AF3313 Corporate Finance Review

Chapter 02

$$\mathbf{CF(A) = OCF - CS - \Delta NWC}$$

- **CF(A) = CF(B) + CF(S)**
  - **Debt (Cash Flow to Creditors, CF(B))** = Interest - change of debt = Interest - (New debt - Retirement/payback/redeemed of debt)
  - **Equity (Cash Flow to Stockholders, CF(S))** = Dividends + Repurchase of stock - new stock issue
- **Operating cash flow(OCF)** = EBIT + Depreciation – Taxes = Net income + Depreciation = Sales - Costs - Taxex = (Sales - Costs)(1-T) + Depreciation*T
- **Capital spending** = 购买/维修 PPE = Purchase(Acquisitions) of fixed assets - Sales of fixed assets
- **Additions to net working capital** = ΔNWC = change of NWC -> sum = 0
  - **Net Working Capital (NWC)** = current asset - current liability

Income Statement

Sales
- Cost of goods sold
- Selling costs/expenses
- Depreciation
EBIT
- Interest
Taxable income
- Taxes (Current + Deffered)
= Net income (Addition to retained earnings + Dividends)

OCF
- Capital spending (购买/维修 PPE)
- NWC (sum=0)
= incremental Cash Flow, CF(A)

Chapter 04. Discounted Cash Flow Valuation

- **The One-Period Case**

$$\mathbf{FV = C_0(1 + r)} \qquad \mathbf{PV = \frac{C_1}{1 + r}}$$

- **The Multiperiod Case**
  - Compounding 复利和**Compounding Periods 多年期复利**, 拿现在的钱去算将来的钱
  - **r代表一个单位，T代表一共多少个单位**

$$\mathbf{FV = C_0(1+r)^T \ \Rightarrow \ FV = C_0(1+\frac{r}{m})^{mT}}$$

  - Present Value and Discounting 现金与折现, 拿将来的钱去算现在的钱

$$\mathbf{PV = \frac{C_T}{(1+r)^T}}$$

- **Simplifications 简化**

  PV 算的是 one period before the first payment
  - **Perpetuity 永续年金:** 源源不断的现金流 **(生命周期无限)**

$$\mathbf{PV = \frac{C}{r}}$$

  - **Growing perpetuity 增长性永续年金:** 能始终以某固定的增长率保持增长的一系列现金流 **(生命周期无限 + 有增长率 g)**

$$\mathbf{PV = \frac{C}{r-g}}$$

  - **Annuity 年金:** 一系列稳定有规律的、**持续一段固定时期(T)**的现金收付活动 **(生命周期有限T)**

$$\mathbf{PV = \frac{C}{r}[1-\frac{1}{(1+r)^T}]}$$
$$\mathbf{FV = PV(1+r)^T}$$

  - **Growing annuity 增长型年金: 在一定时期内(T)**，保持以固定比率增长的一系列现金流 **(生命周期有限T + 有增长率 g)**

$$\mathbf{PV = \frac{C}{r-g}[1-(\frac{1+g}{(1+r)})^T]}$$

Chapter 05. NPV & Other Investment Rules

Independent Projects(独立项目)，可以都选。

Mutually Exclusive Projects(互斥项目)，只能二选一。

- **Net Present Value (NPV): 越高越好**
  - **NPV** is the sum of the present value of the cash flows from the project
  - 最低可接受法则为：**如果 NPV >0，则接受项目**
  - 排序法则：**选择NPV最高的项目**

$$\mathbf{NPV = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_t}{(1+r)^t} = C_0 + \sum_{t=1}^{T}\frac{C_t}{(1+r)^t}}$$
$$\mathbf{C_0 = positive\ cash\ flows,\ represents\ cash\ receipts}$$
$$\mathbf{C_0 = negative\ cash\ flow,\ represents\ cash\ payment}$$

- **Profitability Index (PI): 选>0**

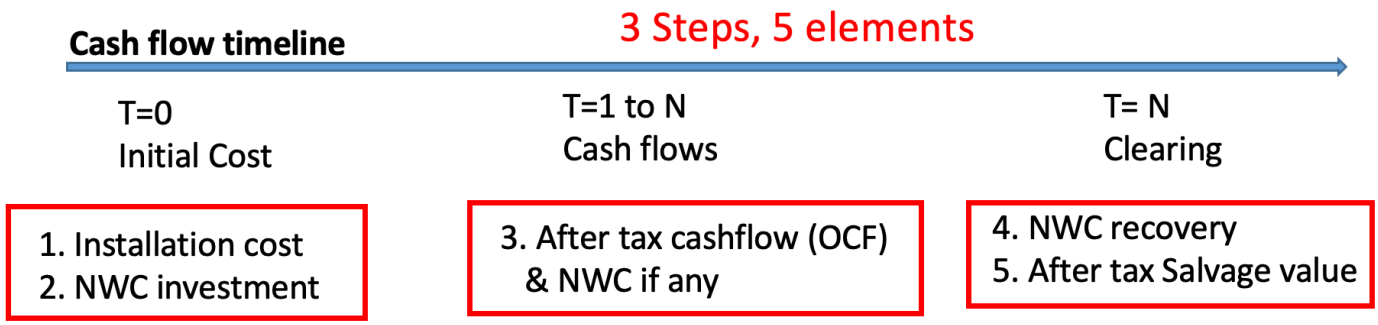
$$\mathbf{PI_2} = \frac{\mathbf{PV}}{\mathbf{-C_0}} = \frac{\frac{\mathbf{C_1}}{(1+\mathbf{r})} + \frac{\mathbf{C_2}}{(1+\mathbf{r})^2} + \cdots + \frac{\mathbf{C_T}}{(1+\mathbf{r})^{\mathbf{T}}}}{\mathbf{-C_0}} \ \mathbf{(accept,\ if\ PI_2 > 1)}$$

PI_1和PI_2在项目选择方面应该有相同的答案，因为它们等同于数字相差1

- **Discount Payback Period (DPB): 越小越好**
  - how long it takes to payback on **a discounted basis** 在折扣的基础上需要多长时间才能收回
  - $$\mathbf{Cash\ Flow\ of\ Present\ Value(PV)} = \frac{\mathbf{C_T}}{\mathbf{(1+r)^T}}$$

	Cash flows					Present Value			
Year	A	B	C	D	$PVIF_{10\%}$	A	B	C	D
0	-1000	-1000	-1000	-1000	1	-1000	-1000	-1000	-1000
1	100	0	100	200	0.90909	90.9091	0	90.9091	181.818
2	900	0	200	300	0.82645	743.802	0	165.289	247.934
3	100	300	300	500	0.75131	75.1315	225.394	225.394	375.657
4	-100	700	400	500	0.68301	-68.3013	478.109	273.205	341.507
5	-400	1300	1250	600	0.62092	-248.369	807.198	776.152	372.553
DPP						∞	4.3675*	4.31592	3.5698

Chapter 06. Making Capital Investment Decisions



- **Incremental Cash Flows = Cash Flow From Assets (CFFA)**

$$\mathbf{Earnings} \neq \mathbf{Cash}$$

- if the value is **positive** then it is a **cash inflow**. If the value is **negative**, then it is a **cash outflow**

$$\mathbf{CFFA = OCF - CS - \Delta NWC}$$
$$\mathbf{CS = capital\ spending\ (购买/维修\ PPE)}$$
$$\mathbf{\Delta NWC = change\ in\ net\ working\ capital\ (current\ assets - current\ liabilities)}$$

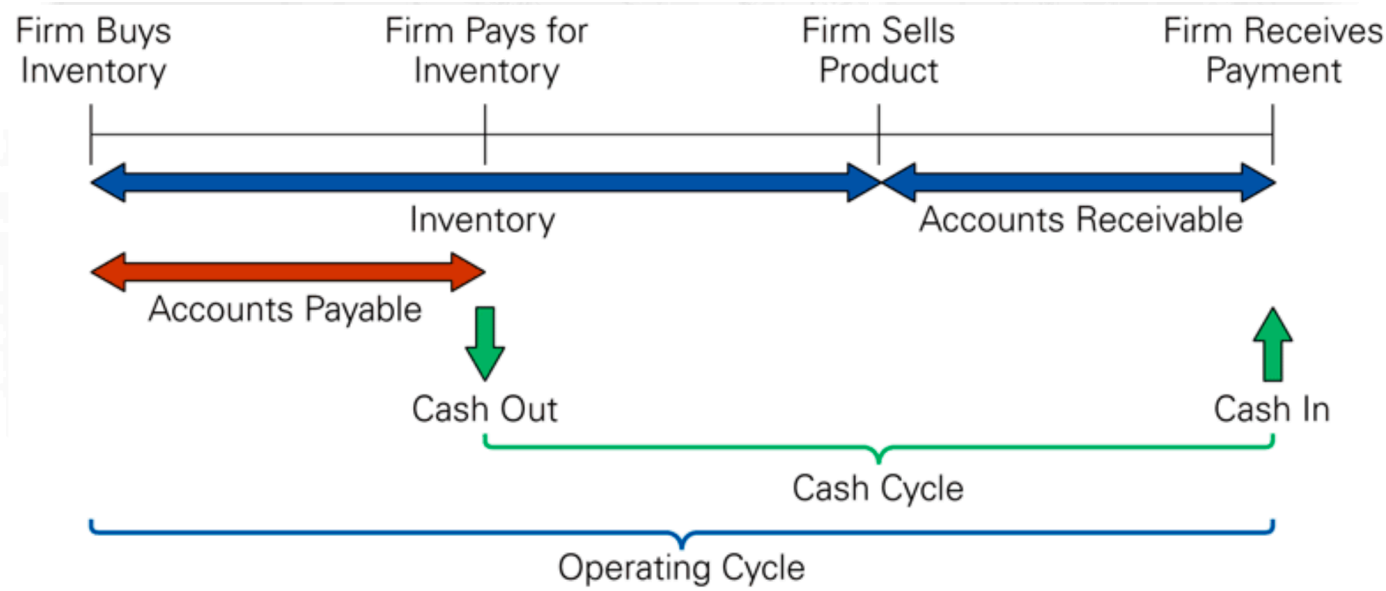
- **Operating Cash Flows (OCFs)**
  - 公司运营产生的现金流量

$$\textbf{Bottom Up}: \ \textbf{OCF} = \textbf{NetIncome} + \textbf{depreciation}$$
$$\textbf{Top Down}: \textbf{OCF} = \textbf{Sales–Costs–Taxes}$$
$$\textbf{Tax Shield}: \textbf{OCF} = (\textbf{Sales–Costs})(\textbf{1–T}) + \textbf{Depreciation} * \textbf{T} \ (\textbf{T是税率})$$
$$\textbf{Net Income(NI)} = (\textbf{sales} - \textbf{costs}) - \textbf{Depreciation}$$

- **Change in Net working Capital (ΔNWC)**
- **After-tax Salvage**, salvage = Market value

$$\textbf{After tax salvage} = \textbf{Salvage–T(Salvage} - \textbf{Book value)} = \textbf{MV} - \textbf{T(MV} - \textbf{BV)}$$

Lecture 06 Chapter 26-28



Operating Cycle = Inventory Period + A/R Period

Cash Cycle = Operating Cycle – A/P Period

$$\textbf{Inventory turnover} = \frac{\textbf{Cost of Good Sold}}{\textbf{Average inventory}}$$
$$\textbf{Inventory period} = \frac{\textbf{365}}{\textbf{Inventory turnover}}$$

$$\textbf{Accounts Receivable turnover} = \frac{\textbf{Sales}}{\textbf{Average Accounts receivable}}$$
$$\textbf{Accounts Receivable period} = \frac{\textbf{365}}{\textbf{Accounts receivable turnover}}$$

$$\textbf{Accounts Payable turnover} = \frac{\textbf{Cost of Good Sold}}{\textbf{Average Accounts Payable}}$$
$$\textbf{Accounts Payable period} = \frac{\textbf{365}}{\textbf{Accounts Payable turnover}}$$

- **Credit Management**

$$\textbf{One Time Sale}: \ \mathbf{NPV} = -\mathbf{v} + \frac{(1-\pi)\mathbf{P}}{(1+\mathbf{r})}$$

$$\textbf{Repeat Customers}: \ \mathbf{NPV} = -\mathbf{v} + \frac{(1-\pi)(\mathbf{P}-\mathbf{v})}{\mathbf{r}}, \quad \textbf{defaults once, NO grant credit again}$$

$$\mathbf{v} = \textbf{variable cost}; \ \pi = \textbf{default probability 违约率}; \ \mathbf{P} = \textbf{current price}; \ \mathbf{r} = \textbf{required return rate}$$

Chapter 08-09 Valuation of Bonds & Stocks

- **Bond (债券)**

$$\textbf{Bond value} = \frac{\mathbf{C}}{\mathbf{r}} \times [1 - \frac{1}{(1+\mathbf{r})^{\mathbf{T}}}] + \frac{\mathbf{FV}}{(1+\mathbf{r})^{\mathbf{T}}}$$

$$\mathbf{C}: \textbf{Coupon paid each period} = \textbf{Coupon rate} * \mathbf{FV}$$

$$\textbf{interest rates}\uparrow \textbf{ present values}\downarrow, \ \textbf{interest rates}\uparrow \textbf{ bond prices}\downarrow$$

- **Stocks (股票)**
  - **Zero Growth** (Dividends will remain at the sa‘；me level forever) 生命周期无限，未来现金流是恒定的

$$\mathbf{P_0} = \frac{\mathbf{Div_1}}{\mathbf{R}}$$

  - **Constant Growth** (Dividends will grow at a constant rate "**g**", forever) 生命周期无限，未来现金流永远以 g 增长

$$\mathbf{P_0} = \frac{\mathbf{Div_1}}{\mathbf{R}-\mathbf{g}}$$

$$\mathbf{R}(\textbf{cost of equity}) = \textbf{Dividend yield} + \textbf{Capital gains yeild} = \frac{\mathbf{Div_1}}{\mathbf{P_0}} + \mathbf{g}$$

  - **Differential Growth** (Dividends will **grow at rate *g*1 for *N* years** and **grow at rate *g*2 thereafter**.

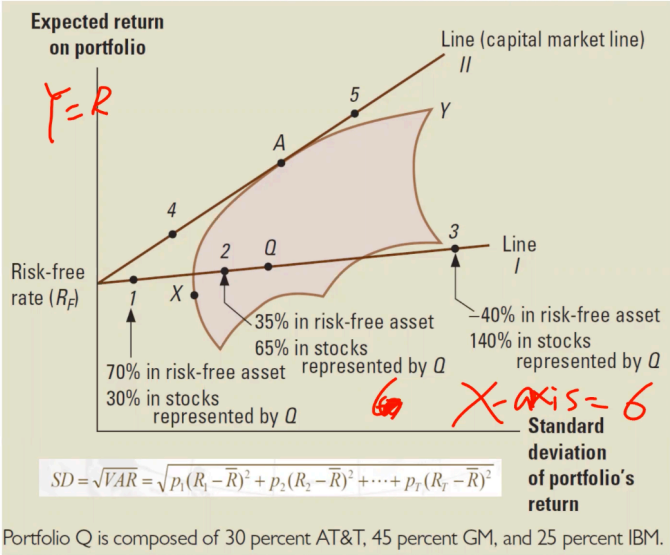
$$\mathbf{P_0} = \frac{\mathbf{C_0} \times (1+\mathbf{g_1})}{\mathbf{r}-\mathbf{g_1}} [1 - \frac{(1+\mathbf{g_1})^{\mathbf{T}}}{(1+\mathbf{r})^{\mathbf{T}}}] + \frac{\frac{\mathbf{C_0} \times (1+\mathbf{g_1})^{\mathbf{T}} (1+\mathbf{g_2})}{\mathbf{R}-\mathbf{g_2}}}{(1+\mathbf{r})^{\mathbf{T}}}$$

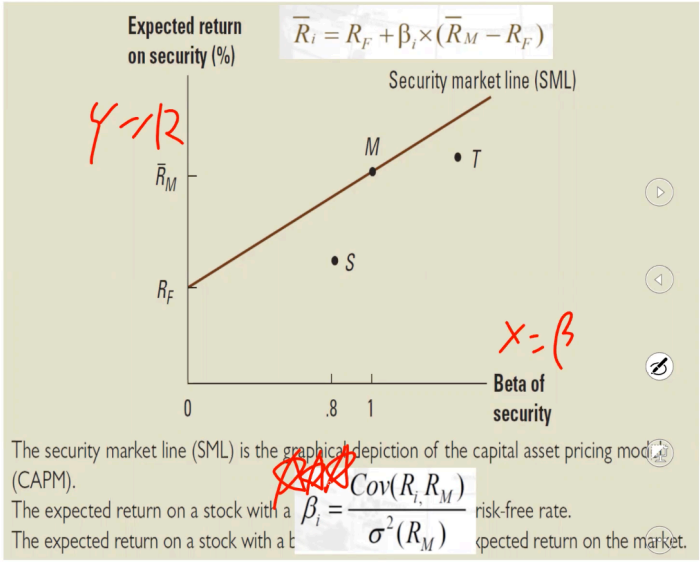
$$\mathbf{P_n} = \frac{\textbf{last divident forever}}{\mathbf{r}}$$

$$\mathbf{P_0} = \frac{\mathbf{C_1}}{(1+\mathbf{r})} + \frac{\mathbf{C_2}}{(1+\mathbf{r})^2} + \ldots + \frac{\mathbf{C_n}+\mathbf{P_n}}{(1+\mathbf{r})^{\mathbf{n}}}$$

Chapter 11 The Capital Asset Pricing Model

- **Portfolios (证券投资组合)**
- **Capital Asset Pricing Model (CAPM)**
- **Capital market line (CML)**





Chapter 13 Risk, Cost of Capital & Capital Budgeting

Debt-to-Equity (D/E) Ratio Formula and Calculation

$$\text{Debt/Equity} = \frac{\text{Total Liabilities}}{\text{Total Shareholders' Equity}}$$

WACC

$$WACC = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D$$

After-tax WACC

$$WACC = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - T_c)$$

Interest paid to debt holders are tax-deductible.

E and D Should be market value at beginning time

Final

Debt(Creditors) versus Equity(Shareholder)

- **Creditors** generally receive the **first claim on the firm's cash flow**, and they receive a **fixed interest rate** regardless of the performance of the business.
- **Shareholder's equity** is the **residual difference between assets and liabilities**, and they receive **dividends or capital gains** only if the business makes enough profit.
- **Shareholder's equity take on more risk** but also have a **greater return** than debt holders (Creditors).

The dividend growth model calculates total return, the total return of stock:

- **The required return (R)** has two components.

- **Dividend yield (Div/P):** This is calculated as the **expected cash dividend (D)** divided by **the current price (P).**
- **Capital gains yield / Dividend growth rate (g):** The rate at which **the value of the investment grows.**

$$R = \text{Dividend yield} + \text{Capital gains yield}$$
$$R = \quad \text{Div}/P_0 \quad + \quad g$$

The CAPM suggests that the expected return is a function of

- **Risk-free rate of return:** is the **pure time value of money.**
- **Beta:** is **the amount of systematic risk present in a particular asset.** 特定资产中存在的系统性风险
- **Market risk premium:** is **the reward for bearing systematic risk.** 承担系统性风险的回报

$$\overline{R}_i = R_F + \beta_i \times (\overline{R}_M - R_F)$$

$$\begin{matrix}\text{Expected} \\ \text{return on} \\ \text{a security}\end{matrix} = \begin{matrix}\text{Risk-} \\ \text{free rate}\end{matrix} + \begin{matrix}\text{Beta of the} \\ \text{security}\end{matrix} \times \begin{matrix}\text{Market risk} \\ \text{premium}\end{matrix}$$

- A **flexible short-term finance policy** would maintain a **high** ratio of current assets to sales.
  - Keeping large **cash balances** and **investments in marketable securities**
  - Large investments in **inventory**
  - **Liberal credit terms**
- A **restrictive short-term finance policy** would maintain a **low** ratio of current assets to sales.
  - Keeping low cash balances, no investment in marketable securities
  - Making small investments in inventory
  - Allowing no credit sales (thus no accounts receivable)