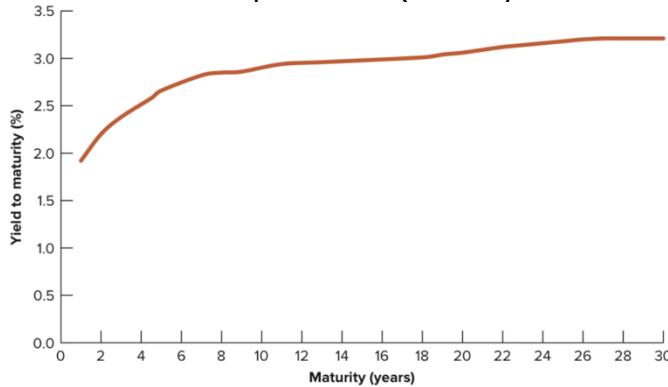
How bond price changes yearly for (30-year bond, 4% yield to maturity)



Yield curve

Treasury strips: the bonds do not have coupon payment and just have the final repayment.

Yield curve: relationship between (maturity time & YTM)



Reasons of not choosing long-term bonds

- Price fluctuates more violently
- More likely to profit from higher interest rate (sell, but rebuy in low price)

Nominal and real interest rate

$$\text{real interest rate} = \frac{1 + \text{nominal interest rate}}{1 + \text{inflation rate}} - 1$$

TIPS: Treasury Inflation Protected Securities

If 3% coupon, 2-year TIPS, then real cash flow \$30 per year, and final payment \$1000

Corporate bonds and the risk of default

Default risk/credit risk: the risk that a bond issuer may default on

Default premium: yield on corporation bonds - yield on US Treasury bond (same coupon and maturity)

Investment grade (BBB and above) & **speculative grade/high yield/junk bonds** (below BBB)

Protecting against default risk

- a. Seniority: hold senior claim (priority over other claims)
- b. Security: a claim on assets or collateral
- c. Protective covenants: limit the issuing of new bonds (debt in moderation is suitable for firms)

2.3 valuing stocks

Stocks and the stock market

Common stock: ownership shares in public held corporations

Initial public (primary) offering (IPO): first offering of shares to the public

Primary market: markets for the sale of new securities issued by corporations
Secondary market: markets where previously issued securities are traded among investors

Limit order book: record the bid and asked price from best to worst

FedEx Corporation (FDX) - NYSE

Top of Order Book, 1:04 PM EST

Bid	Settle Price	Ask	Buy Price
Price	Size	Price	Size
239.81	100	240.06	100
239.80	400	240.16	100
239.70	100	241.02	100
239.33	100	241.14	100
230.03	100	241.23	500

best to worst ↓

limit order book

Trading information

FedEx Corporation (FDX)

NYSE - Nasdaq Real Time Price. Currency in USD

★ Add to watchlist

239.98 **-9.04** **(-3.63%)**

As of 1:02PM EDT. Market open.

Summary	Chart	Conversations	Statistics	Profile	Final
Prev Close: 249.02	Market Cap: 64.318B				
Open: 246.00	Beta: 1.57				
Bid: 239.98 × 100	PE Ratio (TTM): 22.11				
Ask: 240.10 × 100	EPS (TTM): (Trailing 12 months) 10.86				
Day's Range: 236.00–246.00	Earnings Date: Mar 19, 2018–Mar 23, 2018				
52wk Range: 182.89–274.66	Forward Dividend & Yield: 2.00 (0.80%)				
Volume: 2,359,358	Ex-Dividend Date: Div per share N/A				
Avg. Volume: 1,866,076	Stock price per share: N/A				
	1y Target Est: 284.69				

Market values, book values, and liquidation values

- **Book value (of equity):** the value in the firm's balance sheet
 - **Book value per share:** book value of equity / number of outstanding shares
- **Liquidation value:** the value of selling all assets - the money for paying off creditors
 [not market values because successful company will value more than liquidation value]
- **Market value/market capitalization (going-concern value)**
 - Treat the firm as a going concern and has going-concern value
 - Extra earning power
 - Intangible assets
 - Values of future investments
 - Share price: market value / number of outstanding shares

Growth stock: stock of growing company (e.g. Amazon)

- Their market-to-book values are high because of their expected profitability on new investments

Income stock: stock of company that has constrained growth (e.g. Con Ed)

- Their market-to-book values are low because their values mostly depend on its existing assets

Valuing common stocks

Market-to-book ratio: market value / book value

Price-earnings ratio (P/E ratio): stock price (per share) / earnings (per share)

Bond & stock:

- Coupon payment each year + final payment of face value (specified)
- Dividend each year + final payment of stock price (not specified)

Valuation by comparables

Identify similar firms and compare the firm with these similar firms about market-to-book ratio and price-earnings-ratio.

	Market-to-Book Value Ratio		Price-Earnings Ratio	
	Company	Industry	Company*	Industry
FedEx	3.8	7.3	14.4	22.6
Johnson & Johnson	6.2	4.9	14.9	23.9
Campbell Soup	7.4	2.9	13.4	27.0
PepsiCo	15.4	10.0	17.6	27.3
Walmart	3.8	4.0	16.9	19.6
Microsoft	8.4	6.6	23.7	60.8
Amazon	20.4	9.4	97.2	46.6
DowDuPont	1.6	3.5	13.7	13.5
American Electric Power	2.0	1.9	15.9	21.0
US Steel	2.1	2.3	8.2	27.8

$$\text{Intrinsic value } (V_0) = PV = \frac{(DIV_1 + P_1)}{(1 + r)} \text{ (for one-period)}$$

P_1 : predicted stock price after 1 year

DIV_1 : dividend after 1 year

r : discount rate (for a particular level of risk: higher risk, higher r)

Definition: PV of the cash payoffs anticipated by investors in the stock

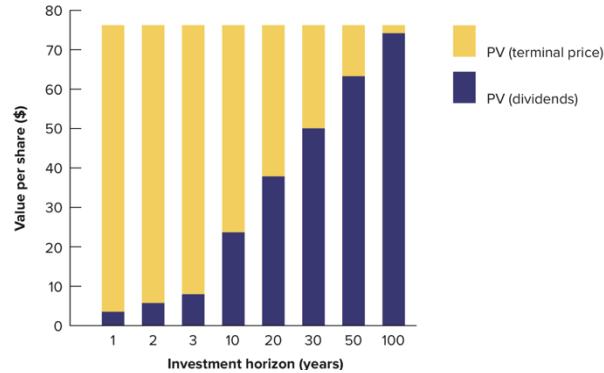
$$\text{Expected return} = \frac{DIV_1 + P_1 - P_0}{P_0} = r \text{ (when stock at fair price i.e. Intrinsic value)}$$

The dividend discount model

Assumption: the value of stock should have the same PV, even the time horizon is different (terminated price is determined by expected dividend: longer, more dividend, less terminated price)

- **With time horizon:**

$$P_0 = \frac{DIV_1}{1 + r} + \frac{DIV_2}{(1 + r)^2} + \dots + \frac{DIV_H + P_H}{(1 + r)^H}$$



○ **Without time horizon:**

$P_0 = PV$ (no terminated price, all future dividends per share)

Simplifying the dividend discount model

Case1 (perpetuity): dividend with no growth (all earnings paid as the dividend)

Assumption: constant dividend DIV_1

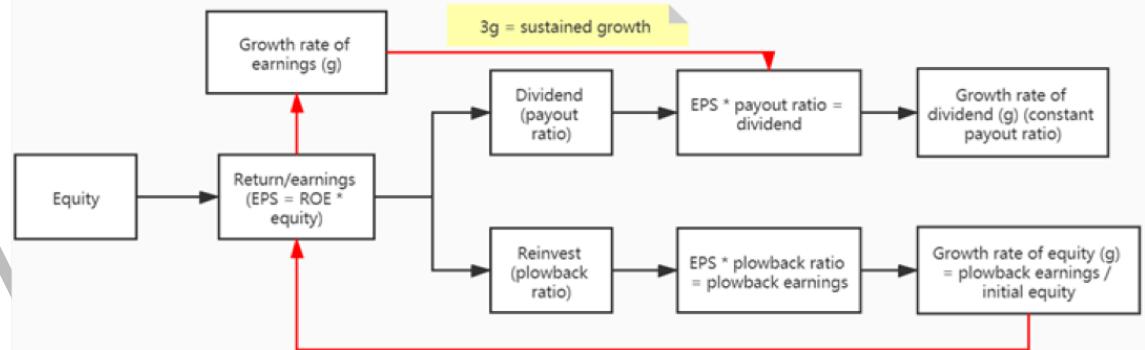
$$P_0 = \frac{DIV_1}{r} = \frac{EPS_1}{r}$$

Case2 (Gordon growth model): dividend with constant growth (g)

$$P_0 = \frac{DIV_1}{1+r} + \frac{DIV_1(1+g)}{(1+r)^2} + \frac{DIV_1(1+g)^2}{(1+r)^3} + \dots$$

$$P_0 = \frac{DIV_1}{r-g} = \frac{DIV_0 * (1+g)}{r-g}$$

Estimation of g



- Payout ratio: $\frac{\text{paid-out as dividend}}{\text{total earnings}}$
- Plowback ratio: $\frac{\text{earnings retained in the firm}}{\text{total earnings}}$
[payout ratio + plowback ratio = 1]

$$g = \frac{\text{plowedback earnings}}{\text{initial equity}} \quad (1)$$

$$= \frac{\text{plowedback earnings}}{\text{total earnings}} \text{ (plowback ratio)} * \frac{\text{total earnings}}{\text{initial equity}} \text{ (ROE)}$$

1. Growth rate in book equity (g) = $\frac{\text{plowedback earnings}}{\text{initial equity}}$
2. If ROE is constant, then growth rate of earnings = growth rate in book equity = g
($\text{EPS} = \text{ROE} * \text{book equity per share}$)
3. If payout ratio is constant, then increase rate of dividend = g
 - Thus if ROE & payout ratio is constant, then growth of book value, earnings, dividend is the same, = **sustainable growth rate**

Plowing back does not necessarily increase stock price:

- The stock price of no-growth ($g = 0$) == the price of constant-growth when $\text{ROE} = \text{required rate of return } (r)$ ($g = \text{ROE} * \text{plowback ratio}$)
- Only when $\text{ROE} > r$, then the value added.
- Firm performance \neq growth rate in EPS (book value of equity/share * ROE, ROE MUST $> r$)

PVGO

Value of assets in place	\$19.82
+ Present value of growth opportunities (PVGO)	18.40
= Total value of Aqua America's stock	\$38.22

PVGO: PV of growth opportunities

Thus P/E ratio: indicator of growth opportunity (unless E is very small)

Case3: with non-constant growth rate

The growth is constant until year H

$$P_0 = \underbrace{\frac{\text{DIV}_1}{1+r} + \frac{\text{DIV}_2}{(1+r)^2} + \cdots + \frac{\text{DIV}_H}{(1+r)^H}}_{\text{PV of dividends from year 1 to horizon}} + \underbrace{\frac{P_H}{(1+r)^H}}_{\text{PV of stock price at horizon}}$$

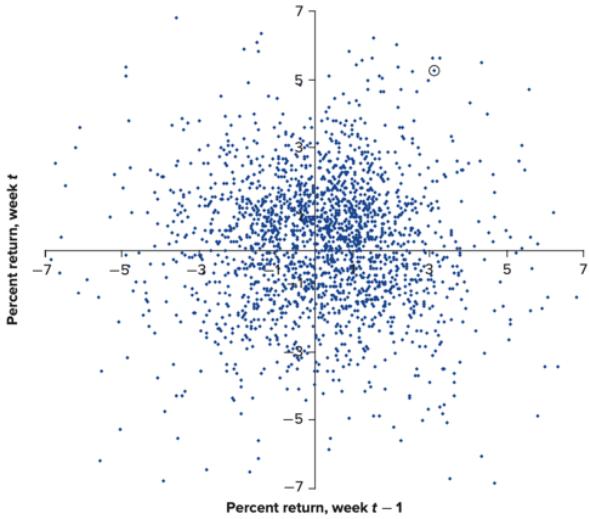
DCF analysis and dividend discount model

If business is public firm, and with no other assets and operations, all FCFs are paid as dividends, then dividend = FCFs / shares

Share price = market value of firm / total shares

No free lunches on wall street

Random walk: changes in stock price cannot be predicted from previous changes in stock price



Efficient market hypothesis: the price has reflected all available information, thus the price is exactly the intrinsic value.

- **Weak form:** history prices are contained in the stock price (because random walk of price, it's impossible to make prediction)
- **Semi-strong form:** all public prices are contained in the stock price (history prices, annual reports etc.)
- **Strong form:** all public and private information are contained in the stock price.

Behavioral finance

- Attitudes towards risk
- Biases about probabilities
- Overconfidence
- Sentiment

2.4 Investment appraisal

Net present value (NPV)

$$NPV = c_0 + \frac{c_1}{(1+r)} + \frac{c_2}{(1+r)^2} + \dots + \frac{c_t}{(1+r)^t}$$

- c_0 : initial investment (money outflow)
- r : opportunity cost of capital (e.g. expected rate of return of investment alternatives)
- c_1, c_2, \dots, c_t : money inflow every year (PMT)
- t : time period t of the investment

Choose mutually exclusive projects

Mutual exclusive projects v.s. independent projects

Decision rule: Any positive NPV if independent projects, highest NPV if mutually exclusive projects

Situation 1: investment timing ---- now or later?

Decision rule: choose the time of highest NPV

Situation 2: life of investment ---- long-lived or short-lived?

Decision rule: select the lowest EAA

EAA (equivalent annual annuity/cost):

$$= \frac{NPV (cost)}{\text{annuity factor}}$$

Situation 3: replacement ---- replaced or not?

Decision rule: if old operating cost > EEA (cost) of operating cost after replacement, then replace; otherwise, don't replace.

Pros and cons of NPV

Pros: "golden standard" of investment, especially choose between mutually exclusive investments

Cons: do not consider capital rationing, because fund is infinite.

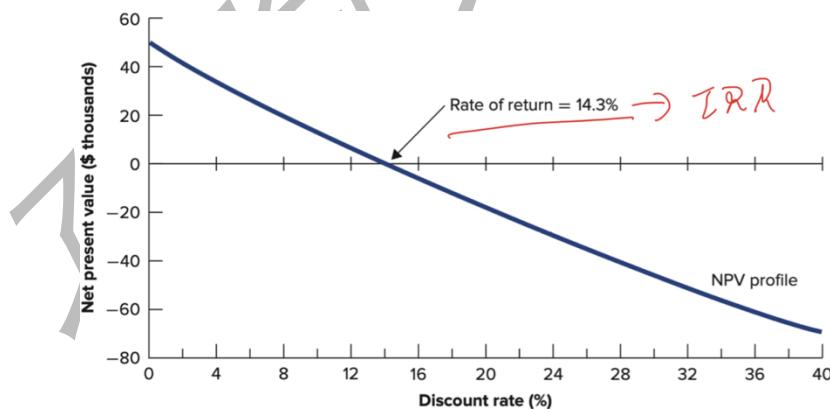
Internal rate of return (IRR)

IRR: the rate of return that leads to 0 NPV. (break-even project)

$$NPV = CF_0 + \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_N}{(1+r)^N} = 0$$

Thus discount rate (r) = IRR

Decision rule: $r > IRR$, $NPV < 0$, decline; $r < IRR$, $NPV > 0$, accept; **higher IRR, higher priority.**

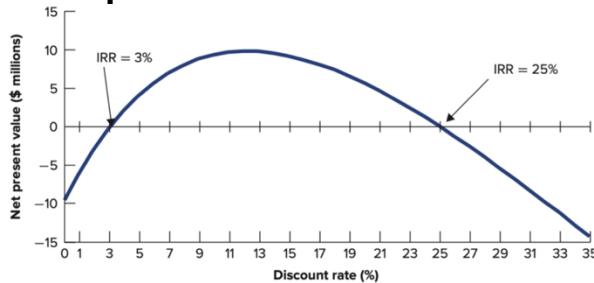


Pitfalls with IRR

- Conflicts between IRR rule & NPV rule

Year:	0	1	2	3	IRR	NPV at 7%
Initial proposal	-350,000	+400,000			14.29%	+\$23,832
Revised proposal	-375,000	+25,000	+25,000	+475,000	12.56%	+\$57,942

- **Multiple IRRs**



Profitability index (PI)

$$\text{Profitability index} = \frac{NPV}{\text{initial investment}}$$

Decision rule: higher PI

Capital rationing (limits of fund for investment)

Soft rationing: limit set by top management ---- extra sources and funds are available if top management allows

Hard rationing: limit set by capital market ---- no more extra funds both from both internal or external sources

Pitfall with PI

Not only the higher rate of return, the amount of return is also important

Payback period rule

Payback period: the length of time before the return covers the initial investment

a. If cash flow per period is equal

$$\text{Payback period} = \text{initial investment} / \text{cash flow per year}$$

b. If cash flow per period is not equal

$$\text{Payback period} = A + B/C$$

A: the last period t when total cash flow < initial investment

B: initial investment - total cash flow at the last period t

C: the cash inflow of the (t+1) period

Decision rule: accept if payback return < the required period

Pros and cons of payback period rule

Pros: simple to understand and compute

Cons:

1. don't consider time value of money
2. If take this rule, then top management may cut off period to get money before they resign
3. Don't consider return after t period, thus the chosen project may not have the highest NPV

2.5 Project analysis

Capital budgeting

Definition: the process of analyzing or ranking all investment opportunities and deciding which ones to accept

The aim: ensure that the firm's investment matches its strategy, which reflects its competitive advantages

Problems (& solutions) of capital budgeting

1. Inconsistent assumption -> optimistic & pessimistic
2. Conflicts of interest -> agency problems
3. Forecast bias -> overstate the benefits of the project

Variables influence the NPV

NPV = investment + PV of cash flow from operations

Sensitivity analysis (NPV varies when single variable changes)

- o **Variable costs:** cost changes depending on the sales/output
- o **Fixed costs:** cost changes not depending on the sales/output

1. Possible changes in sales

- If in the worst case, the sales = **14,000** thousand units
- If in the best case, the sales = **18,000** thousand units

	Worst Case	Best Case
	Year 0	Year 1-12
Investment	-5,400	
1.Sales	14,000	18,000
2.Variable costs	(11,375)	(14,625)
3. Fixed costs	(2,000)	(2,000)
4. Depreciation	(450)	(450)
5. Pretax profit	175	925
6. Taxes (40%)	(70)	(370)
7. Profit after tax	105	555
8. Operating CF	=450 + 105 =555	= 450 + 555 = 1005
	NPV = - \$1217.465	NPV = \$2173.781

2. Possible changes in fixed costs

- If in the worst case, fixed costs = **2,500** thousand dollar
- If in the best case, fixed costs = **1,500** thousand dollar

	Worst case	Best case
	Year 0	Year 1 - 12
Investment	-5,400	
1. Sales	16,000	16,000
2. Variable costs	(13,000)	(13,000)
3. Fixed costs	(2,500)	(1,500)
4. Depreciation	(450)	(450)
5. Pretax profit	50	1050
6. Taxes (40%)	(20)	(420)
7. Profit after tax	30	630
8. Operating CF	=450 + 30 = 480	= 450 + 630 = 1080
	NPV = \$ -1782.672	NPV = \$2738.988

Limitations

- No law of which variable will change
- Best/optimistic or worst/pessimistic cases are too subjective
- Changes are interrelated

Variable	Possible Values		NPV (thousands of dollars)		
	Pessimistic	Optimistic	Pessimistic	Expected	Optimistic
Investment	\$20,250	\$11,400	-\$2,585	+\$1,870	+\$4,925
First-year revenues	\$10,050	\$19,950	-6,886	+1,870	+10,626
Variable costs, % of revenues	55%	25%	-5,293	+1,870	+9,033
First-year fixed costs	\$5,600	\$3,000	-3,224	+1,870	+5,054
Working capital, % difference from expected value	+100	-50	+106	+1,870	+2,752

Scenario analysis (NPV varies under particular scenario (i.e. combinations of variables change))

- Possible changes in both percentage (cost/revenue) and sales

1		Year 0	Cash flows in years 1-12	
			Base Case	Competing Store Scenario
3	Initial investment	-5,400,000		
4	1. Sales		16,000,000	13,600,000
5	2. Variable costs	81.5%	13,000,000	82% 11,152,000
6	3. Fixed costs		2,000,000	2,000,000
7	4. Depreciation		450,000	450,000
8	5. Pretax profit		550,000	-2,000
9	6. Taxes (at 40%)		220,000	-800
10	7. Profit after tax		330,000	-1,200
11	8. Cash flow from operations		780,000	448,800
12				
13	Variable costs as proportion of sales		0.8125	0.8200
14	Discount rate		8%	8%
15	12-year annuity factor		7.5361	7.5361
16	Net present value		478,141	-2,017,808
17				
18	Assumptions: Competing store causes (1) a 15% decline in sales and (2) variable costs to increase to 82% of sales.			
19				

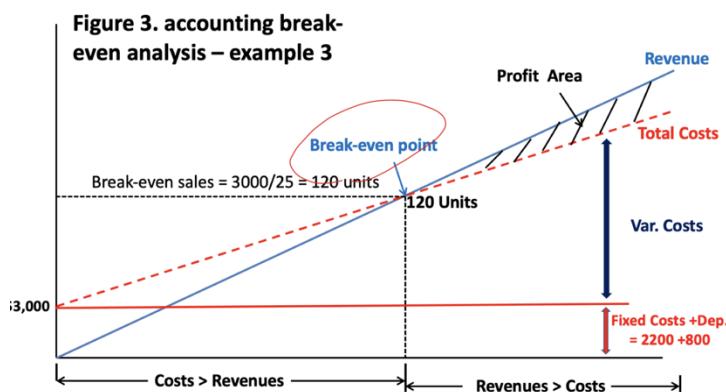
Accounting break-even analysis

Definition: the number of sales makes the profit 0

	Year 0	Year 1 – Year 10
Initial investment	-8,000	
Sales (N = number of units sold)		100 × N
Variable costs		(75 × N)
Fixed costs		(2,200)
Depreciation		(800)
Profit before tax		25 × N – 3000 = 0
Tax (at 40%)		(40% × (25 × N – 3000))
Profit after tax		60% × (25 × N – 3000)

Analysis

Costs & Revenue



Calculations for break-even revenues

$$\text{Break-even revenue} = \text{break-even units sold} * \text{price per unit} =$$

$$\frac{\text{fixed cost} + \text{depreciation}}{\text{profit from additional dollar sold}}$$

Limitations: no time value of money (i.e. NPV may be negative if taken into account of original investment)

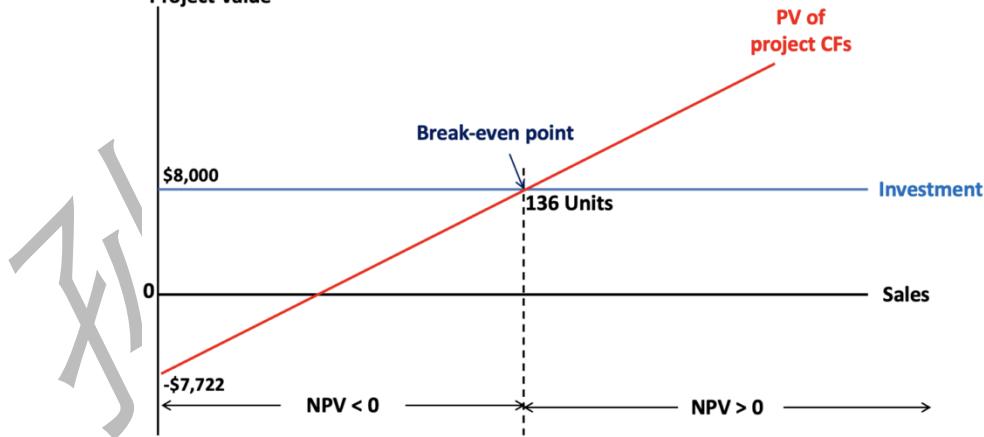
NPV break-even analysis

Definition: the level of sales for which $NPV = 0$

$$NPV = \text{investment} + PV \text{ of cashflow from operations} = 0$$

Analysis

Project Value



[Attention]: higher cost for NPV break-even because cost of time value of money has been taken into account.

3 Risk

3.1 Risk & return

Capital market history

Market indexes: standard & Poor's 500, Dow Jones Industrial Average

Maturity premium: annual return of **long-term treasury bills** - annual return of **short-term treasury bills**

Risk premium = rate of return of **small stock** - rate of return on **short-term treasury bills**

(Market risk premium) = rate of return of **market portfolio** - rate of return of **short-term treasury bills**

Historical records: risky assets have risk premium, high-risk assets have higher average return than low-risk assets

Measuring risk

Distribution of average rate of return

- **Average annual return** (mean)

$$\bar{R} = \frac{(R_1 + R_2 + \dots + R_T)}{T}$$

• Where: R_t = the realized **return** of a security in each year T

- **Variance:** higher variance, higher risk

$$VAR(R) = \sum_{i=1}^n \text{Probability}_i \times (R_i - \bar{R})^2$$

- **Standard deviation** (SD): $SD(R) = \sqrt{VAR(R)}$

Risk and diversification

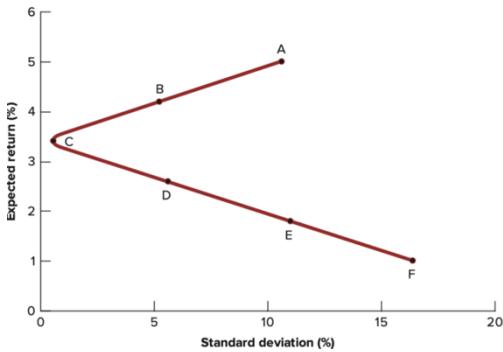
Portfolio diversification

Portfolio rate of return = (fraction of portfolio on nth asset * average rate of return on nth assets)

Investment opportunity frontier

Relationship between SD & rate of return for various weights

	Portfolio Weights		Portfolio Rate of Return (%)			Expected Return	Standard Deviation
	Gold	Autos	Recession	Normal	Boom		
A	0.0	1.0	-8.0	5.0	18.0	5.0	10.6
B	0.2	0.8	-2.4	4.6	10.4	4.2	5.2
C	0.4	0.6	3.2	4.2	2.8	3.4	0.6
D	0.6	0.4	8.8	3.8	-4.8	2.6	5.6
E	0.8	0.2	14.4	3.4	-12.4	1.8	11.0
F	1.0	0.0	20.0	3.0	-20.0	1.0	16.4



- More negatively related assets are beneficial to the portfolios. (ice cream and umbrella)

Risks

- Market risk/systematic risks:** risk that affects the overall stock market
- Specific risk/diversifiable risks:** risks have no relation with others
- Market risk is unavoidable but specific risk can be eliminated by well-functioning portfolios

3.2 CAPM and WACC

Measuring market risk (beta)

Market portfolio

- Diversified portfolio of common stocks (e.g. S&P 500)
- Market risk cannot be eliminated by diversifications

Beta (market risk)

Definition: risk of individual securities measured by the responsiveness to the risk of market portfolio

β is the slope of the line that the (market return, individual return) fits in.

Situations:

- If $\beta < 1$, then individual securities are less volatile than market portfolios;
- If $\beta = 1$, the same
- If $\beta > 1$, then individual securities are more volatile than market portfolios

Portfolio beta

Portfolio beta = (fraction of investment in stock A * β_A) + (fraction of investment in stock B * β_B) + ... + (fraction of stock N * β_N)

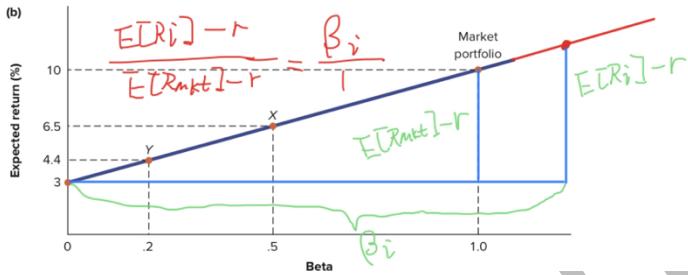
The capital asset pricing model (CAPM)

Assumption: only **market risk** affects expected return (specific risks have been eliminated)

Expected return [for any asset] = risk-free rate of return to compensate for inflation and time value of money (e.g. treasury bills) + risk premium (depends on beta and market risk premium)

$$E[R_i] = r_f + \beta_i(E[R_{Mkt}] - r_f)$$

Security market line (SML)/CAPM: relationship with expected rate of return and β_i



SML for choosing projects: if expected rate of return of projects is above SML, then we can accept this project (same beta, higher rate of return)

Weighted average cost of capital (WACC)

The firm's capital structure

Capital: source of finance - debt, equity and other outstanding securities

Capital structure: relative proportion of debt, equity and other securities a firm holding.

Weighted average cost of capital (WACC)

Average firm's equity, debt costs of capital according to their respective **market values** (because investors pay for market value)

Unlevered: r_{WACC}

Levered: $r_{WACC} = \text{fraction} * \text{cost of equity} + \text{fraction} * \text{cost of debts}$

1. Cost of debt capital

- **Definition:** YTM
- **Effective cost of debt:** $r_D(1 - T_c)$

2. Cost of preferred stock capital (no growth)

$$\text{cost of preferred stock capital} = \frac{\text{preferred dividend}}{\text{preferred stock price}} = \frac{\text{Div}_{\text{pfld}}}{P_{\text{pfld}}}$$

3. Cost of common capital (equity)

- i. For constant-growth dividend discount model

$$P_E = \frac{\text{Div}_1}{r_E - g}, \quad r_E = \frac{\text{Div}_1}{P_E} + g$$

- ii. CAPM: $r_E = r_f + \beta_E(R_{MKT} - r_f)$

Difference between method(i) & method(ii)

Reason: different inputs and major assumptions

WACC pitfalls

1. The use of WACC is appropriate for projects that have the same risk as the firm's existing businesses
2. We can adjust benchmark (discount rate) upwards or downwards for riskier or safer projects

Value a business/project by discount cash flow/WACC

Free cash flow (FCF) = Operating cash flow + interest payment - investment expenditures (which is value that the business can give its investor)

[Valuation horizon]: H

$$PV_{firm} = \frac{FCF_1}{(1 + WACC)} + \frac{FCF_2}{(1 + WACC)^2} + \cdots + \frac{FCF_H}{(1 + WACC)^H} + \frac{PV_H}{(1 + WACC)^H}$$

$$PV_H = \frac{FCF \text{ in year}_{H+1}}{WACC - g}$$

g: asset growth rate, is the growth rate of FCFs, and growth rate of assets value

4 Corporate financing

4.1 Raising equity

Source of corporate financing

Source of funds

Internal generated funds	Retained earnings	
	Depreciation	
External generated funds	Debt	Private debt (bank loans, private displacement)
		Public debt (secured debt, unsecured debt, international)
	Equity	Preferred stock (floating-rate preferred) Common stock (Treasury shares, outstanding shares)

- **Preferred stock:** preference in payment of dividends and liquidation, no voting rights, fixed dividend paid
 - **Floating-rate preferred:** the dividend rate links to the interest rate, thus when r increases, dividend rate increases, thus protect the stockholder.
- **Common stock:** voting rights
 - Treasury shares (internal shares, held in company's treasury, issued but not understanding)
 - Outstanding shares (external shares, held by investors, issued but outstanding)

Concepts

- **Long-term financing:** long-term debt + equity
- **Net worth:** Book value of (common stock + preferred stock)
- **Financial deficit:** cash company needs - the amount generated internally
- **Authorized share capital:** the maximum number of shares that the company is permitted to issue.

Shareholder's equity:

Statement of Financial Position:
Shareholders' Equity

1. **Par Value / Face Value** = value of security shown on certificate (normally £1 per share)

+

2. **Share Premium** = Difference between issue price and par value

+

3. **Retained Earnings** = earnings not paid out as dividends

Common shares (\$0.10 par value per share)	\$ 32
Additional paid-in capital	3,085
Retained earnings	23,710
Treasury shares at cost	(7,576)
Other	(357)
Net common equity	\$18,894
<i>Note:</i>	
Authorized shares (millions)	800
Issued shares, of which	318 ⁿ
Outstanding shares	267
Treasury shares	51

- Additional paid-in capital: (share price - par value) * issued shares
- Treasury shares: issued but not outstanding
- Outstanding shares: issued but outstanding

Equity financing for private firms

Potential sources

- a. **Angel investors:** wealthy, individual investors, buy equity of private firms
- b. **Venture capital firms:**
 - Specialize in raising money to invest in equity of private young company
 - Often demand control of company
- c. **Institutional investors:**
 - Pension fund, insurance companies
 - Directly
 - Indirectly (by being LP of VC firms)
- d. **Corporate investors:**
 - Established corporations purchase equity in young firms (Tencent)
 - Corporate strategic objective
 - Aim for investment return

Securities and valuation

When first issued: preferred stock > common stock

- **[Convertible preferred stock]:** owner has the option to convert into common stock at a future date.
- **Pre-money valuation:** valuation of firms before an investment
- **Post-money valuation:** valuation of firms after an investment

Exit strategies for investment

- Acquisition
- Public offering

The initial public offering (IPO)

Definition: process of first time selling stock to the public

Pros and cons of going public

- **Pros:** greater liquidity, better access to capital

- **Cons:** dispersed equity holders, satisfy public companies' requirement

IPO offers

- **Primary offers:** new shares available when issuing
- **Secondary offers:** equity offering of shares by existing shareholders (exit strategy)

Underwriter & syndicate

Underwriter: an IB firm manages the offering and design its structure

Syndicate: a group of underwriters

Lead underwriter: primary banking responsible for managing the IPO

SEC filings

Registration statements: legal doc provides financial and other information about a firm

- Preliminary prospectus
- Final prospectus

Valuation

Book-building: the process by underwriters for producing offer price based on customer's interest.

Road show: firm's management and lead underwriter travel to promote the firm & explain the rationale for the offering price to institutional investors.

Payoff of the deal and managing risk

Spread: deduct a percentage of issue price (e.g. 5%)

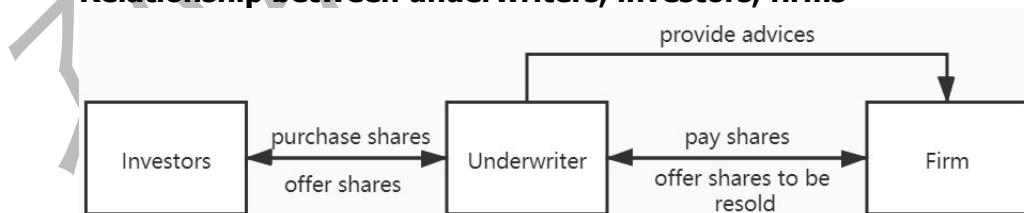
Lockup: a restriction preventing shareholders selling their shares within 180 days after IPO.

Firm commitment IPO: the underwriter guarantees that all stocks will be sold at offer price

Best-effort basis: underwriter does not guarantee but try to sell at the best possible price

Dutch auction IPO: institutional investors auction off the shares, let the market deciding the offer price (the last success auction price = offer price)

Relationship between underwriters, investors, firms



IPO puzzles

- **Under-pricing of IPOs**
- **High issuing costs of IPO:** commission to underwriter is high

Raising additional capital: the seasonal equity offering (SEO)

Definition: firms return to the equity market to offer new shares

- **General cash offer:** issue open to the public
- **Rights offer:** issue **only** to current shareholders at a discount

SEO process

The main difference between (IPO & SEO) is that price-setting is unnecessary for SEO

SEO price reaction

Phenomena: on average, SEO will face price decline after issuing

1. Firms which do not have enough retained earnings will look for funds, this is a bad signal to the market.
2. This means stocks are overpriced, they want to continue making profits, which is a bad signal to the market.

4.1 Raising debt

Corporate debt

Private debt (debt not publicly traded)

a. **Bank loans**

- Term loan (offered by single bank)
- Syndicated bank loan (offered by a group of banks)
- credit line (e.g. credit card)

b. **Private placement:** not trade on market but directly to small groups of investors

Public debt (can be publicly traded)

a. **Secured corporate debt** (bondholder can directly claim to assets)

- **Mortgage bonds:** house etc.
- **Assets-backed bonds:** inventories, machinery etc.

b. **Unsecured corporate debt** (bondholder claim limited to unpledged assets)

Public debt in international markets

i. **Domestic bonds**

- Issuer: local entity
- Trade place: local market
- Denomination: local currency

ii. **Foreign bonds**

- Issuer: foreign company
- Trade place: local market
- Denomination: local currency

iii. Euro bonds

- Issuer: foreign company
- Trade place: local market
- Denomination: not local currency

*Foreign bonds

- Yankee bonds (issued in US)
- Samurai bonds (Japan)
- Bulldogs bonds (UK)
- Panda bonds (China)

Bond covenants

Advantage: covenants reduce its costs of borrowing, this may outweigh the cost of loss of flexibility associated with covenants

Restrictions on:	Typical Restrictions
Issuing new debt	New debt must be subordinate to existing debt No new debt unless firm maintains specific leverage or interest coverage ratios
Dividends and share repurchases	Payouts can be made only from earnings generated after the bond issue Payouts can be made only if earnings exceed some threshold
Mergers and acquisitions	Mergers are allowed only if the combined firm has a minimum ratio of net tangible assets to debt
Asset disposition	Maximum amount of assets that can be sold, and/or minimum amount of assets that must be maintained Restrictions on making loans or any other provision of credit
Requiring Maintenance of:	
Accounting measures	Minimum retained earnings, working capital, and/or net assets Maximum leverage ratios

*Source: Adapted from the American Bar Association's *Commentaries on Debentures*.*

Repayment provisions

1. Call provisions

Definition: clauses in bond agreement allow the issuer the right to repurchase and retire bonds.

Callable bond (**issuer -> call bond**)

- **Call date:** the date when issuer can retire the bond (from the earliest to latest)
- **Call price:** a price that issuer can redeem (coupon + face value)
- **Call premium:** the difference between call price and the face value

1. Yield to call (YTC)

Definition: the yield of a callable bond under the assumption that bond will be called at the **earliest** call date

2. Yield to worst

Definition: $\min\{YTC, TYM\}$

If $YTC > YTM$, the issuer will not call the bond.

2. Convertible provisions (**bondholder -> convert bond**)

Convertible bonds: corporate bonds give bondholder an option to convert each bond into a fixed number of common shares

Conversion ratio: x shares/bond

Conversion price: x money/share

Warrant: right to buy company's shares at a stipulated price before a set date.

Convertible bonds similar to (bonds + warrants), but convertible bonds do not need to pay money, just convert

5 Debt and payout policy

5.1 Debt policy: capital structure (long-time financing)

How borrowing affects value in perfect market

Perfect capital market:

- Securities are fairly priced
- No tax, transaction costs
- Investment cash flow are independent of financing decisions

Value of firm

Assets	Liabilities and Stockholders' Equity
Value of cash flows from the firm's real assets and operations	Market value of debt Market value of equity
Value of firm	Value of firm

- Firm's market value is determined by the cash flow by real assets and operations
- Also market value [debt + equity] = market value of firm
- Cost of capital (firm) = rate of return (investor) = discount rate

MM proposition 1 (debt-irrelevance)

In perfect market, the value of firm is not influenced by the capital structure ($V_L = E + D = V_U$)

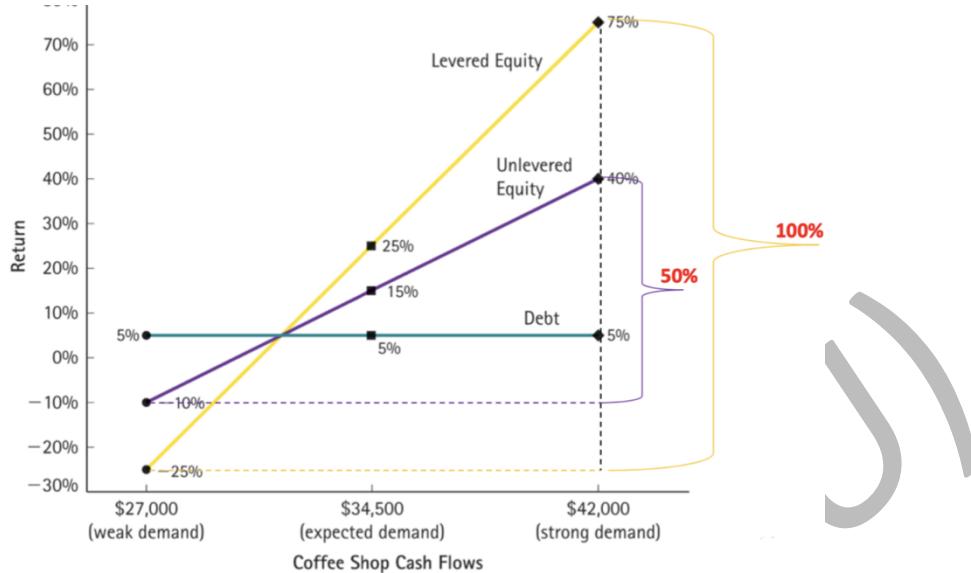
[Restructuring]

Change capital structure without changing capital structure (money issued by debt directly used to repurchase debt rather than staying)

How borrowing affects return on shares (EPS)?

Table 1. Returns to Equity in Different Scenarios with and Without Leverage in Example 1

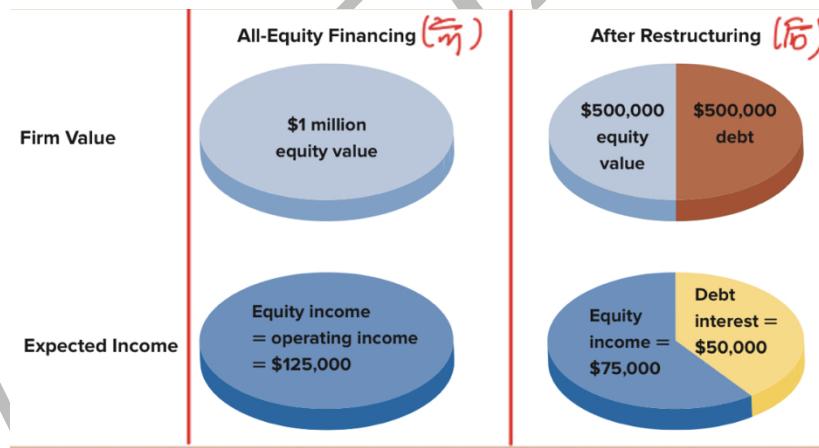
Demand	Coffee Shop		Security Cash Flows		Security Returns		
	Free Cash Flows	Unlevered Equity	Debt	Levered Equity	Unlevered Equity	Debt	Levered Equity
Weak	\$27,000	\$27,000	\$15,750	\$11,250	-10%	5%	-25%
Expected	\$34,500	\$34,500	\$15,750	\$18,750	15%	5%	25%
Strong	\$42,000	\$42,000	\$15,750	\$26,250	40%	5%	75%



- Higher rate of return or higher rate of loss for levered equity

How borrowing affect risk and return?

Debt finance doesn't affect **business risk**/operating risk (i.e. operating income), but does affect **financial risk**: less equity to absorb the same amount of operating risk, if more debt finance.



Debt (D) and cost of equity (r_E) (perfect market)

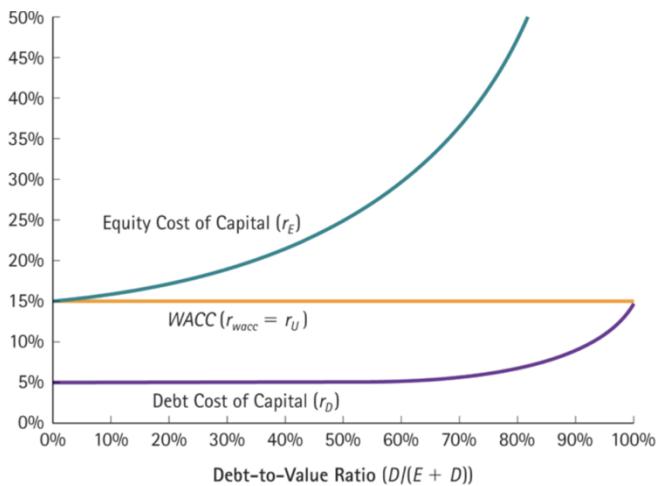
$$r_{asset} = r_{debt} * \frac{D}{D+E} + r_{equity} * \frac{E}{D+E} \text{ (all market values)}$$

[Not r_{WACC} because ignoring taxes]

Cost of capital: the return is you buy all debts and equity of the firm
[r_{asset} is unchanged, because operating income is not changed]

MM proposition 2

$$\text{Cost of equity: } r_E = r_U + \frac{D}{E} (r_U - r_D) \text{ (higher leverage increases financial risk)}$$



Debt, taxes and WACC (imperfect market)

Table 2. ABC's Income with and without Leverage, 2008 (\$ millions)

	With Leverage	Without Leverage
EBIT	\$1850	\$1850
Interest expense	-350	0
Income before tax	1500	1850
Taxes (35%)	-525	-648
Net income	(\$975) < (\$1202)	

(Levered net income < unlevered net income)

Table 3. Total Amount Available to All Investors

	With Leverage	Without Leverage
Interest paid to debt holders	350	0
Income available to equity holders	975	1202
Total available to all investors	(\$1325) > (\$1202)	

(levered total available > unlevered total available)

Interest tax shield

- Interest tax shield = interest expense * tax rate
- CF with levered equity = CF with unlevered equity + interest tax shield

MM1 with taxes (modified)

$$V_L = V_U + PV(\text{interest tax shield})$$

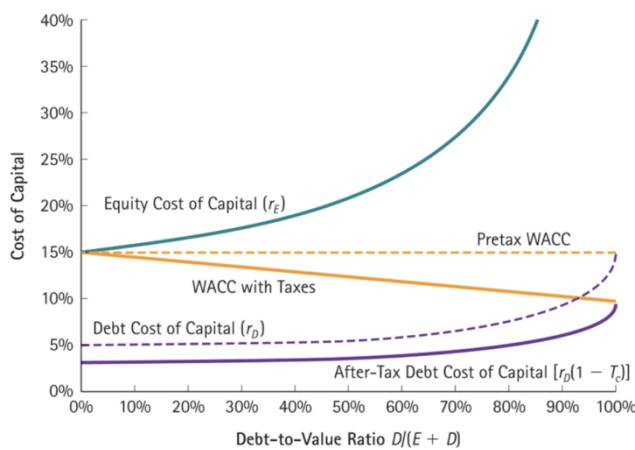
[Because every year's earnings will be more tax yield shield, thus PV of tax shield is the difference of market value]

Taxes and WACC

Usually no firms calculate PV of tax shield, they calculate WACC:

$$r_{WACC} = (1 - T_c) * r_{debt} * \frac{D}{D + E} + r_{equity} * \frac{E}{D + E}$$

Figure 7. the WACC with and without Corporate Taxes



- Lower WACC because higher market value of the firm

Costs of financial distress (imperfect market)

- $V_L = V_U + PV(\text{interest tax shield}) - PV(\text{financial distress costs})$
 $[PV(\text{financial distress costs}) = \text{probability of bankruptcy} * \text{cost of bankruptcy}]$

Direct costs: (total 3% - 4% of pre-bankruptcy market assets)

- Time-consuming
- Creditors often wait several years to receive payment
- Outside professionals are generally hired

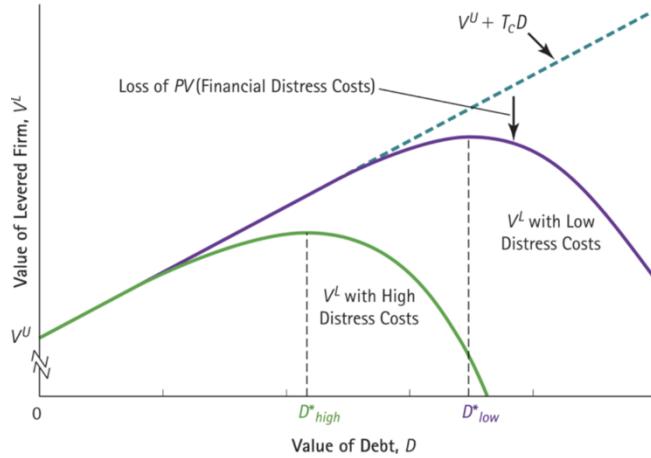
Indirect costs (10% - 20% of firm's value)

- Loss of consumers
- Loss of suppliers
- Loss of employees

Financing choices

The tradeoff theory

Optimal debt choice: marginal increase of tax shield = marginal increase of financial cost



The pecking order theory

For firm: retained earnings > debt > equity

[Only firm who have significant debt financing will issue equity]

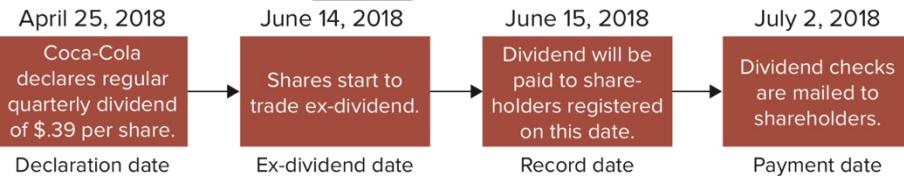
5.2 Payout policy

How corporation pay out cash to shareholders?

Payout policy

- Cash dividends
- Repurchase shares

Dividend payout



[ex-dividend]: buyers on or after that date will not receive the dividend

Stock dividends and splits (NOT cash dividend)

Stock dividend: issue additional shares to its shareholders

Stock split: stock dividends of 50% or higher

- **10% stock dividend:** one new share for every 10 shares already owned
- **3-for-2 stock split:** = 50% shock dividend, 1 additional share for every two shares

Features

- Total market value is unchanged
- Number of shares outstanding increases
- Thus stock price will fall

- Stock dividend will not be taxed

Motivation

- Keep share price in a range to attract small investors
- Increase demand, increase liquidity, boost share price

Repurchase shares

1. Open market repurchase
2. Tender offer (state as a fixed price and when enough, then deal is done)
3. Auction
4. Targeted repurchase / direct negotiation (negotiation with major shareholders)

The information content of dividends and repurchases

Asymmetric information: managers' payout decisions reflect the future prospect of the firm

Dividend information

Features

1. **Dividend smoothing:** maintaining relative constant dividend - increase only when sustainable growth of future earnings, decrease only as a last resort
2. **Changes:** managers focus on changes of dividends rather than the absolute value of dividends

Signaling

- **Increase of dividend:** signal of good news; lack of investment opportunities
- **Decrease of dividend:** signal of bad news; exploit positive NPV investment opportunities

Stock repurchases information

Signaling

1. **Increase of shock repurchase:**

- The stocks are underpriced
- The firm may not be able to deal with the cash

Payout controversy (dividend or repurchase)

Capital budgeting & borrowing decisions

Capital budgeting	low dividend	cash -> investment	
Borrowing decisions	high dividend	borrowing -> investment	cash -> payout dividend

Controversy (Given capital budgeting and borrowing decisions)

- Dividend increases value
- Dividend decreases value
- No effect of value

No effect on firm's value in perfect market (different payout policies)

Policy 1: pay by dividend

- Value of firm (cum-dividend) = current dividend + PV (future FCF)
Share price = cash/shares + FCF/(discount rate*shares)
- Value of firm (ex-dividend) = PV (future FCF)
Share price = market value of firm / shares

	December 11 (Cum-Dividend)	December 12 (Ex-Dividend)
Cash	20	0
Other assets	400	400
Total market value	420	400
Shares (millions)	10	10
Share price	\$42	\$40

Policy 2: pay by share repurchase

- Value of firm (before repurchase) =PV(future FCF)
Share price = market value of firm / shares

	December 11 (Before Repurchase)	December 12 (After Repurchase)
Cash	20	0
Other assets	400	400
Total market value of assets	420	400
Shares (millions)	10	9.524
Share price	\$42	\$42

Repurchase does not influence share price

Tradeoff between 2 policies

	Initial Share Price	Dividend Paid (\$ per share)		
		Year 0	Year 1	Year 2
Policy 1:	\$42.00	2.00	4.80	4.80
Policy 2:	\$42.00	0	5.04	5.04

More dividend now means less future dividend growth, less dividend means more future dividend growth

MM and dividend policy irrelevance and perfect market

Higher FCFs means higher payout and determines higher price. But the firm's choice of dividend policy in a perfect market does not affect initial share price.

The tax disadvantage of dividends (shareholders 角度)

Tax on:

- Dividends shareholders receive
- Capital gains when they sell shares

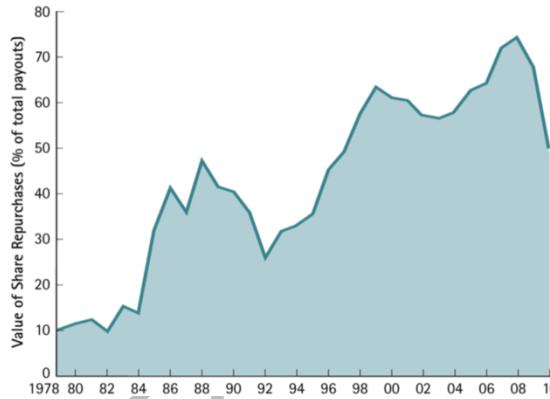
Tradeoff between dividend & capital gain

- If $\text{div_taxrate} > \text{CG_taxrate}$, then more tax if choosing dividend
- Some people will pay dividend because of some policy (e.g. only 50% of dividend will be taxed)
- Even $\text{div_taxrate} = \text{CG_taxrate}$, div should pay immediately, but capital gain can be delayed, thus having advantages of time value of money.

Optimal dividend policy

- When $\text{div_taxrate} > \text{CG_taxrate}$, no dividend

Figure 4. the changing composition of shareholder payouts — the value of share repurchase as a percentage of total payouts to shareholders



[Higher proportion of repurchases means higher taxes on dividend.]

Clientele effect

Definition: the dividend policy reflects the tax preferences of its clientele

- Individuals in the highest tax brackets may pay less or no dividend
- Tax-free investors have no preference to dividend or no-dividend, sometimes may prefer dividend
- Dividend policy is optimal for the tax preference of investors

Payout policy & retention of cash policy (payout & retention)

Perfect market:

Retention & payout not influence the initial value of the firm

Imperfect market:

Cash can be negative leverage and thus a disadvantage of holding cash because tax advantage of leverage

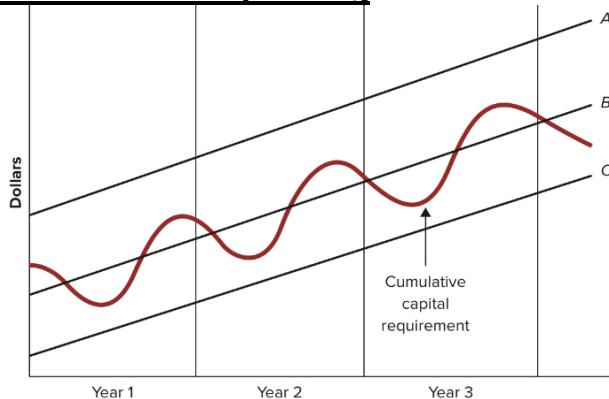
Retaining cash with imperfect capital markets

- Retaining cash may have tax disadvantage
- Cash is important to cover potential future cash shortfalls or periods of operating losses because of financial distress

6 Financial analysis and planning

6.1 Working capital management

Short-term financial planning



A,B,C - long-term financing planning; **red line** - cumulative capital requirement

Short-term financing planning = long-term financing planning - cumulative capital requirement

Strategies

A: relaxed strategy, permanent cash surplus

B: middle-of-the-road policy, seasonal fluctuations, temporary cash surplus or deficit

C: restrictive strategy, short-term financing, permanent cash deficit

Borrowers & lenders

A: lenders

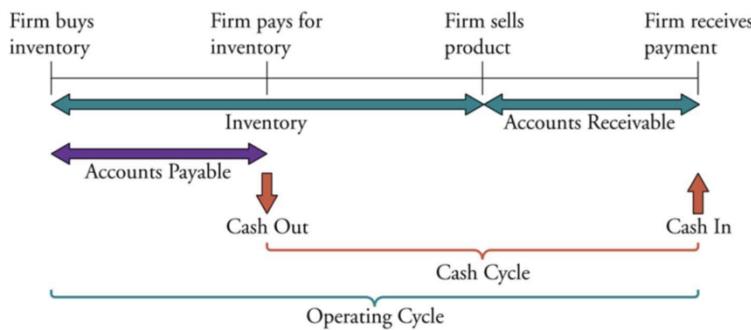
B: borrowers or lenders

C: borrowers

Best strategy (combination of short-term financing + long-term financing)

- **Matching maturities:** short maturity for short-term debt, long maturity for long-term debt
- **Permanent working capital requirement:** fixed working capital, minimum for working capital needed, without which the business cannot survive (permanent investment in net working capital, financed by long-term sources (e.g. equity))
- **Maintaining liquidity:** keep current assets that can be quickly converted into cash

Overview of working capital



Cash cycle/cash conversion cycle = inventory days + accounts receivables - accounts payables

- Inventory days = inventory / (annual cost of goods sold / 365)
- Accounts receivables days = accounts receivables / (annual sales / 365)
- Accounts payables days = accounts payables / (annual cost of goods / 365)

Tracking changes in cash and working capital

Cash budgeting

Definition: forecast cash inflows or outflows on certain period to identify potential cash shortfalls

Steps: identify source of cash -> identify use of cash -> calculate cash shortage or surplus

Cash raising sources

- Issue new bonds/shares
- Bank loan
- Selling (reducing inventory level)
- Getting cash (reducing receivables)
- Business operations (selling products/services)

Cashing spending sources

- Dividend payment, tax, interest
- Repaying bank loan
- Purchasing inventories/raw materials
- Repay money (reduce accounts payables)
- Investing in fixed assets, working capital, financial assets

Working capital management

Trade credit: credit firms extend to its customers

Trade credit terms: 2/10, net 30

Discount period: 10 days

Cash discount: 2% cash discount is taken if paid by during the discount period

Credit period: 30 days, total length of time credit is extended to buyer

Cost of trade credit

$$\text{Effective annual rate} = \left(1 + \frac{\text{discount}}{\text{discount price}}\right)^{\frac{365}{\text{extra days}}} - 1$$

(98 → 100 in (30 - 10) days, thus $(100-98)/98 = \text{discount}/\text{discount price}$)

[Solution]: if necessary and EAR > common r, then it would be better if firm first borrows money from bank to repay before date, then finds methods to repay to the bank.

Receivables management (credit analysis)

- Credit agencies provide reports on credit worthiness
- Check with customer's bank
- Calculate financial ratios

Inventory management (holding inventories)

Benefits:

- Minimize risks of not being able to obtain inputs for production
- Avoid temporarily order
- Reduce order costs

Costs:

- Acquisition costs
- Carrying costs - storage costs, insurance, OC of funds on inventories

