1.★Corporations & Financial Statements

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The Four Types of Firms

1. Sole Proprietorship
2. Partnership
    a. The partnership ends with the death or withdrawal of any single partner.
3. Limited Liability Company
    a. General Partners
    b. Limited Partners
4. Corporation
    a. A legal entity separate from its owners
    b. Ownership Represented by shares of stock

The stock market

- The stock market provides liquidity to shareholders.
- Low stock prices may entice a Corporate Raider to buy enough stock so they have enough control to replace current management. The stock price will rise after the new management team "fixes" the company.

Types of Financial Statements

1. Balance Sheet
    a. Assets = Liabilities + Stockholders' Equity
    b. Assets
        i. Current Assets: Cash or expected to be turned into cash in the next year
            1) Accounts Receivable
            2) Inventories
            3) Other Current Assets: Pre-paid expenses
        ii. Long-Term Assets
            1) Net Property, Plant, & Equipment
                a) Book Value
                b) Depreciation
            2) Goodwill:
                a) Amortization
            - Goodwill intangible use amortization
            - Real property use depreciation
    c. Liabilities
        i. Current Liabilities: Due to be paid within the next year
            1) Accounts Payable
            2) Current Maturities of Long-Term Debt
            3) Wages Payable
            4) Taxes Payable
        ii. Long-Term Liabilities
            1) Long-Term Debt
            2) Capital Leases
            3) Deferred Taxes
    d. Net Working Capital = Current Assets – Current Liabilities
    e. Book Value of Equity = Book Value of Assets – Book Value of Liabilities: Could possibly be negative
    f. Market Value of Equity (Market Capitalization) = Market Price per Share x Number of Shares: Cannot be negative
    g. Market equity is better, book equity is useful when share is not available to the public.
    h. Liquidation Value: Value of the firm if all assets were sold and liabilities paid
    i. Market-to-Book Ratio = Market Value of Equity / Book Value of Equity
    j. Debt-Equity Ratio = Total Debt / Total Equity
    k. Enterprise Value = Market Value of Equity + Debt - Cash
2. Income Statement
    a. EBITDA

        i. Interest: cash for lender
        ii. Tax: cash for government
        iii. D & A: it's not cash
3. Statement of Cash Flows
    a. Three Sections
        i. Operating Activities
        ii. Investment Activities
        iii. Financing Activities
    b. Retained Earnings = Net Income - Dividends
4. Statement of Stockholders' Equity

Tips

- **Deferred taxes 递延所得税**

  The deferred tax liability represents a future taxpayment a company is expected to make to appropriate tax authorities in the future, and it is calculated as the company's anticipated tax rate times the difference between its taxable income and accounting earnings before taxes.

  会计上认定的缴税金额与税务局认定的金额不一致，而其中暂时性的差异就是递延所得税。

- **Capital leases 租期结束时租方获得所有权**

  There may be tax benefits for the lessee to lease an asset rather than purchase it and this may be the motivation to obtain a finance lease.
  A finance lease (also known as a capital lease or a sales lease) is a type of lease in which a finance company is typically the legal owner of the asset for the duration of the lease, while the lessee not only has operating control over the asset, but also has a substantial share of the economic risks and returns from the change in the valuation of the underlying asset.

2.★Statements example

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Balance sheet

GLOBAL CONGLOMERATE CORPORATION
Consolidated Balance Sheet
Year ended December 31 (in $ millions)

Assets	2005	2004
Current Assets		
Cash	21.2	19.5
Accounts receivable	18.5	13.2
Inventories	15.3	14.3
Other current assets	2.0	1.0
Total current assets	57.0	48.0
Long-Term Assets		
Land	22.2	20.7
Buildings	36.5	30.5
Equipment	39.7	33.2
Less accumulated depreciation	(18.7)	(17.5)
Net property, plant, and equipment	79.7	66.9
Goodwill	20.0	—
Other long-term assets	21.0	14.0
Total long-term assets	120.7	80.9
Total Assets	**177.7**	**128.9**

GLOBAL CONGLOMERATE CORPORATION
Consolidated Balance Sheet
Year ended December 31 (in $ millions)

Liabilities and Stockholders' Equity	2005	2004
Current Liabilities		
Accounts payable	29.2	24.5
Notes payable / short-term debt	3.5	3.2
Current maturities of long-term debt	13.3	12.3
Other current liabilities	2.0	4.0
Total current liabilities	48.0	44.0
Long-Term Liabilities		
Long-term debt	99.9	56.3
Capital lease obligations	—	—
Total debt	99.9	56.3
Deferred taxes	7.6	7.4
Other long-term liabilities	—	—
Total long-term liabilities	107.5	63.7
Total Liabilities	**155.5**	**107.7**
Stockholders' Equity	**22.2**	**21.2**
Total Liabilities and Stockholders' Equity	**177.7**	**128.9**

Income statement

GLOBAL CONGLOMERATE CORPORATION
Income Statement
Year ended December 31 (in $ millions)

	2005	2004
Total sales	186.7	176.1
Cost of sales	(153.4)	(147.3)
Gross Profit	33.3	28.8
Selling, general, and administrative expenses	(13.5)	(13.0)
Research and development	(8.2)	(7.6)
Depreciation and amortization	(1.2)	(1.1)
Operating Income	10.4	7.1
Other income	—	—
Earnings before interest and taxes (EBIT)	10.4	7.1
Interest income (expense)	(7.7)	(4.6)
Pretax income	2.7	2.5
Taxes	(0.7)	(0.6)
Net Income	2.0	1.9
Earnings per share:	$0.556	$0.528
Diluted earnings per share:	$0.526	$0.500

Statement of cash flows

GLOBAL CONGLOMERATE CORPORATION Statement of Cash Flows Year ended December 31 (in $ millions)		
	2005	2004
Operating activities		
Net Income	2.0	1.9
Depreciation and amortization	1.2	1.1
Other non-cash items	(2.8)	(1.0)
Cash effect of changes in		
Accounts receivable	(5.3)	(0.3)
Accounts payable	4.7	(0.5)
Inventory	(1.0)	(1.0)
Cash from operating activities	**(1.2)**	**0.2**
Investment activities		
Capital expenditures	(14.0)	(4.0)
Acquisitions and other investing activity	(27.0)	(2.0)
Cash from investing activities	**(41.0)**	**(6.0)**
Financing activities		
Dividends paid	(1.0)	(1.0)
Sale or purchase of stock	—	—
Increase in short-term borrowing	1.3	3.0
Increase in long-term borrowing	43.6	2.5
Cash from financing activities	**43.9**	**4.5**
Change in Cash and Cash Equivalents	**1.7**	**(1.3)**

3.★TVM & Financial Decision Making

2018年9月29日 11:48

Time Value of Money(TVM)

1. 等比数列:$sum = a_1 \times \frac{1-q^n}{1-q}$
2. $PV(C\ in\ perpetuity) = \frac{C}{r}$

   $PV(C\ in\ N\ years) = \frac{C}{r} - \frac{C}{r}\frac{1}{(1+r)^N} = \frac{C}{r}\left(1 - \frac{1}{(1+r)^N}\right)$

   $\mathrm{PV}(\text{growing perpetuity}) = \frac{C}{r-g}$

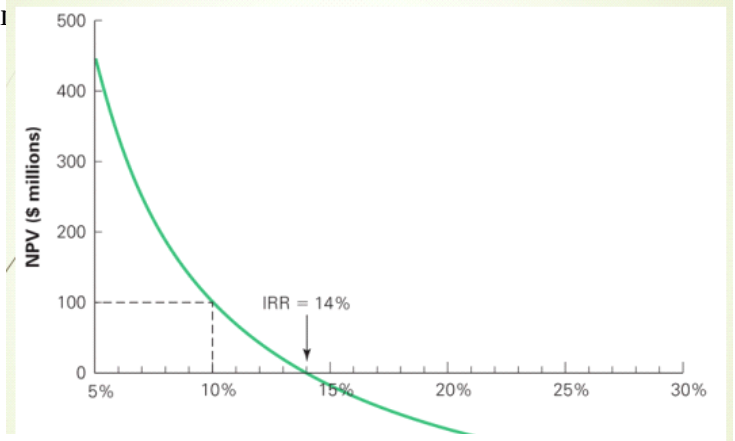
   $\mathrm{PV}(\text{growing annuity in N years}) = \frac{C}{r-g}\left(1 - \left(\frac{1+g}{1+r}\right)^N\right)$
3. $FV(C\ in\ N\ years) = \frac{C}{r}\left((1+r)^N - 1\right)$
4. C comes in the first year

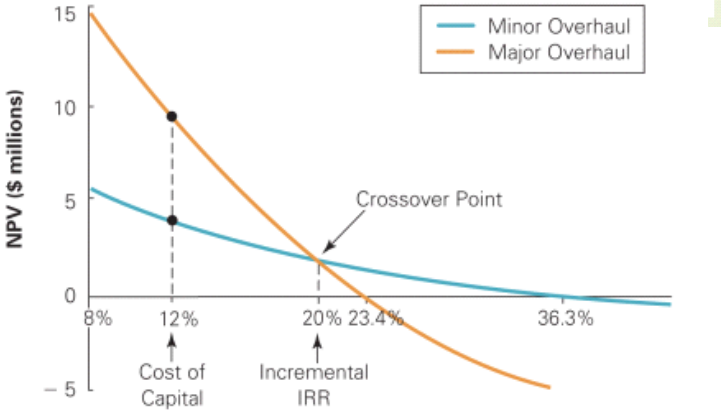
Financial Decision Making

1. NPV = PV(Benefits) - PV(cost)
   NPV = PV(All project cash flows)
2. arbitrage opportunity
   - An arbitrage opportunity occurs when it is possible to make a (possibly random) positive profit without taking any risk or making any investment.
   - Normal Market:
     A competitive market in which there are no arbitrage opportunities.
3. Law of One Price
   - If equivalent investment opportunities trade simultaneously, they must trade for the same price in both markets.

Investment Decision Rules

1. NPV and IRR(Internal rate of return) →
2. Internal Rate of Return (IRR) Investment Rule:
   - Take any investment where the IRR exceeds the cost of capital. Turn down any investment whose IRR is less than the cost of capital.
   - the IRR rule cannot be used to compare projects of different scales.
3. the IRR rule may disagree with the NPV rule and thus be incorrect.
   a. Delayed Investments
   b. Nonexistent IRR
   c. Multiple IRRs
4. The payback period is amount of time it takes to recover or pay back the initial investment
5. The Incremental IRR Rule →
6. The profitability index can be used to identify the optimal combination of projects to undertake.
   - $Profitability\ Index = \frac{NPV}{Resource\ consumed}$





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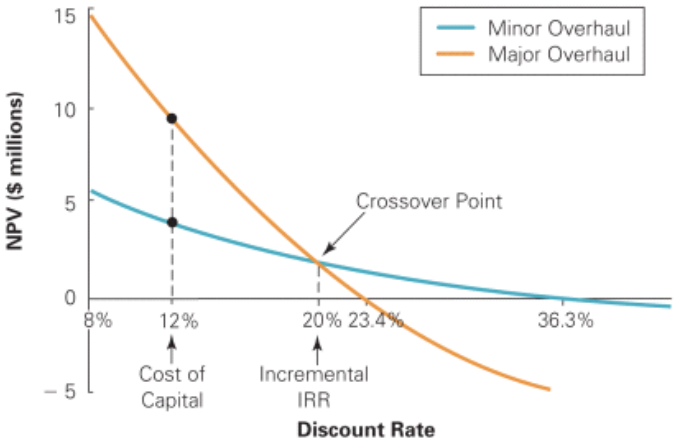

4.★Capital Budgeting

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Fundamentals of Capital Budgeting

1. Capital Budgeting
   - Process used to analyze alternate investments and decide which ones to accept
2. Straight Line Depreciation
   - The asset's cost is divided equally over its life.
   - Annual Depreciation = $7.5 million ÷ 5 years = $1.5 million/year
3. Taxes
   - $\boldsymbol{Unlevered\ Net\ Income} = EBIT \times (1 - \tau_c) = (Revenues - Costs - Depreciation) \times (1 - \tau_c)$
4. **Opportunity Cost**
   - The value a resource could have provided in its best alternative use
5. **Cannibalization**
   - Cannibalization is when sales of a new product displaces sales of an existing product.
6. **Sunk costs**
   - costs that have been or will be paid regardless of the decision whether or not the investment is undertaken

Free cash flow(FCF)

1. **The incremental effect of a project on a firm's available cash is its free cash flow.**

	Year	0	1	2	3	4	5
Incremental Earnings Forecast ($000s)							
1	Sales	—	23,500	23,500	23,500	23,500	—
2	Cost of Goods Sold	—	(9,500)	(9,500)	(9,500)	(9,500)	—
3	**Gross Profit**	—	14,000	14,000	14,000	14,000	—
4	Selling, General, and Administrative	—	(3,000)	(3,000)	(3,000)	(3,000)	—
5	Research and Development	(15,000)	—	—	—	—	—
6	Depreciation	—	(1,500)	(1,500)	(1,500)	(1,500)	(1,500)
7	**EBIT**	(15,000)	9,500	9,500	9,500	9,500	(1,500)
8	Income Tax at 40%	6,000	(3,800)	(3,800)	(3,800)	(3,800)	600
9	**Unlevered Net Income**	**(9,000)**	**5,700**	**5,700**	**5,700**	**5,700**	**(900)**
Free Cash Flow ($000s)							
10	Plus: Depreciation	—	1,500	1,500	1,500	1,500	1,500
11	Less: Capital Expenditures	(7,500)	—	—	—	—	—
12	Less: Increases in NWC	—	(2,100)	—	—	—	2,100
13	**Free Cash Flow**	**(16,500)**	**5,100**	**7,200**	**7,200**	**7,200**	**2,700**

2. **Net Working Capital (NWC)**
   - $NWC = Cash + Inventory + Receivables - Payables$
   - Trade credit is the difference between receivables and payables.
   - $\Delta NWC_t = NWC_t - NWC_{t-1}$

	Year	0	1	2	3	4	5
Net Working Capital Forecast ($000s)							
1	Cash Requirements	—	—	—	—	—	—
2	Inventory	—	—	—	—	—	—
3	Receivables (15% of Sales)	—	3,525	3,525	3,525	3,525	—
4	Payables (15% of COGS)	—	(1,425)	(1,425)	(1,425)	(1,425)	—
5	**Net Working Capital**	**—**	**2,100**	**2,100**	**2,100**	**2,100**	**—**

3. **Free cash flow**
   - $FCF = (Revenues - Cost - Dep.) \times (1 - \tau_c) + Dep. - CapEx - \Delta NWC$
   - $FCF = (Revenues - Cost) \times (1 - \tau_c) - CapEx - \Delta NWC + \boldsymbol{\tau_c \times Dep.}$
     - $\boldsymbol{\tau_c \times Dep.}$ is called the depreciation tax shield
4. **NPV**
   - NPV = $\sum_0^t \frac{FCF_t}{(1+r)^t}$
     - r=WACC(weighted average cost of capital)
     -

	Year	0	1	2	3	4	5
Net Present Value ($000s)							
1	**Free Cash Flow**		(16,500)	5,100	7,200	7,200	7,200	2,700
2	Project Cost of Capital	12%					
3	Discount Factor		1.000	0.893	0.797	0.712	0.636	0.567
4	**PV of Free Cash Flow**		(16,500)	4,554	5,740	5,125	4,576	1,532
5	**NPV**		**5,027**					

5. **Further Adjustments to Free Cash Flow**

a. Other Non-cash Items
   i. Amortization
b. Timing of Cash Flows
   i. Cash flows are often spread throughout the year.
c. Accelerated Depreciation
   i. Modified Accelerated Cost Recovery System (MACRS) depreciation
   ii. MACRS加速折旧法,初期计提折旧较多而在后期计提折旧较少，从而相对加速折旧的方法
d. Liquidation or Salvage Value
   - $Capital\ Gain = Sale\ Price\ - Book\ Value$
   - $Book\ Value = Purchase\ Price - Accumulated\ Depreciation$
   - $After\_Tax\ Cash\ Flow\ from\ Asset\ Sale = Sale\ Price - (\tau_c \times Capital\ Gain)$
   -

	Year	0	1	2	3	4	5
Free Cash Flow and NPV ($000s)							
1	Free Cash Flow w/o equipment	(16,500)	5,100	7,200	7,200	7,200	2,700
	Adjustments for use of existing equipment						
2	After-Tax Salvage Value	(1,600)	—	—	—	—	480
3	Depreciation Tax Shield	—	400	—	—	—	—
4	**Free Cash Flow with equipment**	**(18,100)**	**5,500**	**7,200**	**7,200**	**7,200**	**3,180**
5	**NPV at 12%**	**4,055**					

e. Terminal or Continuation Value
f. Tax Carryforwards
   - Tax loss carryforwards and carrybacks allow corporations to take losses during its current year and offset them against gains in nearby years.

Analyzing the Project

1. **Break-Even Analysis**
   - The break-even level of an input is the level that causes the NPV of the investment to equal zero.
   - **Table** Break-Even Levels for HomeNet

Parameter	Break-Even Level
Units sold	79,759 units per year
Wholesale price	$232 per unit
Cost of goods	$138 per unit
Cost of capital	24.1%

   - EBIT Break-Even of Sales
     - Level of sales where EBIT equals zero
2. **Sensitivity Analysis**
   - Sensitivity Analysis shows how the NPV varies with a change in one of the assumptions, holding the other assumptions constant.
   - **Table 8.9** Best- and Worst-Case Parameter Assumptions for HomeNet

Parameter	Initial Assumption	Worst Case	Best Case
Units sold (thousands)	100	70	130
Sale price ($/unit)	260	240	280
Cost of goods ($/unit)	110	120	100
NWC ($ thousands)	2100	3000	1600
Cannibalization	25%	40%	10%
Cost of capital	12%	15%	10%

3. **Scenario Analysis**
   - considers the effect on the NPV of simultaneously changing multiple assumptions

5.★Cost of Capital and CAPM

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the Equity Cost of Capital

1. Capital Asset Pricing Model (CAPM)
   - $r_i = r_f + \beta_i \times \left(E[R_{Mkt}] - r_f\right)$
2. Passive Portfolio
   - A portfolio that is not rebalanced in response to price changes
3. Market Indexes
   - Report the value of a particular portfolio of securities
   1. S&P 500
      A value-weighted portfolio of the 500 largest U.S. stocks
   2. Wilshire 5000
      A value-weighted index of all U.S. stocks listed on the major stock exchanges
   3. Dow Jones Industrial Average (DJIA)
      A price weighted portfolio of 30 large industrial stocks
4. Exchange-traded funds (ETFs)
   - trade directly on an exchange but represent ownership in a portfolio of stocks

CAPM

1. Determining the Risk-Free Rate
   - The yield on U.S. Treasury securities
   - Surveys suggest most practitioners use 10- to 30-year treasuries
2. The Historical Risk Premium
   - Estimate the risk premium $(E[RMkt] - rf)$ using the historical average excess return of the market over the risk-free interest rate
3. One alternative is to solve for the discount rate that is consistent with the current level of the index.
   - $r_{Mkt} = \frac{Div_1}{P_0} + g = Dividend\ Yield + Expected\ Dividend\ Growth\ Rate$
4. Beta Estimation
   1. beta is the expected percent change in the excess return of the security for a 1% change in the excess return of the market portfolio
   2. Linear Regression
      - $\left(R_i - r_f\right) = \alpha_i + \beta_i\left(R_{Mkt} - r_f\right) + \varepsilon_i$
      - ε_i is the error term and represents the deviation from the best-fitting line and is zero on average.
      - $\mathbf{E}[R_i] = r_f + \beta_i(R_{Mkt} - r_f) + \alpha_i$
      - α_i represents a risk-adjusted performance measure for the historical returns
        - □ If α_i is negative, the stock's historical return is below the SML(security market line)
5. *Debt Yields Versus Returns*
   1. Yield to maturity is the IRR an investor will earn from holding the bond to maturity and receiving its promised payments.
   2. If there is little risk the firm will default, yield to maturity is a reasonable estimate of investors' expected rate of return.
   3. If there is significant risk of default, yield to maturity will overstate investors' expected return.
   - expected return of the bond is
   - $r_d = (1 - p)y + p(y - L) = y - p \times L = Yield\ to\ Maturity - Prob(default) \times Expected\ Loss\ Rate$
6. 2 ways to get expected return
   - Use CAPM
   - Use YTM-expected loss

Given the low rating of debt, we know the yield to maturity of KB Home's debt is likely to significantly overstate its expected return. Using the average estimates in Table 12.2 and an expected loss rate of 60%, from Eq. 12.7 we have

significantly overstate its expected return. Using the average estimates in Table 12.2 and an expected loss rate of 60%, from Eq. 12.7 we have

$$r_d = 6\% - 5.5\%(0.60) = 2.7\%$$

Alternatively, we can estimate the bond's expected return using the CAPM and an estimated beta of 0.26 from Table 12.3. In that case,

$$r_d = 1\% + 0.26(5\%) = 2.3\%$$

While both estimates are rough approximations, they both confirm that the expected return of KB Home's debt is well below its promised yield.

Debt holder and share holder

Cost of Capital

1. Asset (unlevered) cost of capital
   - $r_U = \frac{E}{E+D} \times r_E + \frac{D}{E+D} \times r_D$
   1. Expected return required by investors to hold the firm's underlying assets.
   2. Weighted average of the firm's equity and debt costs of capital
2. Asset (unlevered) beta
   - $\beta_U = \frac{E}{E+D} \times \beta_E + \frac{D}{E+D} \times \beta_D$
3. The difference using method 1 and 2 above

The slight difference in r_U using the two methods arises because in the first case, we assumed the expected return of PG's debt is equal to its promised yield of 3.1%, while in the second case, we assumed the debt has a beta of zero, which implies an expected return equal to the risk-free rate of 3% according to the CAPM. The truth is somewhere between the two results, as PG's debt is not completely risk-free.

   - In 1 we assume debt return equals to yield
   - In 2 we assume debt return equals to risk free rate

4. **Operating leverage**
   1. $Operating\ leverage = \frac{fixed\ costs}{variable\ costs}$
   2. A higher Operating leverage increases the sensitivity of the project's cash flows to market risk.
   3. The project's beta will be higher.
5. In perfect capital markets, choice of financing does **not affect** cost of capital or project NPV.
   - Will be proved next chapter
6. **Weighted Average Cost of Capital (WACC)**, No tax
   - $r_u = \boldsymbol{r_{wacc}} = \frac{E}{E+D} \times r_E + \frac{D}{E+D} \times r_D$
   - Equals to **Asset (unlevered) cost of capital**
   - **Could be used as discount rate of a firm**

6.★Capital Structure

2018年10月3日 1:01

Modigliani-Miller theorem

1. MM's conditions
   a. Free trade
   b. No taxes and other cost
   c. Financial decision do not change cash flows
   d. No asymmetric information
2. MM Proposition I
   - In a perfect capital market, the total value of a firm is equal to the market value of the total cash flows generated by its assets and is not affected by its choice of capital structure.
   - $V_L = V_U$
   - the firm's securities and its assets must have the same total market value.
   - $E + D = U = A$
   - $Equity + Debt = unlevered\ Equity = Assets$ *(all in market value)*
3. MM Proposition II
   - $r_{wacc} = r_U = r_A$
   - $r_E = r_U + \frac{D}{E} \times (r_U - r_D)$
   - We could use expected return on unleveraged equity and debt to get the expected return of an equity
   - The r_{wacc} will not change if r_U not change
   - We could use this to get the new r_E

Leverage

1. The Effect of Leverage
   a. the firm's average cost of capital with leverage is the same as for the unlevered firm.
   b. The Law of One Price implies that leverage will not affect the total value of the firm.
      - It merely changes the allocation of cash flows between debt and equity, without altering the total cash flows of the firm.
2. Levered and unlevered betas
   - $\beta_U = \frac{E}{E+D} \times \beta_E + \frac{D}{E+D} \times \beta_D$
   - $\beta_E = \beta_U + \frac{D}{E} \times (\beta_U - \beta_D)$
3. Leveraged Recapitalization
   - When a firm uses borrowed funds to pay a large special dividend or repurchase a significant amount of outstanding shares

Initial		After Borrowing		After Share Repurchase	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
		Cash	Debt	Cash	Debt
		80	80	0	80
Existing assets	Equity	Existing assets	Equity	Existing assets	Equity
200	200	200	200	200	120
200	**200**	**280**	**280**	**200**	**200**
Shares outstanding (million)	50	Shares outstanding (million)	50	Shares outstanding (million)	30
Value per share	$4.00	Value per share	$4.00	Value per share	$4.00

4. As long as the firm sells the new shares of equity **at a fair price**, there will be **no gain or loss to shareholders** associated with the equity issue itself.
5. Any gain or loss associated with the transaction will result from the **NPV of the investments the firm makes with the funds raised.**

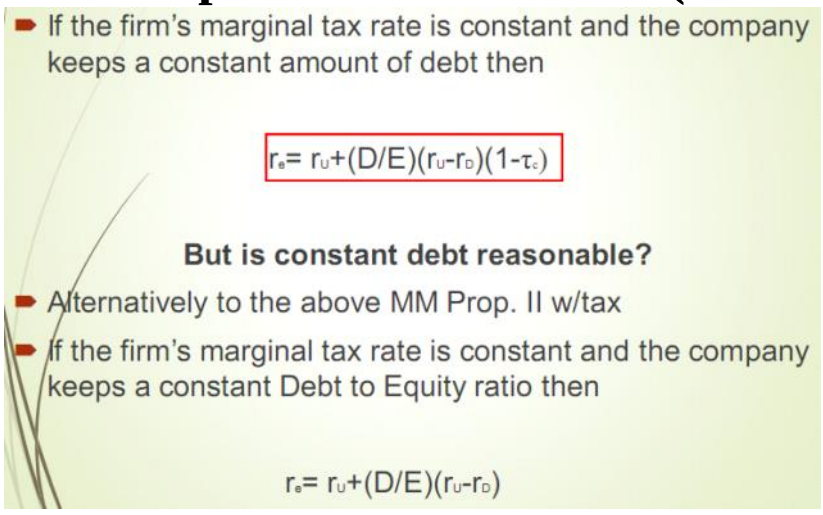
7.★Debt and Taxes

2018年10月3日 12:12

Interest Tax Shield

1. Interest tax shield
   a. Interest Tax Shield = Corporate Tax Rate × Interest Payments
   b. cash flows to investors with leverage = cash flows to investors without leverage + interest tax shield
   c. $\mathbf{V_L = V_U + PV\left(interest\ tax\ shield\right)}$
   d. The final repayment of the principal doesn't contribute to the tax shield
   e. $PV(interest\ tax\ shield) = \tau_c \times D\ (when\ D\ is\ constant)$
   f. MM proposition 1 with taxes(marginal tax rate is constant and constant amount of debt):
      - $V_L = V_U + \tau_c \times D$
   g. MM proposition 2 with taxes(marginal tax rate is constant and constant amount of debt):
      - $r_E = r_U + \frac{D}{E} \times (r_U - r_D)(1 - \tau_c)$
   h. MM proposition 2 with taxes(marginal tax rate is constant and constant D/E ratio):
      - $r_E = r_U + \frac{D}{E} \times (r_U - r_D)$
   i. WACC with taxes
      - $r_{wacc} = \frac{E}{E+D} \times r_E + \frac{D}{E+D} r_D(1 - \tau_c)$
      - Could be used to get V_L
   j. WACC without taxes
      - $r_{wacc} = \frac{E}{E+D} \times r_E + \frac{D}{E+D} r_D$
      - Could be used to get V_U
   k. $PV(\text{interest tax shield}) = V_L - V_U$

MM Proposition II with taxes(see ★MMII with tax)



Share repurchase and No arbitrage pricing

1. After borrow, the value of the firm gain as the interest tax shield
   - $PV(interest\ tax\ shield) = \tau_c \times D\ (D\ is\ constant)$
2. Assume repurchases shares at the current price
   a. Shareholders who keep their shares earn a capital gain
   b. But there will be Arbitrage Opportunity
3. So in fact they can't repurchase shares at the current prices

- Then the holders and the sellers(who sell the shares) will get the same gain(benefit)

Personal taxes and other shields

1. Effective Tax Advantage of Debt τ^*
   - $\tau^* = 1 - \frac{(1-\tau_c) \times (1-\tau_e)}{1-\tau_i}$
   - i: tax on interest
   - c: tax on corporate
   - e: tax on equity
2. The bottom line
   - Calculating the effective tax advantage of debt accurately is extremely difficult.
   - A firm must consider the tax bracket of its typical debt holders, and the tax bracket and holding period of its typical equity holders.
   - The tax advantage of debt will vary across firms and from investor to investor
3. There are numerous provisions in the tax laws for deductions and tax credits, such as depreciation, investment tax credits, carryforwards of past operating losses, etc.
4. Firms in growth industries like biotechnology or high technology carry very little debt, while airlines, automakers, utilities, and financial firms have high leverage ratios.
5. A key item missing from the analysis thus far is that increasing the level of debt increases the probability of bankruptcy.
6. If bankruptcy is costly, these costs might offset the tax advantages of debt financing.

8.★MMII with tax

2018年10月24日 18:42

- If the firm's marginal tax rate is constant and the company keeps a constant amount of debt then

$$r_e = r_U + (D/E)(r_U - r_D)(1-\tau_c)$$

But is constant debt reasonable?

- Alternatively to the above MM Prop. II w/tax
- If the firm's marginal tax rate is constant and the company keeps a constant Debt to Equity ratio then

$$r_e = r_U + (D/E)(r_U - r_D)$$

Just remember it
(I don't know how it come)

a) define and assum:
1. EBIT is constant and forever, Write as e
2. $V_L = D + E$
3. $V_U = V_L - PV(ITS)$
b) for constant D:
4. $r_V = \dfrac{E(1+r_E) + D(1+r_D) - PV(ITS)(1+r_D)}{E + D - PV(ITS)} - 1$

$\Rightarrow r_E = r_U + \dfrac{r_U - r_D}{E}\left(D - PV(ITS)\right)$, where E is changing every year and D does not change

5. $PV(ITS) = D r_D \cdot \tau_c / r_D = D\tau_c$
$\Rightarrow r_E = r_U + \dfrac{D}{E}(r_U - r_D)(1-\tau_c)$

9.★Financial distress

2018年10月3日 14:24

Financial distress, default and bankruptcy

1. Financial distress (财务困境)
   - When a firm has difficulty meeting its debt obligations
2. Default (违约)
   - When a firm fails to make the required interest or principal payments on its debt or violates a debt covenant
3. Bankruptcy (破产)
   - After default, debt holders are given certain rights to the assets of the firm though bankruptcy.
   - The point is if **asset < debt**

The U.S. bankruptcy code

1. Chapter 7 Liquidation
   - A trustee is appointed to oversee the liquidation of the firm's assets through an auction. The proceeds from the liquidation are used to pay the firm's creditors, and the firm ceases to exist.
2. Chapter 11 Reorganization
   - Chapter 11 is the more common form of bankruptcy for large corporations.
   - All pending collection attempts are automatically suspended, and the firm's existing management is given the opportunity to propose a reorganization plan. While developing the plan, management continues to operate the business.
   - The creditors must vote to accept the plan, and it must be approved by the bankruptcy court.
   - If an acceptable plan is not put forth, the court may ultimately force a Chapter 7 liquidation.

Costs of Bankruptcy

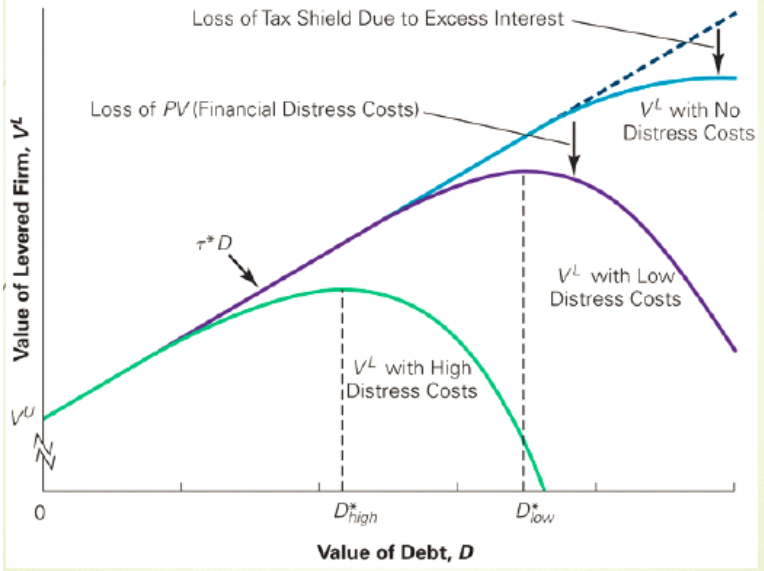
1. Direct Costs
   a. Hire experts, both firm and creditors
   b. Reduce the value of the assets that the firm's investors will ultimately receive.
   c. The average **direct costs** of bankruptcy are **3% to 4% of the market value of total assets**
   - Avoid filing for bankruptcy by first negotiating directly with creditors. Such as reorganize(重组)
   - The direct costs of bankruptcy should not substantially exceed the cost of a workout.
   - Develops a reorganization plan with the agreement of its main creditors (Pre)
2. Indirect Costs
   - often much larger than the direct costs of bankruptcy
   - potential loss due to (indirect cost of) financial distress is 10% to 20% of firm value.
3. Cost of financial distress
   - $PV(financial\ distress\ costs) = discounted\ financial\ distress\ costs$
   - $PV(financial\ distress\ costs) = V_U - V_L$
4. Who pay the cost?
   - Debt holder will pay less initially
   - Although debt holders bear these cost in the end
   - Equity holders pay the present value of the cost of financial distress upfront

Cost of financial distress

1. The probability of financial distress
   - D/E higher, probability higher
   - Volatility of cash flow higher, probability higher
2. The magnitude of the costs after a firm is in distress
3. Discount rate
   - The present value of distress costs will be higher for high beta firms.

Optimal capital structure (Leverage)

1. trading off the benefits of the tax shield from debt against the costs of financial distress and agency costs.
2. $V_L = V_U + PV(\text{Interest Tax Shield}) - PV(\text{Financial Distress Costs})$
3. Firms should increase their leverage until it reaches the level for which the firm value is maximized



10★Capital Budgeting plus

2018年10月3日 15:30

Three Valuation methods

1. **WACC method**
   - The WACC method is a valuation method that uses the WACC
   - $r_{wacc} = \frac{E}{E+D} \times r_E + \frac{D}{E+D} r_D (1 - \tau_c)$
   - FCF is the **unlevered** cash flow from assets
   1. Determine the FCF
   2. Compute the **WACC**
   3. Discounting the FCF using the WACC and get V_0^L
   4. NPV $= V_0^L -$ cost at time 0
   - when should we use WACC method
     1. The project has the comparable risk to the rest of the firm.
     2. The project will not change the firm's D/E ratio
   - Implementing a Constant Debt-Equity Ratio
     1. d is the firm's target debt-to-value ratio
     2. $D_t = d \times V_t^L$ (V_t^L is the levered continuation value on date t.)

	Year	0	1	2	3	4
Project Debt Capacity ($ million)						
1	**Free Cash Flow**	(28.00)	18.00	18.00	18.00	18.00
2	Levered Value, V^L (at $r_{wacc} = 6.8\%$)	61.25	47.41	32.63	16.85	—
3	**Debt Capacity, D_t (at $d = 50\%$)**	**30.62**	**23.71**	**16.32**	**8.43**	—

2. **APV (Adjusted Present Value)**
   - $V_L = APV = V_U + PV(interest\ tax\ shield)$
   - Pretax WACC $= \frac{E}{E+D} \times r_E + \frac{D}{E+D} r_D$
   - It represents investors' required return for holding the entire firm (equity and debt)
   - FCF is the **unlevered** cash flow from assets
   1. ***V_U (investment's value without leverage)***
      1. Determine the FCF
      2. Compute the **Pretax WACC**
      3. Discounting the FCF using the Pretax WACC and get V_U
   2. ***$PV(interest\ tax\ shield)$***
      1. Get $\mathbf{D_t}$
      2. $Interest\ paid\ in\ year\ t = r_D \times D_{t-1}$
      3. $Interest\ tax\ shield = interest \times \tau_c$

	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 $\tau_c = 40\%$)**		**0.73**	**0.57**	**0.39**	**0.20**

      1. Get PV(Interest tax shield) using the Pretax WACC(The tax shield will have the same risk as the firm if the firm maintains a target leverage ratio.)
   3. $V_L = APV = V_U + PV(interest\ tax\ shield)$
   4. NPV $= V_L -$ cost at time 0
   - Firm also may adjust its debt according to a fixed schedule that is known in advance

- That means Predetermined Debt Levels
  - Then we use the given $\mathbf{D_t}$
  - But When debt levels are predetermined, the firm will not have a target leverage ratio(When debt levels are set according to a fixed schedule, we can discount the predetermined interest tax shields using the debt cost of capital)
  - If the debt is permanent, we can use
    - $V_L = V_U + \tau_c \times D$(You cannot compute ruas simply removing (1-tc) from wacc.)
- when should we use APV method
  - When firm does not maintain a constant debt-equity ratio.
  - allows managers to measure their contribution to value.
  - We can easily extend the APV approach to include other market imperfections such as financial distress, agency, and issuance costs

3. FTE (Flow-To-Equity) method

1. Taking into account all payments to and from debt holders
2. Discounted using the equity cost of capital
3. **Free Cash Flow to Equity (FCFE)**
   - The free cash flow that remains after adjusting for interest payments, debt issuance, and debt repayments

	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**

   - $\boldsymbol{Net\ Borrowing\ at\ Date\ t\ = D_t - D_{t-1}}$
   - $\text{FCFE} = \text{FCF} - (1 - \tau_c) \times Interest\ Payments + Net\ Borrowing$

	Year	0	1	2	3	4
Free Cash Flow to Equity ($ million)						
1	**Free Cash Flow**	(28.00)	18.00	18.00	18.00	18.00
2	After-tax Interest Expense	—	(1.10)	(0.85)	(0.59)	(0.30)
3	Net Borrowing	30.62	(6.92)	(7.39)	(7.89)	(8.43)
4	**Free Cash Flow to Equity**	**2.62**	**9.98**	**9.76**	**9.52**	**9.27**

4. Then we get the **NPV(FCFE)** discounting by equity cost of capital
5. Identical to the NPV computed using the WACC and APV methods.

- when should we use FTE method
  - If the firm's capital structure is complex and the market values of other securities in the firm's capital structure are not known.
  - Be viewed as a more transparent method for discussing a project's benefit to shareholders by emphasizing a project's implication for equity.
- Disadvantage

- Must compute the project's debt capacity to determine the interest and net borrowing before capital budgeting decisions can be made.

Project-Based Costs of Capital

1. Different projects will may vary in the amount of leverage they will support.
2. Pretax WACC (r_U) could be estimated from other firms' data.
3. $r_E = r_U + \frac{D}{E} \times (r_U - r_D)$
4. $r_{wacc} = \frac{E}{E+D} \times r_E + \frac{D}{E+D} r_D (1 - \tau_c)$

Other Effects of Financing

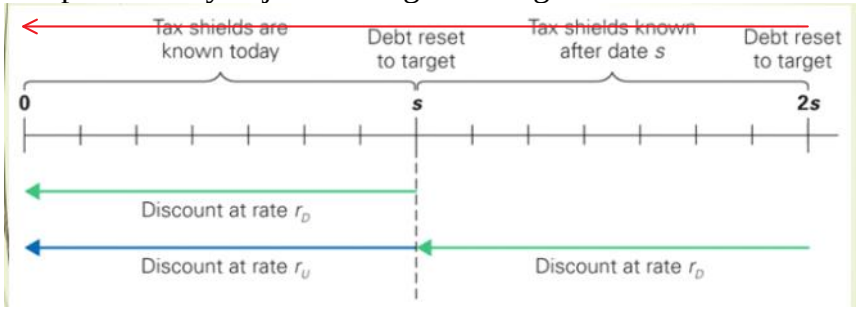
1. banks charge fees (they provide the loan or underwrite the sale of the securities)

Financing Type	Underwriting Fees
Bank loans	< 2%
Corporate bonds	
Investment grade	1–2%
Non-investment grade	2–3%
Equity issues	
Initial public offering	8–9%
Seasoned equity offering	5–6%

2. Security Mispricing
   - Pay more for debt, it is a cost of the project for existing shareholders
   1. Use statements, discount factor is $r_{correct}$
   2. Discount $(r_{wrong} - r_{correct}) \times principle \times (1 - \tau_c)$,discount factor is $r_{correct}$
3. Financial Distress and Agency Costs

Advanced Topics in Capital Budgeting

1. Periodically Adjusted Debt
   - periodically adjust leverage to bring it back into line with the target.



   - The firm's interest tax shields up to date s are predetermined and should be discounted at rate rD.
2. Not maintain a constant debt-equity ratio★★★

	Year	0	1	2	3	4
Unlevered Value ($ million)						
1	Free Cash Flow	(28.00)	18.00	18.00	18.00	18.00
2	Unlevered Value, V^U (at r_u = 8.0%)	59.62	46.39	32.10	16.67	—
Interest Tax Shield						
3	Debt Schedule, D_t	30.62	20.00	10.00	—	—
4	Interest Paid (at r_d = 6%)	—	1.84	1.20	0.60	—
5	Interest Tax Shield (at τ_c = 40%)	—	0.73	0.48	0.24	—
6	Tax Shield Value, T^s (at r_D = 6.0%)	1.32	0.67	0.23	—	—
Adjusted Present Value						
7	**Levered Value, $V^L = V^U + T^s$**	**60.94**	**47.05**	**32.33**	**16.67**	—
Effective Leverage and Cost of Capital						
8	Equity, $E = V^L - D$	30.32	27.05	22.33	16.67	—
9	Effective Debt, $D^s = D - T^s$	29.30	19.33	9.77	—	—
10	Effective Debt-Equity Ratio, D^s/E	0.966	0.715	0.438	0.000	
11	**Equity Cost of Capital, r_E**	**9.93%**	**9.43%**	**8.88%**	**8.00%**	
12	**WACC, r_{wacc}**	**6.75%**	**6.95%**	**7.24%**	**8.00%**	

- For each t
- $T^s = \left(discount\ at\ r_D\right) \sum \left(D \times \mathrm{r_D} \times \tau_c\right)$ (*see sheet above*)
- $V^L = V^U + T^s$
- $D = D$
- $E = V^L - D$
- $\mathrm{r_D} = \mathrm{r_D}$
- $r_E = r_U + (\frac{D - T^s}{E}) \times (r_U - \mathrm{r_D})$
- $\mathrm{r_{wacc}} = \frac{\mathrm{E}}{V^L}\mathrm{r_E} + \frac{\mathrm{D}}{V^L}\mathrm{r_D}(1 - \tau_c)$

	Year	0	1	2	3	4
WACC Method ($ million)						
1	Free Cash Flow	(28.00)	18.00	18.00	18.00	18.00
2	WACC, r_{wacc}	6.75%	6.95%	7.24%	8.00%	
3	**Levered Value V^L (at r_{wacc})**	**60.94**	**47.05**	**32.33**	**16.67**	—

- $V_t^L = \frac{FCF_{t+1} + V_{t+1}^L}{1 + r_{wacc}(t)}$

@

	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**

16★Payout policy

Free cash flow

1. Retain
   a. Invest in new projects
   b. Increase cash reserves
2. Pay out
   a. Repurchase shares
   b. Pay dividends
      - Special dividend
      - Stock split (stock dividend) (in fact, nothing) (be attractive to small investors)

Dividend Dates

1. Declaration date
2. Ex-Dividend date
3. Record date
4. Payable date

Share Repurchase (or buyback)

1. Open market repurchase
   - Buying shares in the open market
   - 95%of all repurchase
2. Tender(投标) offer
   - Public announcement of an offer to all existing security holders to buy back a specified amount of outstanding securities as a prespecified price over a prespecified period of time.
   - Dutch auction(拍卖): lists different prices, shareholders indicate how many shares they are willing to sell. The firm then pay the lowest price at which it can buy back its desired number of shares.

Dividends V.S. Repurchase

- Excess cash: 20m
- R_u: 12%
- Shares: 10m
- Cash flow: 48m/year

a. Cum-dividend price:
$$2 + \frac{4.8}{0.12} = 42$$
b. Ex-dividend price:
$$\frac{4.8}{0.12} = 40$$
c. Repurchase:
$$\frac{400}{10 - \frac{20}{42}} = \frac{400}{\left(\frac{420 - 20}{42}\right)} = 42$$
d. Homemade dividend:
$2000 \times 2 = 4000\ today$
$2000 \times 4.8 = 9600\ future$
$=>$
$2000 \times 2 + 40 \times 125 = 9000\ today$
$(2000 - 125) \times 4.8 = 9000\ future$
e. High dividend (Issue new equity) (plan to pay dividend 48m today) (the same as future):

Issue: $\frac{48-2\times10}{42}=\frac{2}{3}$

Dividend every year: $\frac{48}{10+\frac{2}{3}}=4.5$

Price: $4.5+\frac{4.5}{0.12}=42$

Higher current dividend=>future dividends lower

Lower current dividend=>future dividends higher

Modigliani-Miller

In perfect capital markets, The firm's choice of dividend policy is irrelevant and does not affect the initial share price

The tax disadvantage of dividends

- Tax for dividends (td) are typically higher than Tax for capital gains (tc)
- Long-term investors can defer the capital gains tax forever by not selling
- td > tc: prefer share repurchases rather than dividends
- Optimal dividend policy when td > tc: pay no dividends at all
- Firms may attract different groups of investors depending on their dividend policy
- Clientele effect: dividend policy reflects the tax preference of its investor clientele
  - Individual investors: prefer repurchase
  - Institutions, pension funds: prefer dividend
  - Corporations: prefer dividend
- Sell shares before dividend to avoid high tax
- Firm change dividends infrequently
- Investors prefer stable dividends
- Maintain a long-term target level of dividends as a fraction of earnings

Increase/decrease dividend

- Increase: be able to afford the higher dividend
- Decrease: need to reduce the dividend to save cash

But

- Increase: lack of investment opportunities
- Decrease: to exploit new positive-NPV investment opportunities