

職業準則 精華重點摘錄

準則 I: Professionalism

1 A: Knowledge of the Law

- 1 · 要遵守最嚴格法令的規定。
- 2 · 遇到公司有違反法律或準則的行為時，要遠離該不法行為即可，積極的話要將該違反事項告知相關部門或上司。

1 B: Independence and Objectivity

- 1 · 不接受上市公司的招待，上市公司送的禮物，只能收價值非常輕的禮物。
- 2 · 研究部和承銷部之 **firewall** 建立，**restricted list** 建立，讓研究部或自營部沒有機會不當利用。
- 3 · 投資人員儘量不要參與 **IPO** 及 **private placement**。
- 4 · **Issuer-paid research**(上市公司雇用研究員寫該公司報告，以增加該公司的知名度)可被接受，但要向客戶揭露服務收入，且最好是拿一次性費用。

1 C: Misrepresentation

- 1 · 不能向客戶保證(**assure or guarantee**)某一商品或投資的獲利，但有保證收益的商品之事實陳述，不再此限。
- 2 · 不能向客戶說明不實的服務、能力、或(預期)績效等。但如果無心之過則不屬之。
- 3 · 不能 **plagiarize**(剽竊)他人的作品，即使是簡單的專有名詞定義，如果是原封不動從他處抄來的，也要註明出處。

1 D: Misconduct

- 1 · 不得有違反道德良知的行為或違反專業的行為(如上班時間跟同事打架)。例如履歷表不實造假、拿走公司的機密文件給競爭公司。

準則 II: Integrity of Capital Markets

2 A: Material Nonpublic Information

- 1 · 不得利用內線消息交易，但利用公開且重要及非公開但不重要的資訊，自己加以研究組成的重要且非公開資訊，因符合 **Mosaic Theory**，可加以利用。
- 2 · 內線消息一經公佈即可用，不用 **wait for the slowest method of delivery**

2 B: Market Manipulation

- 1 · 不得散佈不實消息或從事通謀虛偽交易來企圖影響價量。
- 2 · 正常的交易，只是因此造成價格的大幅波動，不算違法 2B

準則 III: Duties to Clients

3A: Loyalty, Prudence, and Care

1. 客戶的資產，如委託書的投票(proxy voting)，要投 non-routine issues，且投票的政策要揭露。
2. Commission 也是客戶的資產，手續費有 paid-up 的情形，一般稱之為 soft dollars，則所購買的服務或商品一定要符合研究的範圍，也就是該產品要有助於受託人的投資決策品質，千萬不能將 soft dollars 的錢用在非研究的支出上。

3 B: Fair Dealing

1. 推薦股票及下單時一視同仁，遇到 IPO 等熱門且立即能獲利的商品，應依照客戶的資產比重及優戶的適當性(appropriate)等量(pro rata)配單。
2. 可以收取不同的服務等級(Different levels of services)費用，但不能違反公平對待的原則，而且要在成為客戶前，就要告知會有不同的服務等級

3 C: Suitability

1. 在理專關係中，要先了解客戶，才能推薦適合的商品
2. 不能預設投資組合讓新客戶二選一或三選一，每一個客戶都是獨特的
3. 投資組合要整體觀念，不要個別計較。
4. 當客戶設定投資組合或共同基金要遵守一定政策(mandate)時，投資的標的物不能偏離該政策所規範的投資標的以外。

3 D: Performance Presentation

1. 模擬的績效要揭露，有沒有扣掉管理費要揭露，但不一定要經過第三者驗證

3 E: Preservation of Confidentiality

1. 客戶資料原則上要保密，除非客戶認為沒有保密的必要而事先同意可以揭露給第三者。

準則 IV: Duties to Employers

4 A: Loyalty

1. 在工作期間，不得從事其它和目前雇主有競爭性的工作，除非獲得雇主書面同意。
2. 離職前當然可以在下班時間從事離職前的準備工作，但不得帶走其在公司完成的作品，研究報告，及客戶名單。

4 B: Additional Compensation Arrangements

1. 在公司工作，或在外從事與雇主相同的競爭性工作，而獲致任何的好處，在接受該好處前，都要獲得原雇主的書面同意。

4 C: Responsibilities of Supervisors

- 1 · 上位者的責任在於要盡好監督之責。
- 2 · 可以將部分上位者的責任授權給下面的人，但留有最終的責任。

準則 V: Investment Analysis, Recommendations, and Actions

5 A: Diligence and Reasonable Basis

- 1 · 可以引用他人的報告作為自己的意見，只要確保第二者、第三者的報告符合嚴謹性即可。
- 2 · 可以尊重公司團體的決策，而掛名出具和原本建議不完全一致的報告。

5 B: Communication with Clients and Prospective Clients

- 1 · 要將投資決定的基本形成過程及法則，向客戶說明。
- 2 · 投資標的物的相關重要考量因素，要因每次的投資建議的不同目的，清楚呈現讓客戶知道。投資風險也要在其所推薦的投資工具中充分說明。
- 3 · 在研究報告的陳述時，要嚴格區分某個看法是自己的意見，還是事實的結論，要嚴格區分事實或意見的不同。

5C: Record Retention

- 1 · 和客戶制定的投資政策書，明定資產配置的比重，或是研究報名的制定過程有詳細的紀錄，在遇到有法律糾紛時，較容易排除。
- 2 · 如果一國的資料保存期限沒有規定的話，CFA 協會建議為 7 年

準則 VI: Conflicts of Interest

6 A: Disclosure of Conflicts

- 1 · 任何造成利益衝突的情況，最常見的情形有：自己擁有股票，自己公司的承銷部和研究部的利益瓜葛，及自己或自己的家人(direct family member)擔任某家上市公司的董事。注意：不要跟雇主揭露你要遵守 CFA 的 Codes and Standards.

6 B: Priority of Transactions

- 1 · 客戶交易優先，公司部位交易也優於個人交易。
- 2 · 公司應建立內部控制，讓員工沒辦法偷偷先行交易，包括 watch list, pre-clearance procedures, duplicate brokerage statements, block-out periods。

6 C: Referral Fees

- 1 · 推介服務給第三者，如果有來自於第三者的好處，一定要向被推介的人知悉。
- 2 · 客戶來找上門，如果是因為關係人的介紹，也要向客戶說明這層關係。
- 3 · 在成為客戶之間，就要揭露推介費的金額，本質等，而不是成為客戶後在告知。

準則 VII: Responsibilities as CFA Institute or CFA Candidate

7 A: Conduct as Members and Candidates in the CFA Program

1· CFA 候選人在考試過程及準備過程中，不得有任何欺瞞的行為。不要假公濟私，或在 **Professional Conduct Statement** 中刻意不揭露自己過去的行為已經觸犯 **Standards** 的規定

7 B: Reference to CFA Institute, the CFA Designation, and the CFA Program

- 1· 正確使用 CFA 標章，包括在完整句子中，CFA 一定要當形容詞，在名片上，CFA 三個字後面不能加任何的符號。
2. 有 CFA 證照不能號稱其有特別的能力，或其績效出眾和 CFA 有關，例如不能說”As a CFA Charterholder, I am the most qualified to manage your assets”; 但可以說:”completion in the CFA program has enhanced my portfolio management skills”，但可以說明自己連續三年過三級(pass three levels on the first try/in three consecutive years)。
- 3· CFA 的 LOGO 不能當成公司文書的上面的標章(Letterhead)，但私人信件上可以使用(前提是自己目前是 CFA 持狀人)

GIPS 的重點:

- 1· **Definition of the Firm** (不一定是一家公司，只要有獨立的部門及決策權即可)。
- 2· 有全權決策權且付費的帳戶(**Discretionary and fee-paying accounts or portfolios**)，一定要根據相似的投資策略，放在一個指數中。但公司的資產則需包含所有的帳戶，不管是有收費還是有全權決策權(**O.A.3**)
- 3· **(Composite)Historical Performance Record:** 最少五年，如果公司或指數少於五年，則成立後起每一年均要符合 GIPS 的規範。五年符合 GIPS 後，未來的五年也要繼續符合，並且 2000 年 1 月 1 日後每一年均要符合 GIPS 的規定。
- 4· GIPS 規定的八大要旨或強制規定類別: **Fundamental of compliance, Input data, Calculation methodology, Composite construction, Disclosure, Presentation and reporting, Real estate, Private equity**。
- 5· GIPS 不能和當地法令衝突，當衝突發生時，仍要遵守當地的法令，惟仍可宣稱自己的公司符合 GIPS，只是要將衝突的地方標明出來。
- 6· **Verification** 的重點: 要對公司整體為之，不能對單獨指數，最少期限為 1 年，是自願性的，一定是第三者來做驗證。

注意2010年GIPS新生效的規定：

編號	2010年新規定
1.A.3 (2.A.2.b) & 1.A.4	Firms must value portfolios on the date of all <i>large</i> external cash flows and the calendar month-end or the last business day of the month
2.A.6	Composite returns must be calculated by asset weighting the individual portfolio returns at least monthly
3.A.7	Carve-out returns are not permitted to be included in single asset class composite returns unless the carve-out is actually managed separately with its own cash balance

數量分析 精華重點摘錄

重點 1:

The interest rate, r , is the required rate of return, r is also called the discount rate or opportunity cost.

An interest rate can be viewed as the sum of the real risk-free interest rate and a set of premiums that compensate lenders for risk; an inflation premium, a default risk premium, a liquidity premium, and a maturity premium.

$$FV = PV(1 + r)^n$$

重點 2:

An annuity is a finite set of sequential cash flows, all with the same value

An Ordinary annuity has a first cash flow that occurs one period from now

Annuity due: An annuity due has a first cash flow that is paid immediately

重點 3:

PV of a series even cash flow and PV of Perpetuity

$$PV = \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \frac{A}{(1+r)^3} + \dots + \frac{A}{(1+r)^{n-1}} + \frac{A}{(1+r)^n}$$

A=the annuity amount

r= the interest rate

N=the number of annuity payments

$$PV = \frac{A}{r}$$

重點 4:

NPV = $\sum_{t=0}^n \frac{CF_t}{(1+r)^t}$

CF_t = the expected net cash flow at time t

n=the investment's projected life

r= the discount rate or opportunity cost of capital (*hurdle rate*)

IRR is the rate to make NPV equal to Zero

$$NPV = CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \dots + \frac{CF_n}{(1+IRR)^n} = 0$$

Decision rule using IRR

Accept projects or investments for which the IRR is greater than the opportunity cost of capital

重點 5:

Money-weighted rates of return is equal to IRR calculation

Time-weighted rate of return focus on each period's holding period return and geometrically link them together, thus eliminating the impact of each period's inflow and outflow on the return.

重點 6:

Range = Maximum value - Minimum value

$$\text{The mean absolute deviation (MAD)} = \frac{\sum_{i=1}^n |X_i - \bar{X}|}{n}$$

Variance and Standard Deviation

$$\text{Population Variance: } \sigma^2 = \frac{\sum_{i=1}^N (X_i - \mu)^2}{N}$$

$$\text{Standard Deviation: } \sigma = \sqrt{\frac{\sum_{i=1}^N (X_i - \mu)^2}{N}}$$

$$\text{Sample Variance: } s^2 = \frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}$$

$$\text{Standard Deviation: } s = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}}$$

重點 7:

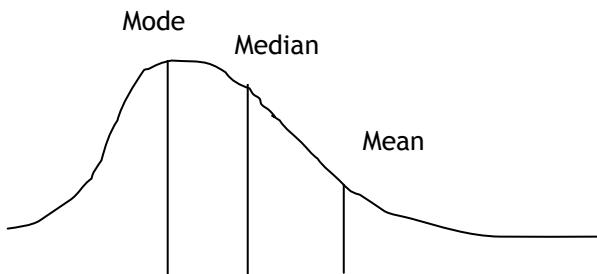
Let K be any positive constant greater than 1. The proportion of the observations within K standard deviations of the mean is at least $1 - (1/K^2)$ for all $K > 1$

重點 8:

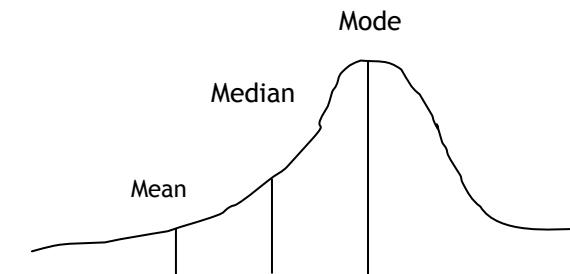
A distribution that is not symmetrical is called skewed.

Skewness represents the extent to which a distribution is not symmetrical.

A *positively skewed* distribution has many outliers in the right tail, and the mean > median > mode. A *negatively skewed* distribution has many outliers in the left tail, and the mean < median < mode.



Distribution Skewed to the Right
(Positively Skewed)



Distribution Skewed to the Left
(Negatively Skewed)

Kurtosis measures the peakedness of a distribution and affects the probability of extreme outcomes. Kurtosis is measured using deviations raised to the *fourth power*. A normal distribution has kurtosis equal to 3, so excess kurtosis is always measured relative to the number three. Positive values of excess kurtosis (kurtosis - 3) indicate a distribution that is **leptokurtic** (fat tails, or more peaked), whereas negative values (kurtosis - 3) indicate a **platykurtic** distribution (thin tails, or less peaked).

重點 9:

if you know the probability that an event B will occur *and* you know the probability that another event A occurs *given* that B has occurred *and* you know the probability that event A occurs, you can compute the probability that B occurs *given* that A has occurred. In other words, you are adjusting your “prior” knowledge of event B with new knowledge about event A.

重點 10:

- A *binomial distribution* assumes that a variable can have one of two values, either success or failure, or in the case of a stock, movement either up (u) or down (d). The binomial distribution can be used to describe the direction of change in the value of an asset or portfolio and to compute its expected value over several periods. This is done by *constructing a binomial tree*.
- You can compute the expected probability of successes in a given set of n trials using the following formula:

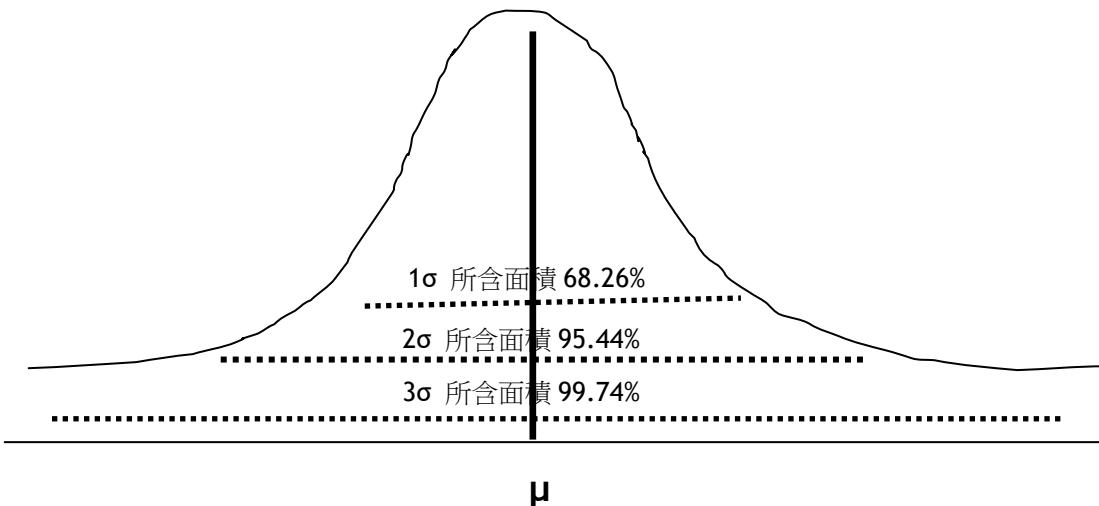
$$p(x) = P(X=x) = (\text{number of ways to choose } x \text{ from } n) p^x (1-p)^{n-x} = c_x^n p^x (1-p)^{n-x}$$

Where p equals the probability of success, x is the number of successes we are looking for, and n is the total number of trials that are being performed.

重點 11：

The normal distribution is completely described by two parameters—its mean, μ , and variance, σ^2 . We indicate this as follows

$$X \sim N(\mu, \sigma^2)$$



- 約 68%的觀察值會落在母體平均值上下一個標準差的範圍內
 - 約 95%的觀察值會落在母體平均值上下二個標準差的範圍內
 - 約 99%的觀察值會落在母體平均值上下三個標準差的範圍內
-
- 90%的觀察值會落在母體平均數 ± 1.645 個標準差內
 - 95%的觀察值會落在母體平均數 ± 1.96 個標準差內
 - 98%的觀察值會落在母體平均數 ± 2.33 個標準差內
 - 99%的觀察值會落在母體平均數 ± 2.58 個標準差內

不同的常態分配有不同的平均數和變異數，為了統一，我們將之轉換為標準常態分配。標準常態分配的平均數為 0，標準差為 1。

$$z = \frac{\text{observation} - \text{population mean}}{\text{standard deviation}} = \frac{x - \mu}{\sigma}$$

重點 12:

Given a population described by any probability distribution having mean μ and finite variance σ^2 , the sampling distribution of sample mean \bar{x} computed from samples of size n from this population will be approximately normal with mean μ and variance σ^2/n when the sample size n is large.

$$\text{known population variance: } \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

$$\text{unknown population variance: } S_{\bar{x}} = \frac{s}{\sqrt{n}}$$

Construction of Confidence Intervals:

A $(1-\alpha)\%$ confidence interval for a parameter has the following structure:

Point estimate \pm (Reliability Factor \times Standard Error)

Where

Point Estimate = a point estimate of the parameter (a value of a sample statistic)

Reliability factor = a number based on the assumed distribution of the point estimate and the degree of confidence $(1-\alpha)\%$ for the confidence interval

Standard Error = the standard error of the sample statistic providing the point estimate

重點 13:

Basis of Computing Reliability Factors

When sampling from a:	Test Statistic	
	Small Sample (n<30)	Large Sample (n \geq 30)
Normal distribution with known variance	z-statistic	z-statistic
Normal distribution with unknown variance	t-statistic	t-statistic*
Nonnormal distribution with known variance	not available	z-statistic
Nonnormal distribution with unknown variance	not available	t-statistic*

* Use of z also acceptable

$(1-\alpha)\%$ confidence interval for the population mean μ is given by

$$\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

重點 14:

Steps in Hypothesis Testing

1. Stating the hypothesis

- 是雙尾檢定還是單尾檢定，要檢定的母體值是多少

2. Identifying the test statistic and its probability distribution

- 是 z 分配還是 t 分配，還是其它的分配

3. Specifying the significance level

- 定一個顯著水準，對常用的是 0.01 或 0.05

4. Stating the decision rule

- 如果計算出來的 z 值或 t 值在正(負)臨界值右(左)方的尾巴區(critical value)，我們就拒絕基本假設，反之，我們就不能拒絕

5. Collecting the data and performing the calculations

- 計算 z 值或 t 值

$$z = \frac{\bar{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$$

$$t = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

6. Making the statistical decision

- 將 5 所計算的 z 值或 t 值和 3 所定出的臨界 z 值或臨界 t 值利用 4 之基準做比較，以拒絕或接受基本假設

7. Making the economic or investment decision

- 拒絕或接受基本假設所代表之經濟或投資含義

重點 15:

Type I and Type II Errors

- **Type I error:** the rejection of the null hypothesis when it is actually true.
- **Type II error:** the failure to reject the null hypothesis when it is actually false.

Type I and Type II Errors in Hypothesis Testing

Fact	Decision	
	Do not reject H_0	Reject H_0
H_0 is true	Correct decision	Incorrect decision Type I error Significance level, α , $=P(\text{Type I error})$
H_0 is false	Incorrect decision Type II error	Correct decision Power of the test $=1 - \text{Type II error}$

重點 16:

p-Values

The *p-value* is the probability of obtaining a critical value that is the same as the computed test statistic, assuming the null hypothesis is true.

There are two decision rules for the *p*-value approach to hypothesis testing:

- Reject H_0 if the *p*-value is less than the significance level of the hypothesis test.
- Do not reject H_0 if the *p*-value is greater than the significance level.

重點 17:

Chi-square (χ^2) Test

- 1 · $H_0: \sigma^2 = \sigma_0^2$ versus $H_a: \sigma^2 \neq \sigma_0^2$
- 2 · $H_0: \sigma^2 \leq \sigma_0^2$ versus $H_a: \sigma^2 > \sigma_0^2$
- 3 · $H_0: \sigma^2 \geq \sigma_0^2$ versus $H_a: \sigma^2 < \sigma_0^2$

In tests concerning the variance of a single normally distributed population, we make use of a chi-square test statistic, denoted by χ^2 . Test statistic for tests concerning the value of a population variance (Normal population):

$$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2} \quad \text{with } n-1 \text{ degrees of freedom}$$

重點 18:

F Test

- For tests concerning differences between the variances of two normally distributed populations based on two random, independent samples, the appropriate test statistic is based on an F-test (the ratio of the sample variances)

$$H_0: \sigma_1^2 = \sigma_2^2 \quad \text{versus} \quad H_a: \sigma_1^2 \neq \sigma_2^2$$

$$H_0: \sigma_1^2 \leq \sigma_2^2 \quad \text{versus} \quad H_a: \sigma_1^2 > \sigma_2^2$$

$$H_0: \sigma_1^2 \geq \sigma_2^2 \quad \text{versus} \quad H_a: \sigma_1^2 < \sigma_2^2$$

- The F-statistic is defined by the numerator and denominator degrees of freedom. The numerator degrees of freedom is the divisor used in calculating the sample variance in the numerator (number of observations minus 1). The denominator degrees of freedom is the divisor used in calculating the sample variance in the denominator (number of observations minus 1)

$$F = \frac{s_1^2}{s_2^2}$$

重點 19:

Technical trading rules and indicators

Typical stock-market cycle

- Rising trend channel
- Flat trend channel
- Declining trend channel

Contrary-opinion rules

- Mutual fund cash positions
- Credit balances in brokerage accounts
- Investment advisory opinions
- OTC versus NYSE volume
- Chicago Board Options Exchange(CBOT) put-call ratio
- Futures traders bullish on stock-index futures

Follow the smart money

- Confidence index
- T-bill-Eurodollar Yield spread
- Debit balances in brokerage accounts(margin debt)

Momentum indicators

Breadth of market: breadth of market measures the number of issues that have increased each day and the number of issues that have declined.

Stocks above their 200-day moving average

Stock price and volume technique

Dow Theory:(1)major trends that are like tides in the ocean (2)intermediate trends that resemble waves (3)short-run movements that are like ripples

經濟分析 精華重點摘錄

Microeconomic Analysis

Elasticity

1. Price Elasticity of Demand (e_p): = $| (\Delta Q_D / Q_D) / (\Delta P / P) |$

$$\text{or } = | [(Q_{D2} - Q_{D1}) / (Q_{D2} + Q_{D1}) / 2] / [(P_2 - P_1) / (P_2 + P_1) / 2] |$$

2. If $|e_p| > 1$, demand is elastic, if $P \downarrow (\uparrow)$ then $PQ \uparrow (\downarrow)$.

If $|e_p| < 1$, demand is inelastic, if $P \downarrow (\uparrow)$ then $PQ \downarrow (\uparrow)$.

If $|e_p| = 0$, demand is perfectly inelastic, the demand curve is vertical, if $P \downarrow (\uparrow)$ then $PQ \downarrow (\uparrow)$.

If $|e_p| = \infty$, demand is perfectly elastic, the demand curve is horizontal, if $P \downarrow (\uparrow)$ then $Q = PQ = 0$.

3. Determinants of Price Elasticity of Demand: a. Substitutes, b. The proportion of one's budget spent on the product, c. Type of product, d. Time, e. definition of the market.

4. Cross elasticity of demand: $(e_c) := (\Delta Q_D^A / Q_D^A) / (\Delta P^B / P^B)$

If good A and good B are substitutes: $e_c > 0$, independent: $e_c = 0$, complements: $e_c < 0$

5. Income Elasticity of Demand (e_I): = $(\Delta Q_D / Q_D) / (\Delta I / I)$

$$\text{or: } = [(Q_{D2} - Q_{D1}) / (Q_{D2} + Q_{D1}) / 2] / [(I_2 - I_1) / (I_2 + I_1) / 2]$$

6. Normal Goods: $e_I > 0$, Inferior Goods: $e_I < 0$, Necessaries: $1 > e_I > 0$, Luxuries: $e_I > 1$.

7. Price Elasticity of Supply (e_s): = $(\Delta Q_S / Q_S) / (\Delta P / P)$

$$\text{or: } = [(Q_{S2} - Q_{S1}) / (Q_{S2} + Q_{S1}) / 2] / [(P_2 - P_1) / (P_2 + P_1) / 2]$$

8. Determinants of Price Elasticity of Demand: a. the ability of producers to change output, b. time Horizon.

Efficiency and Equity

1. In equilibrium, the efficient quantity is the output for which marginal benefit equals the marginal cost (MB=MC).
If $MB > MC$: $Q \uparrow$ If $MB < MC$: $Q \downarrow$

2. The consumer surplus is the total difference between the consumer's willingness to pay and the price actually paid for the product. It is equal to the triangle area between the marginal benefit curve (demand curve) and market price P^* .

3. The producer surplus is the total difference between the producer's willingness to receive and the market price P^* actually received. = the triangle area between market price P^* and the marginal cost curve (supply curve).

4. Consumer Surplus + Producer Surplus = Social Welfare

5. Two schools of thought regarding the fairness of the efficient allocation of resources in a competitive market focus on (1) whether the results of the allocation of resources are fair (Utilitarianism) and on (2) whether the rules of the economic allocation of resources are fair. (Symmetry principle)

Markets in Action

1. Price ceilings: if $P <$ equilibrium P , create shortage and black markets, social welfare decreases.
2. Price floors: if $P >$ equilibrium P , create surplus, social welfare decreases.
3. A tax on producers will tend to shift the supply curve up and to the left. In comparison to an untaxed market, equilibrium will be achieved with a higher market price and a lower quantity produced.
4. A tax on buyers will tend to shift the demand curve down and to the left. In comparison to an untaxed market, equilibrium will be achieved with a higher market price and a lower quantity produced.
5. Statutory incidence: refers to who pay the tax. The incidence of the tax will tend to fall on the side of the market (demand or supply) that has a lower elasticity. i.e. if the price elasticity of demand is lower than the price elasticity of supply, buyers will share more tax than the producers.
6. A subsidy will tend to shift the supply curve down and to the right. In comparison to an unsubsidized market, equilibrium will be achieved with a lower price and a greater quantity produced.
7. A quota limits the amounts of a good that can be produced. If the quota is greater than what would be produced under normal market conditions, then it will have no effect. If the amount is less, than the market equilibrium that is achieved will be at a higher price than what would occur without the quota.

Output and Costs

1. Explicit Costs = Accounting Costs , Explicit Profit = Accounting Profit
2. Economic Costs (= Opportunity Costs) = Accounting Costs (= Explicit Costs) + Implicit Costs
3. Total Cost = Fixed Cost + Variable Cost
Average Total Cost (ATC) = Total Cost / Output = AFC+AVC
Marginal Cost (MC) = Δ Total Cost / Δ Output
4. Average Product (AP)= Total Product (TP)/ Input
Marginal Product (MP)= Δ Total Product / Δ Input
5. MP (AP) first increases then decreases.
6. MP intersects AP's maximum, before (after) AP's maximum, $MP > (<) AP$.
7. MC intersects ATC [AVC]'s minimum, before (after) ATC [AVC]'s minimum, $MC < (>) ATC [AVC]$.
8. AFC is always decreasing. MC(ATC and AVC) first decreases then increases because MP (AP) first increases then decreases.
9. Economies of Scales: Long run ATC decreases as quantity increases.
Constant Return to Scale: Long run ATC unchanged as quantity increases.
Diseconomies of Scales: Long run ATC increases as quantity increases.
10. MC, AVC and ATC decrease (AFC unchanged) if:
 - a. Resource prices decrease, b. Taxes decrease, c. Advance in technology.

Perfect Competition

1. Characteristics of Purely Competitive (Price Taker, Perfect Competition) Market:
 - a. All firms produce an identical product.
 - b. Large amount of firms in the market, all firms are price taker.
 - c. Each firm's market share is very low, no firm can affect the market price.
 - d. No barrier to entry or exit the market.
2. The demand curve that price takers (perfect competition) faced is horizontal ($P=AR=MR$). The demand curves that price searchers (monopolistic competition, oligopoly, monopoly) faced are downward sloping ($P=AR>MR$).
3. For all market structures, profit maximization condition: $MR=MC$, for perfect competition: $P=AR=MR=MC$ in short run, $P=AR=MR=MC = SRATC$'s minimum = $LRATC$'s minimum in long run. Besides perfect competition, firms in other markets won't produce under ATC 's minimum.
4. Under perfect competition, MC above AVC is firm's short run supply curve. If $P > ATC$, profit is positive.
If $ATC > P > AVC$, profit is negative. But firms will continue to operate in short run but cease to operate in long run.
If $P < AVC$, the firms should shutdown immediately no matter in short run or long run.
5. The short run market supply curve is the horizontal summation of individual firm's short run supply curve.
6. The market supply curve is more elastic in the long run than in the short run. This occurs because in the long run, firms in an industry can adjust their fixed costs.
7. Long run supply curve (LRS):
 - a. Increasing Cost Industry: LRS slope upward,
 - b. Constant Cost Industry: LRS is horizontal,
 - c. Decreasing Cost Industry: LRS is slope downward.

Monopolistic Competition

1. Characteristics of Monopolistic Competition (Competitive Price-Searcher Market):
 - a. All firms produce differentiated product that are close substitutes for each other.
 - b. Large amount of firms in the market.
 - c. Each firm's market share is very low.
 - d. Low barrier to entry or exit the market.
2. Producers face a downward-sloping demand curve and demand is highly elastic.
3. For all market structures, firms might have positive profit in short run, but only firms under monopoly and oligopoly can have positive profits in long run.

Monopoly and Oligopoly

1. The Causes of Entry Barriers: a. Economies of scale, b. Holding special technology or raw material, c. Government licensing, d. Patents and other proprietary knowledge.
2. Characteristics of Monopoly: a. No perfect substitutes, b. Only one firm in the market, c. Rent-seeking behavior occurs, d. No entry is possible.
3. Characteristics of Oligopoly: a. Only several firms in the market, b. Have a strong incentive to collude and to cheap on collusive agreement, c. Non-price competition, d. High barrier to entry or exit the market.
4. Regulation on the Pricing of Monopoly: a. Average cost pricing ($P = ATC$), monopoly has no excess profit. b. Marginal cost pricing ($P=MC$), Net Deadweight Loss=0.
5. Kinked demand curve model: an oligopolist faces a downward sloping demand curve but the elasticity may depend on the reaction of rivals to changes in price and output. Assuming that firms are attempting to maintain a high level of profits and their market share it may be the case that:
 - a. rivals will not follow a price increase by one firm - therefore demand will be relatively elastic and a rise in price would lead to a fall in the total revenue of the firm
 - b. rivals are more likely to match a price fall by one firm to avoid a loss of market share. If this happens demand will be more inelastic and a fall in price will also lead to a fall in total revenue.

A rise in marginal costs will not necessarily lead to higher prices providing that the new MC curve cuts the MR curve at the same output. The kinked demand curve theory suggests that there will be price stickiness in these markets and that firms will rely more on non-price competition to boost sales, revenue and profits.

6. The pricing and output decisions of firms:

	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
quantity produced	High			Low
Q^*				
price, $P^*(Q^*)$	Low			High
MR, MC	$P=MR=MC(Q^*)$	$MR(Q^*)=MC(Q^*)$	$MR(Q^*)=MC(Q^*)$	$MR(Q^*)=MC(Q^*)$
Demand	horizontal	downward sloping	downward sloping	downward sloping
ATC	$P=\min ATC$ in long run	$P \neq \min ATC$	$P \neq \min ATC$	$P \neq \min ATC$

Macroeconomic Analysis

Demand and Supply in Factor Markets

1. Factors that cause shifts in the demand curve for a resource:
 - a. Productivity of labor, b. The price of substitutes, c. The demand for the final good or service.
2. The demand for a resource is its Marginal Revenue Product (MRP).
3. Demand for input = $MRP = \Delta \text{Total Revenue} / \Delta \text{Input} = (\Delta \text{Total Revenue} / \Delta \text{Output}) \times (\Delta \text{Output} / \Delta \text{Input}) = MR \times MP$.
4. The equilibrium price and quantity for input is determined by demand and supply:
 $MRP = MR \times MP = MC_{\text{input}}$
i.e. in labor market: $MRP_{\text{Labor}} = \text{wage}$, in capital market: $MRP_{\text{Capital}} = \text{interest rate}$
5. The labor supply curve could slope backward, for at least a part of its range because income effect is greater than substitution effect.
6. The effects on wages of labor unions: a. Restricting supply, b. Increasing demand.
7. For non-renewable natural resources, in equilibrium, increasing rate of oil price = interest rate, i.e.
 $(P_1 - P_0) / P_0 = r$

Monitoring Cycles, Jobs, and the Price Level

1. The phases of the business cycle: Expansion, Business Peak, Contraction, Recessionary Trough.
2. Unemployment rate = $(\text{number of unemployed} / \text{Labor Force}) \times 100\%$
Labor force participation rate = $(\text{Labor Force} / \text{working-age population}) \times 100\%$
The employment to population ratio = $(\text{number of employed} / \text{working-age population}) \times 100\%$
3. Three Types of Unemployment:
 - a. Frictional Unemployment,
 - b. Structural Unemployment,
 - c. Cyclical Unemployment.
4. Natural Rate of Unemployment: Frictional Unemployment + Structural Unemployment.
5. Full Employment: Cyclical Unemployment = 0.
6. Inflation rate = $[(\text{current CPI} - \text{year-ago CPI}) / \text{year-ago CPI}] \times 100$
7. The problems associated with CPI bias: a. New Goods, b. Quality Changes, c. Commodity substitution, d. Outlet substitution
8. The Causes of Inflation:
 - a. AD increases (AS unchanged), or AD increases more rapidly than AS.
 - b. AS decreases (AD unchanged), or AS decreases more rapidly than AD.
 - c. High levels of inflation are usually due to rapid growth of the money supply.
9. The Harmful Consequences of Inflation.
 - a. Increase business risk.
 - b. Information distortion,
 - c. Disincentives to firms,
 - d. Income redistribution.
10. a. Short-run Philips curve: a downward sloping curve represents the trade-off between inflation and unemployment.
b. Long-run Philips curve: a vertical straight line represents there is no trade-off between inflation and unemployment in the long run.
11. The causes of business cycles:
 - a. Variability of aggregate demand: AD sometimes grows more rapidly and sometimes more slowly than LRAS.
 - b. Real business cycle: LRAS sometimes grows more rapidly and sometimes more slowly than AD.

Aggregate Supply and Aggregate Demand

1. LRAS is vertical. SRAS slopes upward to the right.
2. Factors that shift long run AS to the right: a. An increase in the supply of resources. b. An improvement in technology and productivity. c. Institutional changes that increase the efficiency of resource use.
3. Factors that shift short run AS to the right: a. A decrease in resource prices or production costs. b. A reduction in the expected rate of inflation. c. Favorable supply shocks. d. A better economic condition expectations. e. A decrease in production tax.
4. The Components of Aggregate Demand: $AD=C+I+G+(X-M)$
5. AD slopes downward because a reduction in the price level will:
 - a. Increase the wealth of people holding the fixed quantity of money.
 - b. Reduce the real rate of interest.
 - c. Make domestically produced goods cheaper than those produced abroad.
6. Factors that shift short run AD to the right:
 - a. An increase in real wealth.
 - b. A lower interest rate.
 - c. Increased optimism about the future.
 - d. An increase in expected future inflation,
 - e. An increase in income abroad,
 - f. A decrease in the exchange rate.
 - g. Fiscal and monetary policy-An increase in government spending, or a decrease in tax, or an increase in the money supply.
7. The long-run macroeconomic equilibrium is determined by the intersection of AD, SRAS and LRAS

Fiscal Policy

1. Laffer Curve: a curve which supposes that for a given economy there is an optimal income tax level to maximize tax revenues. If the income tax level is set below this level, raising taxes will increase tax revenue.
2. Fiscal Policy includes: a. expansionary fiscal policies : increase government spending or reduce tax. shifts the AD curve rightward. b. restrictive fiscal policies : decrease government spending or raise tax. shifts the AD curve leftward.

3. The Effects of Fiscal Policy :

	AD	Price Level	Income	Unemployment
Tax \downarrow (\uparrow) or Gov't Expenditure \uparrow (\downarrow)	\downarrow (\uparrow)			

4. Multiplier effects: a. government purchases multiplier: $1/(1 - MPC)$,
b. tax multiplier: $-MPC/(1 - MPC)$,
c. Balanced budget multiplier = 1.
5. The Time lag of Fiscal policy: a. Recognition lag, b. Administrative lag, c. Operation lag.
6. Crowding Out Effects:
 - a. On Investment:
When government adopts an expansive (restrictive) fiscal policy, this increase (reduce) the need to borrow funds. Higher (lower) interest rates crowds out (crowds in) private investment and the consumption of durable goods, partially offset (stimulate) the effect of fiscal policy.
 - b. On Net Exports:
Expansive (restrictive) fiscal policies tend to be associated with rising (falling) government budget deficits, rising (falling) real interest rates, foreign capital flows in (out), domestic currency appreciates (depreciates), decreases (increases) net exports, and rising (falling) foreign trade deficits.
7. The Automatic Stabilizers: a. Progressive income tax, b. Corporate profit tax, c. Unemployment compensation.

Money and Monetary Policy

1. Components of the Demand for Money:
 - a. Transaction Demand,
 - b. Asset (Liquidity) Demand,
 - c. Precautionary Demand
2. Money demand changes if:
 - a. Inflation rises, money demand increases.
 - b. GDP rises, money demand increases.
 - c. Institutional changes.
3. The supply of money is determined by the central bank, the tools are:
 - a. Open market operation,
 - b. Reserve requirements,
 - c. Discount rate policy.
4. Potential Deposit Expansion Multiplier: $1 / \text{required reserve ratio}$.
5. The goals of the Fed are three-fold: a. maximum employment, b. stable prices, c. moderate long-term interest rates.
6. The Effects of Monetary Policy:

	AD	Price Level	Income	Unemployment
Interest rate \downarrow (\uparrow) or Money Supply \uparrow (\downarrow)	\downarrow (\uparrow)			
7. The Quantity Theory of Money: $M \times V = P \times Y$, where $P \times Y$ = nominal GDP
or $\Delta M/M + \Delta V/V = \Delta P/P + \Delta Y/Y$
8. Under full employment or in long run, $M \uparrow$ then only $P \uparrow$.
Monetarist economists' view: since $\Delta V/V = 0$, if $\Delta M/M > (=) \Delta Y/Y$, then $\Delta P/P > (=) 0$.
9. The primary way that the Fed conducts monetary policy is through their influence on the federal funds rate. In determining how to adjust the federal funds rate (FFR), the fed must decide between two types of rules: a. instrument rules, b. targeting rules.
10. The Taylor rule is an instrument rule based on the rate of inflation and on the output gap. It stipulates how much the Fed should change the nominal interest rate in response to divergences of actual GDP from potential GDP and of actual inflation rates from target inflation rates.
Taylor rule: $FFR = \text{long-run equilibrium real interest rate} + \text{actual inflation} + 0.5(\text{actual inflation} - \text{target inflation}) + 0.5(\text{actual GDP} - \text{potential GDP})$
11. There are four targeting rules:
 - a. McCallum rule,
 - b. Targeting the rate of growth of the money supply,
 - c. Targeting the exchange rate,
 - d. Inflation targeting.

財務報表分析 精華重點摘錄

1. Unqualified opinion (clean) - 合理確信財務報表符合：(不能選絕對確信)

符合 GAAP、會計原則適當、會計估計合理 reasonableness of estimates

無重大性的誤述 no material errors、允當表達 (不能選絕對正確表達)

2. Comprehensive income = Net Income + Other comprehensive income

Other comprehensive income:

- Foreign currency translation gains and losses.
- Adjustments for minimum pension liability.
- Unrealized gains and losses from cash flow hedging derivatives.
- Unrealized gains and losses from available-for-sale securities.

3. Conditions for *revenue recognition*

⊕ completion of earning process

⊕ assurance of payment

4. Non-recurring Items

- Unusual or infrequent items
- Extraordinary items: Unusual AND infrequent
- Income or loss from discontinued operations

Note: 折舊方法改變不再是會計原則變更，為估計變動

Note: Some prior period adjustments are NOT reported in the net income statement, but are adjustments to beginning retained earnings

5. Simple capital structure: no potentially dilutive securities

Complex capital structure: potentially dilutive securities (stock options, warrants, convertible debt, convertible preferred stock)。注意反稀釋檢定。

6. marketable and non-marketable financial instruments

	Trading	Available-for-sale	Held-to-maturity
Balance sheet	Fair value	Fair value	Amortized cost
Income Statement	Dividends Realized gains/losses Unrealized gains/losses	Dividends Realized gains/losses	Interest Realized gains/losses

7. Differences Relating to Cash Flow Classification

	US GAAP	IFRS
Interest received	CFO	CFO <i>or</i> CFI
Dividends received	CFO	CFO <i>or</i> CFI
Interest paid	CFO	CFO <i>or</i> CFF
Dividends paid to shareholders	CFF	CFF <i>or</i> CFO
Income taxes paid	CFO	CFO Unless the expense is associated with an investing or financing transaction

8. Free Cash Flow

Free Cash Flow to the Firm (FCFF) : 可供所有投資人(債權人與股東)使用的現金

$$\text{FCFF} = \text{NI} + \text{NCC} - \text{WCI}_{\text{Inv}} + [\text{Int} \times (1-\text{tax rate})] - \text{FCI}_{\text{Inv}}$$

$$\text{FCFF} = \text{CFO} + [\text{Int} \times (1-\text{tax rate})] - \text{FCI}_{\text{Inv}}$$

Free Cash Flow to Equity (FCFE) : 可供股東使用的現金

$$\text{FCFE} = \text{CFO} - \text{FCI}_{\text{Inv}} + \text{Net borrowing}$$

9. Inventory Equation : $\text{BI} + \text{P} = \text{EI} + \text{COGS}$

10. In the periods of rising prices & stable or increasing inventory quantities:

<u>rising prices</u>	FIFO	LIFO
Inventory balances	↑	↓
COGS	↓	↑
Net income (EBT & EAT)	↑	↓
Taxes	↑	↓
Working capital = CA - CL	↑	↓
Cash flows (after-tax)	↓	↑

11. Converting LIFO Statements into FIFO equivalents

Inventory: (LIFO basis → FIFO basis)

+ LIFO reserve

Retained Earnings:

$$+ (\text{LIFO reserve}) \times (1-t)$$

Deferred tax liability:

$$+ (\text{LIFO reserve}) \times (t)$$

$$\text{FIFO COGS} = \text{LIFO COGS} - \Delta \text{LIFO Reserve}$$

$$\text{FIFO Net Income} = \text{LIFO Net Income} + [\Delta \text{LIFO Reserve} \times (1-t)]$$

12. Effect of Capitalization on Financial Indicators

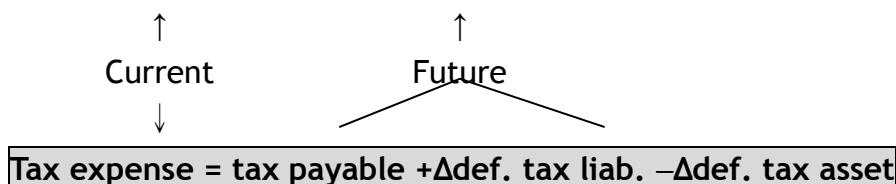
	Expensing	Capitalizing
Income variability	↑	↓
Profitability—early years (ROA & ROE)	↓	↑
Profitability—later years (ROA & ROE)	↑	↓
Total cash flows (ignoring tax effects)	Same	Same
CFO	↓	↑
CFI	↑	↓
Leverage ratios (debt/equity & debt/assets)	↑	↓

13.

Impairment effect	
Cash flow (ignoring tax effects)	No effect
Assets (PP&E)	↓
Deferred taxes	↓
Current net income, ROA, ROE	↓
Stockholders' equity	↓
Depreciation expense	↓
Future net income, ROA, ROE	↑
Future asset turnover ratios	↑
Leverage ratios	↑
Average age (= Accum depr / depr)	↑

14.

$$\text{Tax Expense} = \text{tax payable} + \text{deferred tax expense}$$



15. Liability method: Deferred asset or liability is measured at **tax rate** exists when reversing event occurs

16. Valuation Allowance

Valuation Allowance↑	→	Operating Income↓
Valuation Allowance↓	→	Operating Income↑

17. Change in Tax Rate

Effect of tax rate & tax law changes (assume def tax liab > def tax assets)

- tax rates $\downarrow \rightarrow$ def. tax liab. $\downarrow \rightarrow$ Tax expense $\downarrow \rightarrow$ income \uparrow
- tax rates $\uparrow \rightarrow$ def. tax liab. $\uparrow \rightarrow$ Tax expense $\uparrow \rightarrow$ income \downarrow

18. Financial Statement Effects of Issuing a Bond

■ Statement of Cash Flow

	CFF	CFO
Issuance of debt	\uparrow cash received $= PV$ of bond at market interest rate	No effect
Periodic interest payments	No effect	\downarrow interest paid $= (\text{coupon rate}) (\text{par value})$
Payment at maturity	\downarrow face (par) value	No effect

■ Income Statement

Issued at Par	Issued at a Premium	Issued at a Discount
–	CFF \uparrow	CFF \downarrow
Market rate = face rate	Market rate $<$ face rate	Market rate $>$ face rate
Interest expense $= (\text{face rate}) (\text{face value})$ $= \text{cash paid}$	Interest expense $= \text{cash paid} - \text{amortization of premium}$ (non-cash)	Interest expense $= \text{cash paid} + \text{amortization of discount}$ (non-cash)
–	CFO \downarrow	CFO \uparrow
Interest is constant	Interest \downarrow over time	Interest \uparrow over time

■ Balance Sheet

Issued at Par	Issued at a Premium	Issued at a Discount
Carried @ face value	Carried @ Face value + premium	Carried @ Face value – discount
–	Liability \downarrow as premium is amortized to interest expense	Liability \uparrow as discount is amortized to interest expense

19. With zero-coupon bonds, there is *no coupon*, so for CFO purposes there is no interest (cash) payments deducted. **CFO is severely overstated.**

20. Lease Classifications

Lessor (出租人)	Lessee (承租人)
資本租賃：4 條件之 1 加 2 條件 Sales-type leases → selling profit + financing profit Direct-financing leases → financing profit	資本租賃：4 條件之 1
營業租賃	營業租賃

四條件之一：one of four criteria (for lessee)

- ◆ title transfer
- ◆ bargain purchase option
- ◆ lease term $\geq (75\%)(asset\ life)$
- ◆ PV (MLP) $\geq (90\%)(fair\ value\ of\ asset)$

@ min. (lessee's incremental borrowing rate, implicit rate in lease)

PLUS both of the two necessary conditions (revenue-recognition criteria):

- ◆ collectibility of lease payments is reasonably predictable; AND
- ◆ No significant uncertainties of un-reimbursable costs

21. Comparison between Operating & Capital Leases (for lessees)

Statement Totals	Capital lease	Operating lease
Assets	↑	↓
Liabilities	↑	↓
Net Income (in early years)	↓	↑
CFO	↑	↓
CFF	↓	↑
Total cash flow (ignoring tax effects)	Same	Same

Ratios		Capital lease	Operating lease
Current ratio	CA/CL	↓	↑
Working capital	CA-CL	↓	↑
Asset turnover	Sales/TA	↓	↑
ROA	EAT/TA	↓	↑
ROE	EAT/E	↓	↑
Debt to Equity	D/E	↑	↓
Interest Coverage	EBIT/I	↓	↑

Capital Lease payment	Interest Expense	CFO → (outflow)
	Principal Repayment	→ CFF (outflow)
Operating Lease payment	Rent Expense	CFO → (outflow)

22. Off-Balance-Sheet Financing Techniques

- Take-or-pay & throughput arrangements

Adjustment:

Assets ↑	Liabilities ↑ = PV (debt obligations)
----------	--

- Sale of receivables with recourse

Adjustment:

Receivable (CA) ↑ → CFO ↓	CL ↑ → CFF ↑
------------------------------	-----------------

- Finance subsidiaries: 49%

- equity method of accounting for unconsolidated affiliates (20%~50%)

23.

Cash Conversion Cycle (or net operating cycle)

$$= \text{Receivables Days} + \text{Inventory Processing Days} - \text{Payables payment period}$$

24. DuPont Analysis

Return on equity (ROE)

$$\frac{\text{Net Income}}{\text{Equity}} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Equity}}$$

$$= (\text{Net Profit Margin}) \times (\text{Equity Turnover})$$

$$\text{ROE} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

$$= (\text{Net Profit Margin}) \times (\text{Asset Turnover}) \times (\text{Equity Multiplier})$$

$$ROE = \left(\frac{EBIT}{Sales} \times \frac{Sales}{Assets} - \frac{I}{Assets} \right) \times \frac{Assets}{Equity} \times (1-t)$$

= [(Operating Profit Margin) (Total Asset Turnover) – (Interest Expense Rate)] (Financial Leverage Multiplier) (Tax Retention Rate)

$$ROE = \frac{\text{Net Income}}{\text{EBT}} \times \frac{\text{EBT}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

= tax burden x interest burden x EBIT margin x asset turnover x financial leverage

25. Fraud Triangle

- Incentive/pressure (誘因/壓力) - the motive to commit fraud
- Opportunities (機會) - the firm has a weak internal control system
- Attitude/rationalization (態度/行為合理化) - the mindset that fraud is justified

26. Accounting Shenanigans On The Cash Flow Statement

§ Stretching Accounts Payable

→ stretching A/P (應付帳款付現天數↑) → CFO↑

§ Financing Accounts Payable

→ 公司可操控現金支出的類別(CFO 或 CFF)與時間點。

§ Securitizing Accounts Receivable

→ securitizing A/R → CFO↑ (加速認列) → gain↑ → NI↑

§ Repurchasing Stock to Offset Dilution

情況	分析師觀點
(1) 當員工執行 stock options(認股權)時，股數會增加，為了防止 EPS 下降，故公司會買回庫藏股。 (2) 同時，執行認股權時，公司會產生租稅利益(tax benefit)。	
執行認股權 → CFF↑ 買回庫藏股 → CFF↓ 產生 tax benefit → CFO↑	執行認股權 → CFF↑ 買回庫藏股 → CFO↓ (視為 options-based compensation 的成本) 產生 tax benefit → CFO↑

公司財務管理及股票分析 精華重點摘錄

■ The capital budgeting is based on five principles:

1. Decisions are based on after-tax cash flows, not accounting income.
 - Incremental cash flows
 - Sunk costs
 - Externalities: Cannibalization (negative externality),
2. Cash flows are based on opportunity costs.
3. Timing of cash flows is important.
4. Cash flows are analyzed on an after-tax basis.
5. Financing costs are reflected in the required rate of return.

■ Net Present Value (NPV)

$$NPV = \sum_{t=0}^n \frac{CF_t}{(1+k)^t} = CF_0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \dots + \frac{CF_n}{(1+k)^n}$$

Decision Rule:

For independent projects

$$\begin{array}{ll} NPV \geq 0 & \text{Accept} \\ NPV < 0 & \text{Reject} \end{array}$$

■ Internal Rate of Return (IRR)

The IRR is the discount rate for which the NPV of a project is equal to zero.

$$NPV = 0 = \sum_{t=0}^n \frac{CF_t}{(1+IRR)^t} = CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \dots + \frac{CF_n}{(1+IRR)^n} \quad \text{Decision Rule}$$

For independent projects

$$\begin{array}{ll} IRR \geq k & \text{Accept} \\ IRR < k & \text{Reject} \end{array}$$

■ Profitability Index (PI)

$$PI = \frac{\sum_{t=1}^n \frac{CF_t}{(1+k)^t}}{CF_0} = 1 + \frac{NPV}{CF_0}$$

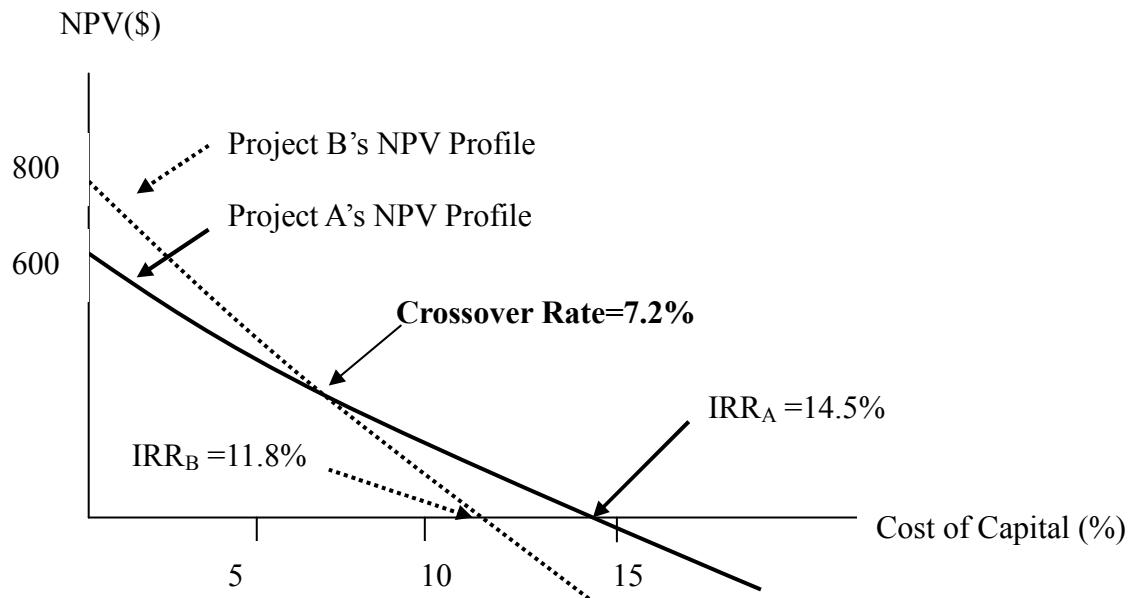
Decision Rule

$$\begin{array}{ll} PI \geq 1 & \text{Accept} \\ PI < 1 & \text{Reject} \end{array}$$

The accept/reject decision rule is equivalent to both the NPV and IRR decision rule. That is, if $PI \geq 1$ then $NPV \geq 0$, and $IRR \geq k$.

■ NPV Profiles

A graph that shows a project's NPV for different discount rates.



- All else equal,
 1. a delay in the receipt of cash flows will make a project's NPV more sensitive to changes in the discount rate.
 2. the increased sensitivity is illustrated by steeper slope in the NPV profile.

■ The Relative Advantages and Disadvantages of the NPV and IRR Methods

NPV

1. advantages
 - The theoretically best method.
 - Implicitly assumes that the project cash flows can be invested *at the discount rate used to calculate NPV*.
2. disadvantages
 - Does not include any consideration of the size of the project

IRR

1. advantages
 - It measures profitability as a percentage (estimated return). The IRR provide information on the margin of safety that NPV does not.
2. disadvantages
 - The possibility of producing rankings of mutually exclusive projects different from those from NPV analysis.
 - The possibility that there are multiple IRRs or no IRR for a project.
 - Implicitly assumes that the project cash flows could be invested at the project's IRR.

Conflicting Project Rankings

When the discount rate less than *crossover rate*

$$IRR_A > IRR_B \quad \rightarrow \leftarrow \quad NPV_B > NPV_A$$

■ Surveys of capital budgeting methods

DCF method (ex. NPV) : theoretical superiority.

Simpler techniques (ex. Payback period): more likely used by small companies, private companies, companies outside the U.S.

■ Weighted average cost of capital

$$WACC = w_d \times [k_d (1 - \tau)] + w_{ps} \times k_{ps} + w_{ce} \times k_{ce}$$

■ The component cost of capital

The after-tax cost of debt $k_d (1 - \tau)$

- Use market interest rate (YTM) on new (marginal) debt, not the coupon rate on the firm's existing debt. (yield-to-maturity approach)

The cost of preferred stock k_{ps}

$$k_{ps} = \frac{D_{ps}}{P}$$

The cost of equity capital k_{ce}

1. The capital asset pricing model approach

$$k_{ce} = R_f + \beta [E(R_m) - R_f]$$

2. The dividend discount model approach

$$(i). \quad k_{ce} = \frac{D_1}{P_0} + g$$

$$\begin{aligned} \text{where } g &= (1-\text{payout rate})(\text{ROE}) = (\text{retention rate})(\text{ROE}) \\ &= b \times \text{ROE} \end{aligned}$$

$$(ii). \quad k_{ce} = \frac{D_1}{P_0(1-f)} + g \quad f: \text{flotation cost}$$

3. Bond yield plus risk premium approach

$$k_{ce} = \text{bond yield} + \text{risk premium}$$

■ The correct treatment of flotation costs

1. Incorporate into the cost of capital

$$k_{ce} = \frac{D_1}{P_0(1-f)} + g \quad f: \text{flotation cost}$$

2. Adjust the initial project cost

Flotation costs are a cash outflow that occurs at the initiation of a project and affect the project NPV by increasing the initial cash outflow.

■ Estimating a beta using the Pure-Play Method

$$\beta_{U,comparable} = \frac{\beta_{L,comparable}}{\left[1 + \left((1 - t_{comparable}) \frac{D_{comparable}}{E_{comparable}} \right) \right]}$$

$$\beta_{L,project} = \beta_{U,comparable} \left[1 + \left((1 - t_{project}) \frac{D_{project}}{E_{project}} \right) \right]$$

■ The revised CAPM

$$k_{ce} = R_f + \beta [E(R_m) - R_f + CRP]$$

Where: CRP = country risk premium

$$\text{CRP} = \text{sovereign yield spread} \times \left\{ \frac{\text{Annualized standard deviation of equity index of developing country}}{\text{Annualized standard deviation of sovereign bond market in terms of the developed market currency}} \right\}$$

Where:

Sovereign yield spread = difference between the yields of government bonds in the developing country denominated in the local currency and Treasury bonds of similar maturities.

■ Break points occur any time the cost of one the components of the company's WACC changes

$$\text{Break point} = \frac{\text{Amount of capital at which the component's cost of capital changes}}{\text{Weight of the component in the capital structure}}$$

■ Liquidity Ratios

1. Operating cycle

Operating cycle = days of inventory + days of receivables

2. Cash conversion cycle (Net operating cycle)

$$\text{Cash conversion cycle} = \left[\text{Average days of receivables} \right] + \left[\text{Average days of inventory} \right] - \left[\text{Average days of payables} \right]$$

■ DuPont Equation:

$$\text{ROA} = \frac{\text{Net income}}{\text{Revenues}} \times \frac{\text{Revenues}}{\text{Average total assets}}$$

$$ROA = \text{net profit margin} \times \text{total asset turnover}$$

$$\text{ROE} = \frac{\text{Net income}}{\text{Revenues}} \times \frac{\text{Revenues}}{\text{Average total assets}} \times \frac{\text{Average total assets}}{\text{Average shareholder's equity}}$$

$$ROE = \text{net profit margin} \times \text{total asset turnover} \times \text{financial leverage}$$

■ DuPont Equation (extended):

$$\begin{aligned} \text{ROE} &= \frac{\text{Operating income}}{\text{Revenues}} \times \frac{\text{Income before taxes}}{\text{Operating income}} \times \left[1 - \frac{\text{Taxes}}{\text{Income before taxes}} \right] \\ &\quad \times \frac{\text{Revenues}}{\text{Average total assets}} \times \frac{\text{Average total assets}}{\text{Average shareholder's equity}} \end{aligned}$$

$$\begin{aligned} \text{ROE} &= \text{operating profit margin} \times \text{effect of nonoperating item} \times \text{tax effect} \\ &\quad \times \text{total asset turnover} \times \text{financial leverage} \end{aligned}$$

■ Frequency of the board elections

Investors should consider:

- Whether there are **annual elections** or **staggered multiple-year terms** (a **classified board**). A classified board may serve another purpose to act as a takeover defense. Annual elections of all members make the board more responsive to shareholder wishes.

■ The independent board

1. A board can be considered independent if its decisions are not controlled or biased by the management of the firm.

2. The firm should have policies in place to

- Discourage board members from receiving **consulting fees** for work done on the firm's behalf or receiving **finders' fees** for bringing mergers, acquisitions, and sales to management's attention.

■ Board committees

1. Audit Committee

The committee ensures that the financial information provided to shareholders is complete, accurate, reliable, relevant, and timely.

2. Remuneration/Compensation Committee

The investor should be sure a committee of independent board members sets executive compensation, commensurate with responsibilities and performance.

3. Nominations Committee

The nominations committee handles recruiting for new (independent) board member.

■ Voting rules

➤ *Share blocking:*

Prevent investors who wish to vote their shares from trading their shares during a period prior to the annual meeting.

A restriction on the ability of shareholders to express their opinions and act in their own interest.

➤ *Confidential voting:*

Confidential voting can encourage unbiased voting.

➤ *Cumulative voting:*

Shareholders may be able to cumulative number of votes allotted to their shares for one or a limited number of board nominees.

■ Takeover defenses

➤ *Golden parachutes*

➤ *Poison pills*

➤ *Greenmail (use of corporate funds to buy back the shares of a hostile acquirer at a premium to their market value)*

➤ *All of these defenses may be used to counter a hostile bid, and their probable effect is to decrease share value.*

■ Primary and secondary capital market

1. Primary capital market

2. Secondary financial market

■ Call Market vs. Continuous Market

1. Call Market

2. Continuous Market

- Market Types
 1. Over-the -counter market
 2. Third market
 3. Fourth market
- Exchange membership
 1. Specialists (market maker)
 2. Commission broker
 3. Floor brokers
 4. Registered traders
- Type of orders
 1. Market Orders
 2. Limit Orders
 3. Stop loss Orders
 4. Short sale orders
- Short selling

$$\underline{\text{Margin purchases}} \quad \text{trigger price } P_t = P_0 \times \left(\frac{1 - IM}{1 - MM} \right)$$

$$\underline{\text{Short sales}} \quad \text{trigger price } P_t = P_0 \times \left(\frac{1 + IM}{1 + MM} \right)$$

- Price-weighted index

$$\text{Price-weighted index} = \frac{\text{Sum of stock prices}}{\text{number of stocks in index adjusted for splits}}$$

The direction of Bias:

The Denominator (divisor) must be adjusted to reflect stock splits and change in the sample over time. After a stock split, the denominator is adjusted downward, so the index is the same before and after the split. The index is biased downward because faster-growth firms tend to split their shares, decreasing the weights of the most successful companies in the index.

- Market value-weighted index

$$\text{Index}_t = \frac{\sum P_t \times Q_t}{\sum P_b \times Q_b} \times \text{Index}_b$$

The direction of Bias:

Firms with greater market capitalization have a greater impact on the index than do firms with lower market capitalization.

■ Unweighted index

✓ Arithmetic mean $\frac{\sum X_i}{n}$

✓ Geometric mean $\sqrt[n]{X_1 \times X_2 \times \dots \times X_n} - 1$

Where $X_i = \frac{P_{t+1}}{P_t}$ for stock i

The direction of Bias:

The use of the geometric mean rather than the arithmetic mean causes a downward bias in the index. The geometric average will always be lower than the arithmetic average unless all stocks have equal-percentage price changes.

■ Efficient market

1. Weak-form efficient market

- Current stock prices *fully reflect all currently available security market information.*
- *Past price and volume information will have no predictive power* about the future direction of security prices.
- An investor can't achieve excess returns using *technical analysis*.

2. Semistrong-form efficient market

- Current stock prices fully reflect all publicly available information.
- Stock prices include all security market and nonmarket information to the public.
- An investor can't achieve excess returns using fundamental analysis.

3. Strong-form efficient market

- Stock prices fully reflect all information from public and private sources.
- Stock prices include all types of information: security market, nonmarket public, and private (inside) information.
- No investor has monopolistic access to information relevant to the formation of prices, and none should be able to consistently achieve abnormal returns.

■ Market anomaly

An anomaly is something that deviates from the common rule.

1. Earnings surprises to predict returns
2. Calendar studies
3. Price-earning ratio(P/E)
4. Small firm effect
5. The neglected firms effect
6. Book value/market value

- Behavioral finance

Consider the psychological bases for perceived investor behavior that creates some degree of systematic mispricing of securities and may explain some anomalies that trend to refute the EMH.

 - Prospect theory
 - Overconfidence bias
 - Confirmation bias
 - Escalation bias
- There are several reasons that pricing anomalies can persist, but all are rooted in the fact that the pricing anomaly is not quickly exploited by traders or arbitrageurs.
 1. Lack of theoretical explanation
 2. Transactions costs
 3. Small profit opportunities
 4. Trading restrictions
 5. Irrational behavior
 6. Other limits on arbitrage
- The top-down approach to security valuation

economic analysis → industry analysis → stock analysis

- A comparison of estimated value and market prices

Investment decision process

If estimate intrinsic value (V) > market price (P)

⇒ buy

If estimate intrinsic value (V) < market price (P)

⇒ Don't buy or sell if you own it

- The value of preferred stocks and common stock

Preferred stock valuation

$$V_0 = \frac{D_P}{k_P}$$

Common stock valuation

- Infinite period model (constant growth DDM/Gordon Growth Model)

$$V_0 = \frac{D_0 \times (1+g)}{k_e - g} = \frac{D_1}{k_e - g}$$

Assumptions:

- The stock pays dividends, and they grow at a constant rate.
- The constant growth rate, g , is never expected to change.
- $k_e > g$, If not, the math will not work.

- Temporary Supernormal Growth (Multistage DDM)

For a firm with supernormal growth (g_1) over n periods followed by a constant growth rate of dividends forever (g_2)

$$V_0 = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \cdots + \frac{D_n}{(1+k_e)^n} + \frac{P_n}{(1+k_e)^n}$$

where

$$P_n = \frac{D_n(1+g_2)}{k_e - g_2} = \frac{D_{n+1}}{k_e - g_2}$$

- Present Value of Operation Free Cash Flows (OFCF)

- The value of the total firm is discounting the operating free cash flows prior to the payment of interest to the debt holders but after deducting funds needs to maintain the firm's asset base (capital expenditures).

- The total value of the firm is equal to: ($V=E+D$)

$$V_0 = \sum_{t=1}^n \frac{OFCF_t}{(1+WACC)^t}$$

- Infinite model:

$$V_0 = \frac{OFCF_1}{WACC - g_{OFCF}}$$

4. Present Value of Free Cash Flow to Equity (FCFE)

- The FCFE is OFCF have been adjusted for payments to debt holders (interest and principal) and any payments to preferred stockholders.
- The value of the stock of firm is equal to: ($V=E$)

$$V_0 = \sum_{t=1}^n \frac{FCFE_t}{(1+k_e)^t}$$

- Infinite model:

$$V_0 = \frac{FCFE_1}{k_e - g_{FCFE}}$$

- Use the DDM to develop an earnings multiplier model

$$\frac{P_0}{E_1} = \frac{D_1 / E_1}{k_e - g}$$

Price-to-earnings (P/E) ratio

Advantages of using P/E ratios in valuation are:

1. Earning power is the primary determinant of investment value.
2. The P/E ratio is popular in the investment community.

Disadvantages of using P/E ratios in valuation are:

1. Earning can be negative, which produces a useless P/E ratio.
2. The volatile, transitory portion of earnings makes the interpretation of P/E ratios difficult for analysts.
3. Management discretion within allowed accounting practices can distort reported earnings.

Price-to-book value (P/B) ratio

Advantages of using P/B ratios in valuation are

1. Book value is a cumulative amount that is usually positive even when EPS is negative.
2. Book value is more stable than EPS, so it may be more useful than P/E when EPS is particular high, low, or volatile.

Disadvantages of using P/B ratios in valuation are:

1. P/B ratios do not recognize the value of nonphysical assets such as human capital.
2. P/B can mislead when there are significant differences in the amount (i.e., size) of assets used by firms being compared.
3. Different accounting conventions can obscure the true investment in the firm made by shareholders.

Price-to-sales (P/S) ratio

Advantages of using P/S ratios in valuation are:

1. The ratio is meaningful even for distressed firms.
2. Sales figures are not as easy to manipulate or distort as EPS and book value.
3. P/S ratios are not as volatile as P/E multiples.

Disadvantages of using P/S ratios in valuation are:

1. High sales do not necessarily indicate operating profits as measured by earnings and cash flow.
2. P/S ratios do not capture differences in cost structures across companies.
3. While less subject to distortion, revenue recognition practices can distort sales forecasts.

Price-to-cash flow (P/CF) ratio

Advantages of using P/CF ratios in valuation are:

1. Cash flow is harder for managers to manipulate than earnings.
2. Price to cash flow is more stable than price to earnings.
3. Using cash flow addresses the problem of differences in quality of earnings that arises when using P/Es.

Disadvantages of using P/CF ratios in valuation are:

1. Some items affecting actual cash flow from operations are ignored when the EPS plus noncash charges estimates is used. For example, noncash revenue and net changes in working capital are ignored.
2. FCFE rather than cash flow should be used. However, FCFE is more volatile than straight cash flow.

債券分析 精華重點摘錄

重點 1:

Affirmative Covenants:

- 1.to pay interest and principal on a timely basis
- 2.to pay all taxes and other claims when due
- 3.to maintain all properties used and useful in the borrowers business in good condition and working order
- 4.to submit periodic reports to a trustee stating that the borrower is in compliance with the loan agreement

Negative covenants:

impose limitations on the borrowers ability to incur additional debt unless certain tests are satisfied

重點 2:

Basic features of a bond.

- 1.Maturity :the life of the bond
- 2.Par value :the face value of the bond, the principal will be paid at maturity.
- 3.Coupon rate :the promised interest rate will be paid by the issuer periodically. (in quarterly, semiannual or annual)
- 4.Provisions for redeeming bonds :how will the principal be repaid, in bullet (one time repaid at maturity) or in amortized (repaid periodically).
- 5.Currency denomination :the currency will be paid for the interest and the maturity principal.
- 6.Options: granted to the issuer or investor

重點 3:

對issuer或borrower 有利的embedded option:

1. the right to call the issue
2. the right to prepay principal above the scheduled principal payment
3. the accelerated sinking fund provision
4. the cap on a floater

對 bondholders 有利的 embedded option:

1. conversion privilege
2. the right to put the issue
3. floor on a floater

重點 4:

The risks associated with investing in bonds:

1. interest rate risk
2. call and prepayment risk
3. yield curve risk
4. reinvestment risk
5. credit risk
6. liquidity risk
7. exchange-rate risk
8. volatility risk
9. inflation or purchasing power risk
10. event risk
11. sovereign risk

重點 5:

There are three types of credit risk:

1. default risk
2. credit spread risk
3. downgrade risk

Credit spread risk:

---an investor is concerned that the market value of a bond will decline and the price performance of a bond will be worse than that of other bonds.

Downgrade risk:

---the risk that a credit rating agency will lower a bond's rating
---increasing yield required
---lowering the bond's price

重點 6:

Volatility risk

Price of callable bond = price of option-free bond - price of embedded call option
當Volatility增加，price of embedded call option會增加，造成Price of callable bond下降。
Price of putable bond = price of option-free bond + price of embedded put option

當Volatility下降，price of embedded put option下降，造成Price of putable bond下降。

重點 7:

Kinds of Treasury Securities

- 1.Treasury Bills(T-bills)
- 2.Treasury notes
- 3.Treasury Bonds
- 4.TIPS(Treasury Inflation-Protected Securities)

coupon payment=inflation-adjusted par value*(stated coupon rate)/2

inflation-adjusted par value=previous par*CPI adjustment factor(e.g. annualized

CPI=5%→adjusted par will be increased by 2.5%)

重點 8:

MBS (Mortgage-backed Securities):

- Backed by a pool of amortizing mortgage loans (the collateral)
- Has monthly cash flows that include interest, scheduled principal payments, and prepayments of principal
- Prepayment risk is significant for investors in pass-through securities

CMO(Collateralized Mortgage Obligations):

- customized claims to the principal and interest payments of mortgage pass-through securities
- redistribute the prepayment risk and maturity risk of the securities
- decrease borrowing costs by redistributing prepayment risk or altering the maturity structure to better suit investor preferences

重點 9:

Types of municipal bonds:

1. Tax exempt bond:
 - the interest income earned on most in-state bonds held by a resident of that state is free from both state and federal income tax
2. Taxable bonds:
 - A municipal bond must meet certain standards in order to qualify for tax-exempt status, otherwise, taxable and the interest income on these bonds is subject to federal income tax

重點 10:

Tax-Backed Bonds and Revenue Bonds

1. tax-backed bond:

- A. Limited tax GO debt: subject to a statutory limit on taxes that may be raised to pay off the obligation.
- B. Unlimited tax GO debt: the most common type of GO bond, secured by the full faith and credit of the borrower and backed by its unlimited taxing authority.
- C. Double-barreled bonds: secured by taxing power + additional resources, e.g., fees, grants, and special charges.
- D. Appropriation-backed obligations: also known as moral obligation bonds. back up by states, not a legal binding, but a ‘moral obligation’.

2. Revenue bond:

are supported only through revenues generated by projects that are funded with the help of the original bond issue has higher risk

重點 11:

The factors to decide ratings

(1)firm-specific considerations:

- i. Past repayment history.
- ii. Quality of management, ability to adapt to changing conditions.
- iii. The industry outlook and firm strategy.
- iv. Overall debt level of the company.
- v. Operating cash flow, ability to service the debt.
- vi. Other source of liquidity (cash, saleable assets)
- vii. Competitive position, regulatory environment, union contracts/history.
- viii. Financial management and controls.
- ix. Susceptibility to event risk and political risk.

(2)Factors specific to a particular debt issue:

- i. Priority of the claim being rated.
- ii. Value/quality of any collateral pledged to secure the debt.
- iii. The covenants of the debt issue.
- iv. Any guarantees of obligations for parent company support.

重點 12:

Pure expectation theory:

---the yield for a particular maturity is an average of the short term rate that are expected in the future

Liquidity preference theory

---investors require risk premium for holding longer term bonds

---the maturity longer, the risk premium required more

Market segmentation theory

---investors and borrowers have preferences for different maturity ranges

---the supply of bonds and the demand of bonds determine equilibrium yields for the various maturity ranges

---weaker version of the market segmentation theory is preferred habitat theory

---investors can be induced to move from their preferred maturity ranges when yields are sufficiently higher in other (non-preferred) maturity ranges

重點 13:

(1) Absolute yield spread (nominal spread)

= yield on the higher-yield bond - yield on the lower-yield bond

(2) Relative yield spread = (Absolute yield spread) / (yield on the benchmark bond)

(3) Yield ratio = (subject bond yield) / (benchmark bond yield)

重點 14:

Coupon rate = yield required by market 則 price=par value

Coupon rate < yield required by market 則 price<par value (discount)

Coupon rate > yield required by market 則 price>par value (premium)

若是 premium bond ,債券價格隨著到期日接近而 decrease

若是 discount bond ,債券價格隨著到期日接近而 increase

若是 par bond ,債券價格隨著到期日接近而 unchanged

重點 15:

$$\text{Value of the bond} = C/(1+R_1) + C/(1+R_2)^2 + C/(1+R_3)^3 + P/(1+R_3)^3$$

C= coupon payment

R₁=spot rate for 1 year

R₂= spot rate for 2 year

R₃= spot rate for 3 year

P=par (face) value of the bond

特例：zero-coupon bond

$$\text{Value of a zero-coupon bond} = \text{par value}/(1+YTM/2)^{2*N}$$

YTM=discount rate

N= years to maturity

重點 16:

Arbitrage steps :

- i. Using the appropriate spot rate to value a coupon bond.
- ii. Compare the value to the market price of this bond.
- iii. To buy the lower price one and to sell the higher price one

可利用 Treasury STRIPS(Separate Trading of Registered Interest and Principal Securities) 及 Treasury bonds的市值(現值)的差異進行套利

if the price of bond > arbitrage-free value(cash flow discount):

sell the bond and buy individual cash flows.(a series of zero-coupon bonds)

重點 17:

Traditional yield measures:

Current yield:

公式: Current yield = annual coupon payment / bond price

Yield to maturity(YTM):

For a debt security, YTM is the annualized internal rate of return (IRR) on it

For a semiannual coupon bond,

因 bond price = $C/(1+r/2) + C/(1+r/2)^2 + \dots + C/(1+r/2)^{2n} + P/(1+r/2)^{2n}$

此時 $r=YTM$

Relationship between yields:

Bond price	Relationship
Par	Coupon rate = current yield = YTM
Premium	Coupon rate > current yield > YTM
Discount	Coupon rate < current yield < YTM

記憶: Current yield 必在中間

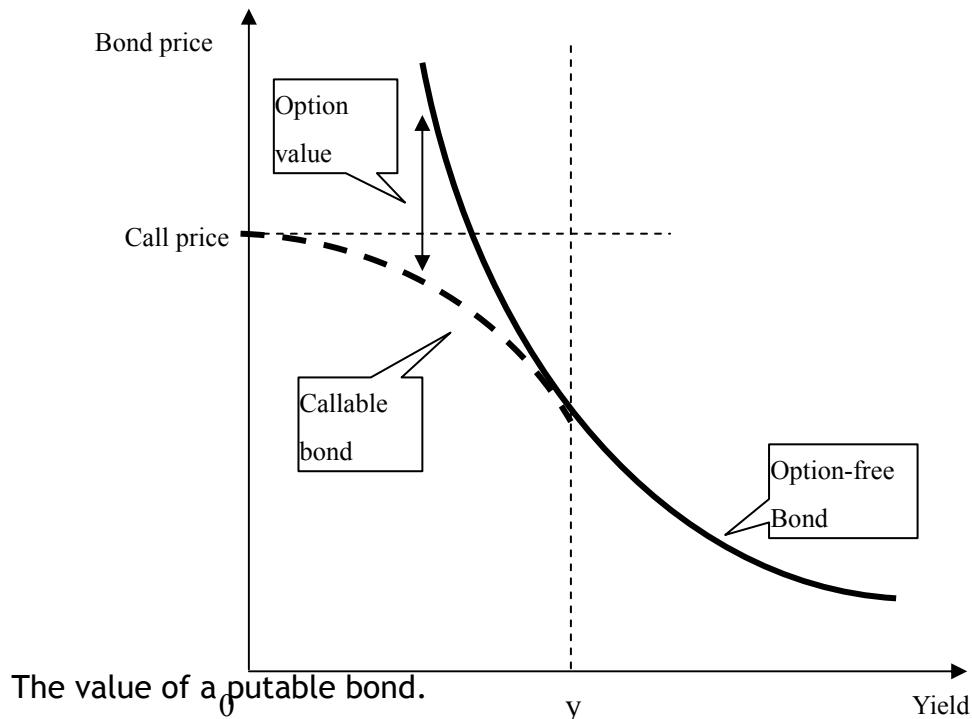
YTM之假設(必考):

1. hold to maturity
2. coupon 可用 YTM 再去 reinvest ----- yield curve is flat
3. 按時償還本金及利息(無違約)

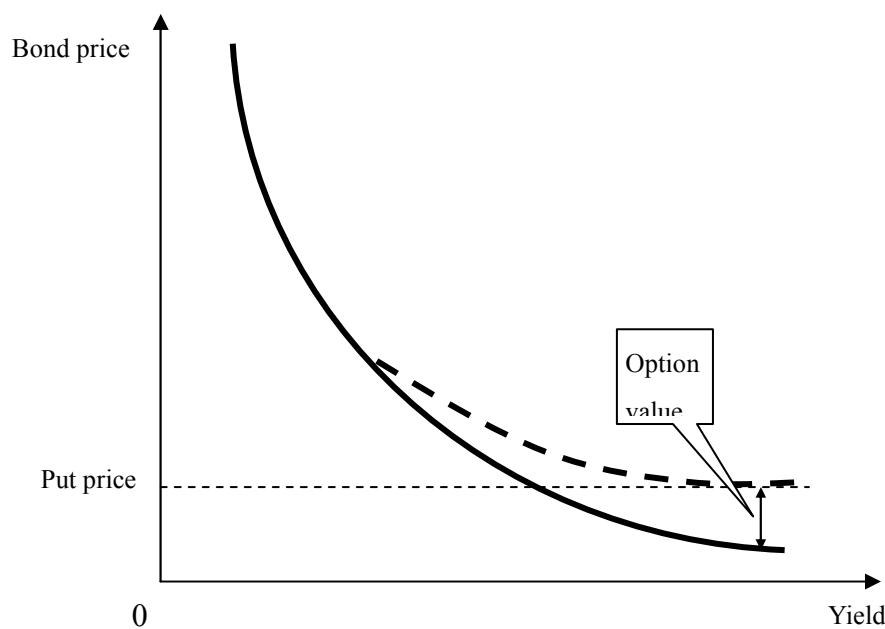
重點 18:

callable bond and putable bond

Value of a Callable bond = value of option-free bond – value of the embedded call option



**Value of a Putable bond = value of the option-free bond
+ value of the embedded put option**



重點 19:

Yield to call:

To calculate the yield on a **callable bond** which assumed will be called at call price
When a bond has a call protection period, we calculate the **yield to first call** over the period until the bond may first be called

Yield to worst:

the worst yield outcome of any that are possible given the call provision of the bond.(for instance, worst of YTM, YTC, YTFPC

Yield to refunding:

Specific situation where a bond is currently callable and current rates make calling the issue attractive to the issuer, but where the bond covenants contain provisions giving protection from refunding until some future date.

Yield to put(YTP):

Used if a bond has a put feature and is selling at a discount

Cash flow yield(CFY):

For MBS or amortizing ABS, there is a principal repayment schedule, but in many case, the repayment amount are greater than scheduled amounts. **Cash flow yield** incorporated an assumed schedule of monthly cash flows based on how prepayments are likely to occur

公式:

$$BEY = [(1 + \text{mthlyCFY})^6 - 1] * 2$$

重點 20: *nominal spread, Z-spread and OAS*

Nominal spread:

the simplest and most straightforward of the spread measures
an issue's YTM minus the YTM of a Treasury security of similar maturity

Zero-Volatility Spread(Z-spread)(Static Spread):

is the equal amount that we have to add to each rate on the Treasury spot yield curve in order to make the PV of the risky bond's cash flows equal to its market price

Option-adjusted spread (OAS):

for an option embedded bond, OAS is the spread that takes the option yield component out of the Z-spread

OAS does not involve the effect of embedded option.

$$\text{Z-spread} - \text{OAS} = \text{option cost in \%}$$

for a **callable bond**:

$$\text{option cost} > 0, \text{OAS} < \text{Z-spread}$$

for a **putable bond**:

$$\text{option cost} < 0, \text{OAS} > \text{Z-spread}$$

Introduction to the measurement of interest rate risk

重點 21:

Full valuation approach (Scenario analysis approach):

for a given change in the yield curve (interest rate scenario) , re-calculate the bond price by cash flow discount

Duration/Convexity approach:

provide an approximation of the actual interest rate sensitivity of a bond or bond portfolio

重點 22:

Macaulay Duration:

i. the earliest measure of duration

ii. an estimate of a bond's interest rate sensitivity base on the time, in years, until promised cash flow will be received

iii. Macaulay Duration = $-(\Delta P/P)/[\Delta Y/(1+Y/n)]$

where P =bond price

ΔP =bond price changed

Y = current market YTM

ΔY = yield changed

Modified Duration:

i. Derived from Macaulay duration

ii. take the current YTM into account

iii. Modified Duration = $-(\Delta P/P)/\Delta Y = \text{Macaulay Duration}/(1+Y/n)$

Effective Duration:

i. Effective duration is calculated from expected price changes in response to change in yield that explicitly *take into account a bond's embedded options.*

ii. Effective duration = $(V_- - V_+)/ (2*V_0*\Delta y)$

Where, V_- = bond price when yield decrease by Δy

V_+ = bond price when yield increase by Δy

V_0 = initial bond price

Δy = yield changed

iii. bond price change in %= -Effective duration* Δy in %

Duration of a bond portfolio

portfolio duration = $W_1*D_1 + W_2*D_2 + \dots + W_n*D_n$

where W_i = market value weighting of bond i in the portfolio

D_i = Duration of bond i

重點 23:

Convexity

- (1) Convexity is a measure of the curvature of the price-yield curve of a bond
(2) The more curved the price-yield relation is (higher convexity), the worse the duration-based estimates of bond price changes in response to changes in yield are.

(曲度愈大，單用duration來估計利率變動對價格變動的準確度就愈低)

Modified Convexity and Effective Convexity:

Effective convexity takes into account changes in cash flow due to embedded options, while modified convexity does not.

公式: Convexity = $(V_- + V_+ - 2 \cdot V_0) / [2 \cdot V_0 \cdot (\Delta r)^2]$

重點 24:

bond price change = duration effect + convexity effect = -duration * Δr + convexity * $(\Delta r)^2$

重點 25:

Factors that affect duration

Longer maturity: higher interest risk, higher duration

Higher coupon rate : lower interest risk, lower duration, higher reinvestment risk

Callable bonds : lower interest risk, lower duration, higher reinvestment risk

Puttable bonds : lower interest risk, lower duration

Higher YTM will lower the interest rate risk of the bond (lower duration) 因利率愈高，斜率愈小(切線愈平坦)

重點 26:

PVBP (Price Value of a Basis Point)

PVBP is an estimate of the change in a bond's or a bond portfolio's value for a one basis point change in yield.

PVBP = DV01 = duration * bond (portfolio) market value * 0.0001

衍生性金融商品精華重點摘錄

- A **forward commitment** is an agreement between two parties in which one party agrees to buy and the other agrees to sell an asset at a future date at a price agreed on today. The three types of forward commitments are **forward contracts**, **futures contracts**, and **swaps**.
- A **contingent claim** is a derivative contract with a payoff dependent on the occurrence of a future event. The primary types of contingent claims are **options**, but other types involve variations of options, often combined with other financial instruments or derivatives.
- A FRA is a forward contract in which one party, the long, agrees to pay a fixed interest payment at a future date and receive an interest payment at a rate to be determined at expiration.

Position	Interest rate
Long FRA	Will benefit if interest rate increase
Short FRA	Will benefit if interest rate decrease

- The general formula for the payment to the long at settlement is :

$$(notional \ principal) \left[\frac{(floating - forward) \left(\frac{days}{360} \right)}{1 + (floating) \left(\frac{days}{360} \right)} \right]$$

Where *notional principal* is the amount of the loan.

days is the number of days the loan for.

forward	futures
private(OTC) contracts	exchange-traded
dealer market (no central location)	physical exchange
customized	standardized
default risk	guaranteed by clearinghouse
Gains & losses recognized at the end of the agreement	daily settle/marketing to market
unregulated	regulated at the federal government level
very limited liquidity	liquidity (have a secondary market)

Moneyness	Call option	Put option
In-the-money	S>X	S<X
At-the-money	S=X	S=X
Out-of-the-money	S<X	S>X

- **Intrinsic value** is the value that can be captured if the option is exercised.
- **Time value** is the difference between the market price of the option and its intrinsic value. At expiration the time value is zero.

- Option price = Intrinsic value + Time value

option	Lower Bound	Maximum Value
European call	$c_0 \geq \text{Max}[0, S_0 - X/(1+r)^T]$	$c_0 \leq S_0$
American call	$C_0 \geq \text{Max}[0, S_0 - X/(1+r)^T]$	$C_0 \leq S_0$
European put	$p_0 \geq \text{Max}[0, X/(1+r)^T - S_0]$	$p_0 \leq X/(1+r)^T$
American put	$P_0 \geq \text{Max}(0, X - S_0)$	$P_0 \leq X$

- Put-Call parity $S_0 + p_0 = c_0 + X/(1+r)^T$
- Early exercise
 - American calls on non-dividend-paying stocks
There is no reason for early exercise of an American call option on stocks with no dividend.
 - American calls on dividend-paying stocks
It may be advantageous to exercise an American call prior to the stock's ex-dividend date, particularly if the dividend is expected to significantly decrease the price of the stock.
 - American put options
Early exercise may be warranted if the company that issued the underlying stock is in bankruptcy so that its price is zero. It is better to get ~~X~~ now than at expiration.

	Call		Put	
\uparrow	European	American	European	American
S	\uparrow	\uparrow	\downarrow	\downarrow
X	\downarrow	\downarrow	\uparrow	\uparrow
T	\uparrow	\uparrow	$\uparrow \downarrow$	\uparrow
σ	\uparrow	\uparrow	\uparrow	\uparrow
r	\uparrow	\uparrow	\downarrow	\downarrow
D	\downarrow	\downarrow	\uparrow	\uparrow

- A plain vanilla interest rate swap is simple an interest rate swap in which one party pays a fixed rate and the other pays a floating rate, with both sets of payments in the same currency
 - Notional principal is generally not swapped in single currency swaps.
 - Net interest is paid by the one who owes it.
 - At the conclusion of the swap, there is no transfer of funds.

- The party who wants floating-rate interest payments agrees to pay fixed-rate interest and has the *pay-fixed* side of the swap. The counterparty, who receives the fixed payments and agrees to pay variable-rate interest, has the *pay-floating* side of the swap and is called the *floating-rate payer*.
- In a **currency swap**, each party makes payments to the other in different currencies. The notional principle is usually exchanged at the beginning and the end of the life of the swap.

	Cover Call	Protective Put
Strategy	$S_0 - c_0 = -p_0 + X/(1+r)^T$	$S_0 + p_0 = c_0 + X/(1+r)^T$
Value at expiration	$V_T = S_T - \max(0, S_T - X)$	$V_T = S_T + \max(0, X - S_T)$
Profit	$\begin{aligned} & S_T - \max(0, S_T - X) - S_0 + c_0 \\ &= X + c_0 - S_0 \quad \text{if } S_T > X \\ &= S_T - S_0 + c_0 \quad \text{if } S_T < X \end{aligned}$	$\begin{aligned} & S_T + \max(0, X - S_T) - S_0 - p_0 \\ &= S_T - S_0 - p_0 \quad \text{if } S_T > X \\ &= X - S_0 - p_0 \quad \text{if } S_T < X \end{aligned}$
Maximum Profit	$X - S_0 + c_0$	∞
Maximum loss	$S_0 - c_0$	$S_0 + p_0 - X$
Breakeven	$S_T^* = S_0 - c_0$	$S_T^* = S_0 + p_0$

其它投資 精華重點摘錄

- 房地產 NOI 的定義: NOI is gross potential income (GPI) minus expenses, which include estimated vacancy and collection losses, insurance, property taxes, utilities, and repairs and maintenance.
- the income approach : market value(V) =
$$\frac{\text{annual net operating income(NOI)}}{\text{market capitalization rate(R)}}$$
- After tax cash flow(ATCF) = NOI-利息費用-折舊-個人所得稅+折舊-本金償還
注意: 如果 NOI-利息費用-折舊是負的, 則乘上一個所得稅率之後, 會發生所得稅利益, 這部分產生稅盾效果, 也算是正的 ATCF 的一部分
- 衡量避險基金的績效應注意問題:
 1. 生存者偏差
 2. 相關係數、標準差、及傳統 VAR 會低估
 3. 夏普指數會高估
 4. 報酬率的分配會有負偏的狀況
- 原物料投資的不同投資人之投資動機:

Investor Types	Motivation	Investment Vehicles
Passive Investors	1 · Diversification 2 · hedge against inflations	Collateralized futures position (funds)*
Active Investors	Profit from Economic Growth	Commodity futures
Portfolio Manager	Protected from interest rate surge. Plus, earn current income from holding commodity related bonds/equities	Commodity linked bonds/equities

*A collateralized position in futures is a portfolio in which an investor takes a long position in futures for a given amount of underlying value and simultaneously invests the same amount in government securities, such as Treasury bills. Source of return for the product: implied interest and futures price change.

■ 商品期貨為什麼會有 Contango 或 Backwardation 的狀況

Terminology	Contango	Backwardation
Definition	The futures curve is upward sloping	The futures curve is downward sloping
Why and when it occurs?	If a commodity's price is high and volatile, and the commodity's consumers are eager to hedge the costs of the commodity, which takes a large percentage of its operating expenses.	<ul style="list-style-type: none"> ■ If a commodity's price is low and is volatile. ■ Backwardation actually used to be the norm in most commodities because a potential price fall had a bigger impact on the few large producers than on many small consumers
Opportunity and risk	<ul style="list-style-type: none"> ■ Roll yield tends to be negative 	<ul style="list-style-type: none"> ■ Roll yield tends to be positive