Ethical and Professional Standards

準則 I: Professionalism

1 A: Knowledge of the Law

1． 要遵守最嚴格的法令

判斷方法: Maximize (國籍地法、執業地法、Code and Standards)

2．遇到公司有違反法律或準則的行為時，要將該違反事項告知相關部門或上司，並且不要參與其中。但如果遇到第三者來的不法要約，遠離即可。

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/watch list 的建立，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)可被接受，但要向客戶揭露服務收入，該收入最好是一次性的收入(flat fee not tied to stock performance)。

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、能力等。

3． 不能 plagiarize(剽竊)他人的作品，即使最簡單的名詞定義也不能直接移植他人文字。

I D: Misconduct

1．不得有違反道德良知的行為或違反專業的行為(如果基金經理人和 trader 在公司打架，均為不妥)，但非專業內的外部行為，不為所問。

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． 內線消息不需要等到最後媒體公開才能做交易(It is not necessary to 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，或欺騙大眾誤信並利用該假消息交易。

準則 III: Duties to Clients

3A: Loyalty, Prudence, and Care

1． 不能侵佔客戶的利益，客戶利益優先。客戶是指受益人，不是指受益人的 trustee(受託人)

2． 客戶的資產，如委託書的投票(proxy voting)，重要的議題(non-routine issues)一定要投票。付出的 Commission 都符合本質原則及比例原則，如果有 soft dollars(paid-up)，則所購買的服務或商品一定要符合研究的範圍。券商一定要找符合 best execution。

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費用，但不能違反公平對待的原則(如第一點所示)。

3． 如果家人也是客戶，則 3B override 6A，所以有好的標的也要等量配給該「客戶」，不能歧視他。

3 C: Suitability

2．投資組合要整體觀念，不要個別計較。

3．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．向客戶宣稱的績效一定是完整、精確、以及真正能夠代表公司。但該績效不一定要經過驗證，也沒有規定績效期間要多長(1 年、3 年、5 年均可)，也沒有說一定要符合 GIPS 關於 composites 的定義。

3 E: Preservation of Confidentiality

1．客戶資料原則上要保密，但如果違法、法令要求(包括 CFA 協會)，或客戶允許，則為例外。

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． 離職前可以在下班時間從事事前的準備工作，但不得帶走其在公司完成的作品，研究報告，及客戶名單。也不得在下班時間 call 現有客戶或準客戶。

3． 個人賦閒在家完成的作品，可以帶至 A 公司，也可以帶至 B 公司。
4． 對老闆在履歷表造假，不屬於 4A 的違反，屬於 1D 的違反。

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(金錢及非金錢)，在接受該好處前，都要獲得原雇主的書面同意。客戶的禮可收，但要雇主事前同意。

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(delegation)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． 研究報告的製作過程應該維持相當的嚴謹性，不能隨便用他人的意見。引用統計數據資料，不宜用太短的期間做判斷。
2． 引用他人的報告作為自已的意見，或接續前任同事的作品繼續加工均可，但要確保來源的報告符合嚴謹性。

5 B: Communication with Clients and Prospective Clients

1． 要將投資決定的基本方針，向客戶/準客戶說明; 該方針如有改變，要通知客戶及準客戶。
2． 投資標的物的相關重要考量因素，要因每次的投資建議之不同目的，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已的意見，還是事實。

5C: Record Retention

1．保存客戶資料的形式不一定要 hardcopy，也不一定要放在總部，保存的期間 7 年。

準則 VI: Conflicts of Interest

6 A: Disclosure of Conflicts

1． 任何會造成利益衝突的情況，都要向客戶/雇主揭露。最常見的情形有: 自已擁有股票、自已公司的承銷部和研究部的利益衝突、自已或自已的家人(direct family member)擔任某家上市公司的董事或 consultant、幫自已的親屬開戶未和上司報告、特別的薪酬獎勵制度(special compensation arrangements)、或 1B 所提到的 Issuer-paid research。
2． 4B 及 6C 也是 6A 的特別情況。

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，讓員工沒辦法先行交易，包括 watch list, pre-clearance procedures (不能增量購買約定的數量), duplicate brokerage statements, block-out periods。

3．違反 6B 優先利用公司內部資訊交易時，通常也違反了 6A、4A(對雇主的忠誠)及 3A。

6 C: Referral Fees

1． 推介服務或產品給客戶，如果有來自於其他人的好處，一定要向客戶事前報告。給推介費的人也要向客戶報告，而且是成為客戶前就要報告。

2． 公司員工和他人的推介協議，一樣也要讓老闆先批准。

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。

2． 不可以利用在 CFA 協會或分會的職務，假公濟私。

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

1． 不能說 Crystal Liu, CFA II。CFA LOGO 不能成為公司標章的一部分。

2． 正確使用 CFA 標章，包括在完整句子中，CFA 一定要當形容詞

3． 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。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)。

Global Investment Performance Standards(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． Discretionary + fee-paying 的 portfolio 至少要放在一個 composite 中；反之 non-discretionary 的 portfolio 一定不可放在 composite 中。

3． 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．IPS 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，一定要是第三者來做驗證。

Quantitative Methods

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.

■ future value (FV) and present value (PV) of a single sum of money

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

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

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

A=the annuity amount

r= the interest rate per period corresponding to the frequency of annuity payments

N=the number of annuity payments

When the time horizon goes infinitely, the above equation becomes:

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

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

❒ 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

■ **The mean absolute deviation (MAD)** is the average of the absolute values of the deviations of individual observations from the arithmetic mean

MAD= $\frac{\sum_{i=1}^{n}|X_i-\overline{X}|}{n}$

■ Variance and Standard Deviation

1. The *variance* is defined as the mean of the squared deviations from the mean.
2. The standard deviation is simply calculated as the squared root of the variance. Since the standard deviation and the mean are expressed in the same units, standard deviation is usually the more relevant measure. It is important to note that you have to calculate the variance before you can get to the standard deviation.

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

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

重點 7:

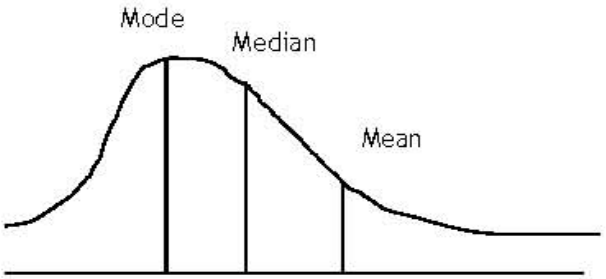
Let K be any positive constant greater than 1. The proportion of the observations within K standard deviations of the mean is at least **$1-(1/K^2)$** for all K>1

Number of Standard deviation	Proportion falling within that SD
1.5	56%
2	75%
2.5	84%
3	89%
4	94%

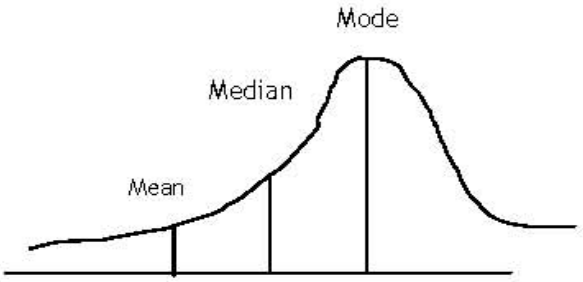
重點 8:

A distribution that is not symmetrical is called skewed. A positive skewed distribution is characterized by many small losses and a few extreme gains. A negatively skewed distribution is characterized by many small gains and a few extreme losses.

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)

Absolute skewness is computed in the same way as the variance except that *cubed* deviations from the mean are used instead of squared deviations. *Relative skewness*(S_K) is equal to absolute skewness divided by the cubed standard deviation times number in the sample (for large sample)

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:

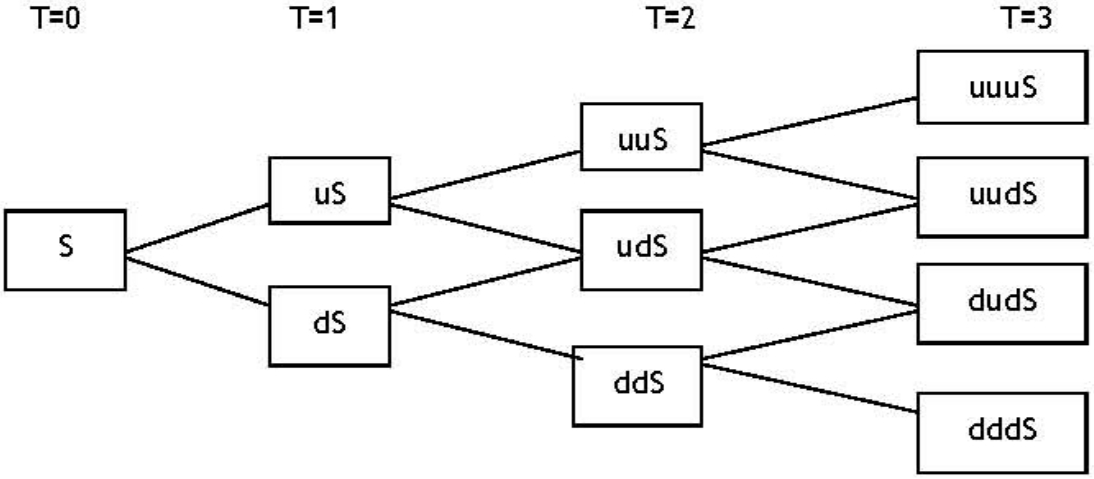
if you know the probability that an event B will occur *and* you know the probability that another event A occurs *given* that B has occurred *and* you know the probability that event A

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.

邊際機率(1) ⟶ 給定主觀機率⟶ 求出另一邊的邊際機率(total probability rule 之運用) ⟶利用條件機率(2)增加預測準度，也就是(2)大於(1)，事後機率大於事前機率

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 is 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)=(number of ways to choose x from n)$p^x(1-p)^{n-x}$ = $c_x^n p^x (1-p)^{n-x}$

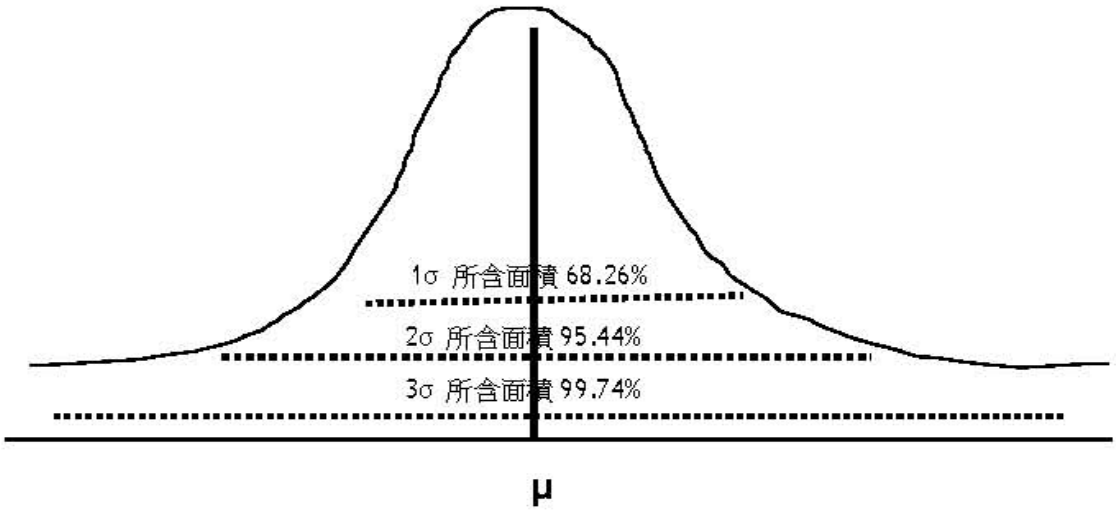
Where *p* equals the probability of success, *x* is the number of successes we are looking for, and *n* is the total number of trials that are being performed.

重點 11:

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

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

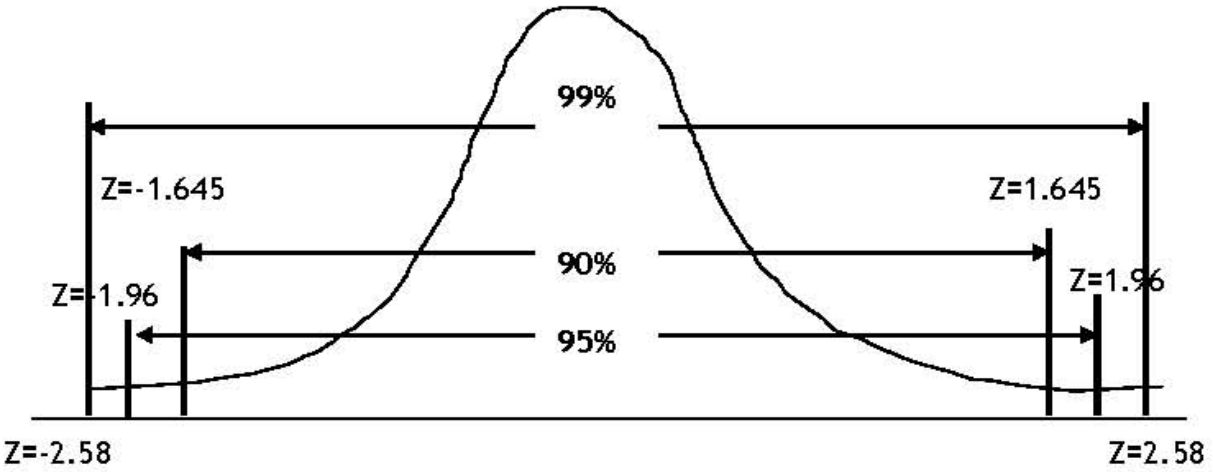
We can also define a normal distribution in terms of the mean and the standard deviation, σ (this is often convenient because σ is measured in the same units as X and μ). As a consequence, we can answer any probability question about a normal distribution variable if we know its ean and variance (or standard deviation)



- 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。而標準常態分配下的 Z 值代表的就是從平均數到某一個觀察值的標準差值。我們可以利用標準常態分配表，找出一個特定的 Z 值，然候求出對應之機率值。



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

重點 12:

1. 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 $\boldsymbol{\sigma^2/n}$ when the sample size *n* is large.

2. The central limit theorem states that the variance of the distribution of the sample mean is $\boldsymbol{\sigma^2/n}$. The positive square root of variance is standard deviation. The standard deviation of a sample statistic is known as the ***standard error of the statistic*** (or ***standard error of the sample mean*** in most cases).

3。 The formula used depends on whether the population variance is known or unknown but the equation is not substantially different.

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

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

❒ Construction of Confidence Intervals. A (1-α)% confidence interval for a parameter has the following structure:

Point estimate ± (Reliability Factor x 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-α)% for the confidence interval
Standard Error = the standard error of the sample statistic providing the point estimate

重點 13:

For confidence intervals based on samples from normally distributed populations with *unknown variance*, the theoretically correct reliability factor is based on the t-distribution.

Basis of Computing Reliability Factors

When sampling from a:	*Test Statistic*	
	Small Sample (n<30)	Large Sample (n≧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	not available	***t-statistic****

unknown variance		

* Use of z also acceptable

(1-α)% 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

There are four possible outcomes when we test an null hypothesis:

1. We reject a false null hypothesis. This is a correct action
2. we reject a true null hypothesis. This is a **Type I error**
3. we do not reject a false null hypothesis. This is a **Type II error**
4. we do not reject a true null hypothesis. This is a correct action

- ***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

	Decision	
Fact	Do not reject H_0	Reject H_0
H_0 is true	Correct decision	Incorrect decision ***Type I error*** Significance level, α, =P(Type I error)
H_0 is false	Incorrect decision ***Type II error***	Correct decision Power of the test =1 - 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. $H_0 \quad \sigma^2 \leq \sigma_0^2$ 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, donated by χ^2. Test statistic for tests concerning the value of a population variance (Normal population):

$$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$$ with n-1 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)

  $H_0: \sigma_1^2 = \sigma_2^2$ versus $H_a: \sigma_1^2 \neq \sigma_2^2$

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

H_0: $\sigma_1^2 \geq \sigma_2^2$ versus 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

Economics

I. Microeconomic Analysis

Elasticity

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

   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 ↓ (↑) then PQ ↑ (↓).

   If $|e_P| < 1$, demand is inelastic, if P ↓ (↑) then PQ ↓ (↑).

   If $|e_P| = 0$, demand is perfectly inelastic, the demand curve is vertical, if P ↓ (↑) then PQ ↓ (↑).

   If $|e_P| = \infty$, demand is perfectly elastic, the demand curve is horizontal, if P ↓ (↑) 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: $(e_C) := (\triangle Q^A{}_D / {}^A Q_D) / (\triangle P^B / P^B)$

   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): = $(\triangle Q_D / Q_D) / (\triangle I / I)$

   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_P): = $(\triangle Q_S / Q_S) / (\triangle P/P)$

   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 ↑ If MB<MC:Q ↓

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 equals 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

$$\textit{Average Total Cost (ATC)} = \textit{Total Cost / Output} = AFC+AVC$$

Marginal Cost (MC) = △Total Cost /△Output

4. Average Product (AP)= Total Product (TP)/ Input

Marginal Product (MP)= △Total Product /△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 identity 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 maximizations 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. Kinded 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 Q*	High ←			→ Low
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≠min ATC	P≠min ATC	P≠min ATC

II. 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 = △Total Revenue /△Input = (△Total Revenue /△Output) x (△Output/△Input) = MR x MP.
4.. The equibrium price and quantity for input is determined by demand and supply:
   MRP = MR x MP = MC_{input}
   i.e. in labor market: MRP_{Labor} = wage, in capital market: $MRP_{Capital}$ = interest rate
5. 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 = (number of unemployed / Labor Force) x 100%
   Labor force participation rate= (Labor Force / working-age population) x 100%
   The employment to population ratio= (number of employed / working-age population) x 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 = [(current CPI – year-ago CPI) / year-ago CPI] x 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.

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 slope downwards 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,
   higher. 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 ↓(↑) or Gov't Expenditure ↑(↓)	↑(↓)	↑(↓)	↑(↓)	↓(↑)

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 / required reserve ratio.

5. Fed's two monetary policies:

a. Fixed-rule policy: refer to actions of the Fed that are taken regardless of the health of the economy. The rules ensuring stable money supply growth— increasing the money supply only at a constant rate equal to the long run growth rate in real GDP. The Fed does not attempt to stabilize AD.

b. Feedback-rule policies: refer to a set of rules dicating actions to be taken by the Fed in response to

the changing health of the economy. A recessionary decrease in AD triggers an increase in money supply growth, while an inflationary increase in AD triggers a reduction in money supply growth.

6. The Effects of Monetary Policy:

	AD	Price Level	Income	Unemployment
Interest rate ↓ (↑) or Money Supply ↑ (↓)	↑ (↓)	↑ (↓)	↑ (↓)	↓ (↑)

7. The Quantity Theory of Money: M x V = P x Y, where P x 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 ↑ then only P ↑.

Monetarist economists' view: since $\Delta V/V = 0$, if $\Delta M/M > (=) \Delta Y/Y$, then $\Delta P/P > (=) 0$.

9. New Monetarist feedback rule: places emphasis on price level stability. The rule uses the quantity theory of money, which states that increases in the money supply cause proportional increases in the price level.

10. New Keynesian feedback rule places emphasis on both price level stability and business cycle stability (i.e. reducing deviations of real GDP from potential real GDP), increases the federal funds target rate as inflation and inflation indicators increase and as real GDP rises above potential GDP. And vice versa.

11. Main differences between the two rules

a. The new Keynesian feedback rule is directly and immediately affected by the business cycle. Gaps between GDP and potential GDP bring quick action under the the new Keynesian rule. In contrast, the new Monetarist rule produces a slow response to changes in real GDP.

b. The new Keynesian rule uses the federal funds target rate as the policy variable, whereas the new Monetarist rule uses the growth rates of the money supply as the policy variable.

Financial Statement Analysis

Cash conversion cycle (or net operating cycle)
= Average receivables collection period + Average processing time for inventory
- Payables payment period

- Receivables turnover

$$= \frac{\text{Net annual sales}}{\text{average receivables}}$$

- Average receivables collection period

$$= \frac{365}{\text{receivables turnover}}$$

- Inventory turnover

$$= \frac{\text{COGS}}{\text{average inventory}}$$

- Processing time for inventory

$$= \frac{365}{\text{inventory turnover}}$$

- Payables turnover ratio

$$= \frac{\text{COGS}}{\text{average trade payables}}$$

- Payables payment period

$$= \frac{365}{\text{payables turnover ratio}}$$

WC = CA – CL; CR = CA/CL

Anti-dilutive?

Begin Bal. + Purchase – Depr. = End Bal.

Ratio analysis using **duPont System**

Return on equity (ROE)

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

= (Net Profit Margin) x (Equity Turnover)

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

= (Net Profit Margin) x (Asset Turnover) x (Equity Multiplier)

$$\text{ROE} = \frac{\text{EBT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} \times (1-t)$$

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

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

$BI + P = COGS + EI$

FIFO COGS = LIFO COGS – Δ LIFO Reserve

Balance Sheet items:

LIFO reserve = FIFO inventory – LIFO inventory

Inventory: (LIFO basis ➔ FIFO basis)	**Retained Earning:**
	+ (LIFO reserve) x (1-t)
+ LIFO reserve	**Deferred tax liability:**
	+ (LIFO reserve) x (t)

Income Statement items:

FIFO COGS = LIFO COGS – Δ LIFO Reserve

FIFO Net Income = LIFO Net Income + [Δ LIFO Reserve x (1–t)]

Tax Expense = tax payable + deferred tax expense

Tax expense = tax payable + Δ def. tax liab. – Δ def. tax asset

Deferred tax liab. = t_n (pretax income – taxable income)* = t_n (timing difference)*

deferred tax asset = t_n (taxable income – pretax income)* = t_n (timing difference)*

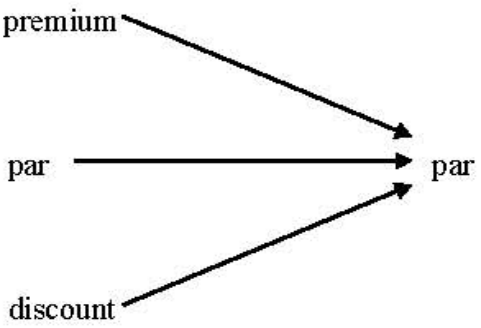
tax expense = (taxable income) (t_c) + Δ deferred tax liab – Δdeferred tax asset

*** cumulative**

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

- Financial Statement Effects of Issuing a Bond
  ⊕ Statement of Cash Flow

	CFF	CFO
Issuance of debt	↑ cash received = PV of bond at market interest rate	No effect
Periodic interest payments	No effect	↓ interest paid = (coupon rate) (par value)
Payment at maturity	↓ face (par) value	No effect



⊕ 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 ↓ as premium is amortized to interest expense	Liability ↑ as discount is amortized to interest expense

⊕ Income Statement

Issued at Par	Issued at a Premium	Issued at a Discount
–	CFF ↑	CFF ↓
Market rate = face rate	Market rate < face rate	Market rate > face rate
Interest expense = (face rate) (face value) = cash paid	Interest expense = cash paid – amortization of premium	Interest expense = cash paid + amortization of discount
–	CFO ↓	CFO ↑

Interest is constant	Interest ↓ over time	Interest ↑ over time

Inter-corporate Investments

持股狀況	會計方法
Over 50% ownership; Control of the investee	Consolidation method
Joint control	Under US GAAP, equity method usually required; Only under IFRS, proportionate consolidation permitted
20%~ 50% ownership; Significant influence	Equity method
Under 20% ownership; No significant influence	Accounting methods for passive investments

Classifications of Marketable Securities

	Balance sheet	**Income statement**
Investments in securities held to maturity	Amortized cost	* Interest earned * Realized gain/loss
Trading investments	Fair market value	* Dividends/Interest earned * Realized gain/loss * **Unrealized holding gain/loss**
Available-for-sale investments	Fair market value **Note: Unrealized holding gain/loss** *adjustment to stockholders equity* (**NOT** as a gain or loss on income statement)	* Dividends/Interest earned * Realized gain/loss

1. Bond price

(1)Full price/Clean price➔Full price = Clean price + accrued interest. ➔Clean price = the quoted price at trading.

(2)Accrued interest➔the interest earned by the investor from last coupon day to sometime.

2. Risks Associated with Investing in Bonds

(1)Interest rate risk

➔price risk➔bond price change due to market rate movement.➔can be approximately estimated by duration.(△P% = Modified Duration*△y)

(2)Yield curve risk

➔The market value of a bond portfolio changed due to the change of the shape of the yield curve.

(3)Call/Prepayment risk

(4)Credit risk

➔ Default risk/Credit spread risk/Downgrade risk

(5) Liquidity risk

(6) Inflation risk

➔purchasing power risk➔due to unexpected inflation.

➔Expected inflation rate is embedded in the yield➔not a risk.

(7)Volatility risk

➔for option embedded bonds, interest rate volatility changes will affect the value of the bonds.➔Higher Volatility➔higher value of option.

3. Yield Measures, Spot Rates, and Forward Rates

(1)Sources of return from investing in a bond:

i. Coupon payments.

ii. The recovery of principal at maturity

iii. Interest on interest.(reinvestment income➔reinvestment risk)

(2).Kinds of yield:

i. Current yield =annual coupon payment / bond price

ii. Yield to maturity(YTM)

➔ YTM is the annualized internal rate of return (IRR) on it.

➔assumptions for YTM:

(i) Hold to maturity.

(ii) Reinvestment rate=YTM

iii. Relationship between yields:

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

(3) Factors affect reinvestment risk (hold others same)

i. **Coupon rate**➔Higher coupon rate➔more interest to reinvest ➔ higher reinvestment risk

ii. **Maturity**➔longer maturity➔more cash flows to reinvest ➔higher reinvestment risk (zero-coupon bond excluded)

(4)Spot rate and spot curve.

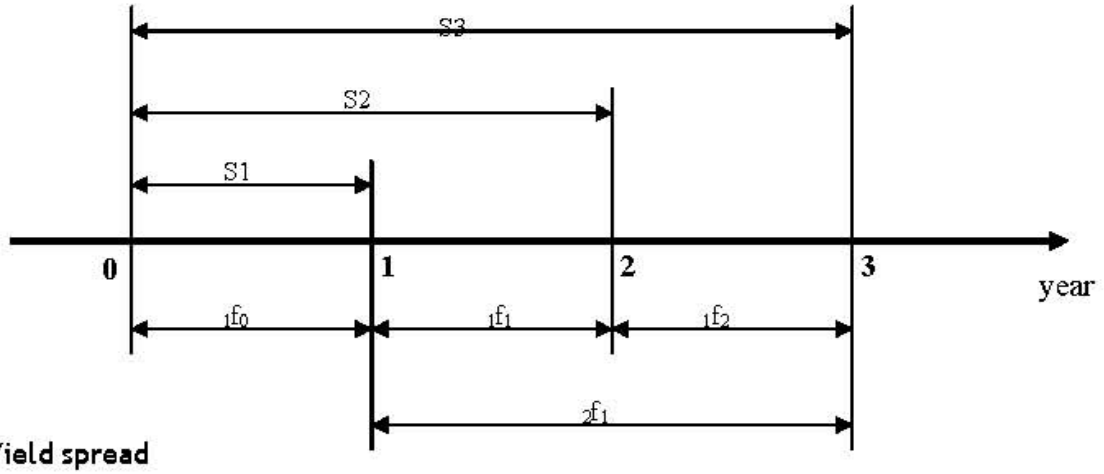
➔Spot Rate➔the discount rate for a single payment, i.e., the YTM of a zero-coupon bond.

➔Spot curve➔a series of spot rate for various tenor (maturity).

(5)Forward rate ➔A borrowing rate for a loan to be made in the future.

(6)Between spot rate and Forward rate

Between Spot rate and Forward rate



4. Yield spread

(1) Nominal spread=Absolute yield spread=YTM_1 - YTM_2

(2) Relative yield spread

=(Absolute yield spread)/ (yield on the **lower**-yield security) = **Yield ratio -1**

(3)Yield ratio

=(yield on the higher-yield security)/(yield on the lower-yield security)

= **Relative yield spread + 1**

(4)Zero-Volatility Spread =Z-spread=Static Spread

→the equal amount that we have to add to each rate on the spot curve of $Bond_1$ in order to make the PV of $Bond_2$'s cash flow to its market price. (for instance, between a T-Bond and a risky bond)

(5)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.

→**OAS = Z-spread - option cost in %**

→**for an option-free bond→option cost=0→OAS = Z-spread**

→ **for a callable bond→option cost> 0→OAS < Z-spread**

→ **for a puttable bond→option cost<0→OAS > Z-spread**

5. **Term structure of interest rates→Three theories:**

(1) **Pure expectation theory→**the yield for a particular maturity is an average of the short term rate that are expected in the future. → can explain all shapes of yield curve.

(2) **Liquidity preference theory→**investors require risk premium for holding longer term bonds→the maturity longer, the yield higher→**can not** explain the inverted yield curve

(3) **Market segmentation theory→**investors and borrowers have preferences for different maturity ranges.→funds' demand and supply in each maturity range decide the interest rate of that maturity.

6. Bond valuation

(1) value of the bond=present value of the cash flows

$=C/(1+R)+C/(1+R)^2+C/(1+R)^3+P/(1+R)^3$

$=C/(1+R1)+C/(1+R2)^2+C/(1+R3)^3+P/(1+R3)^3$

where

R=discount rate = YTM

R1、R2、R3= spot rate for 1/2/3 year

(2) YTM ↑ ➔Bond price ↓ .

YTM ↓ ➔ Bond price ↑

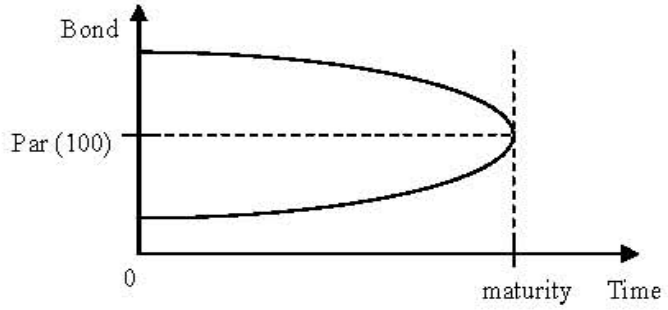
(3) YTM ＞ coupon rate ➔ discount bond (bond price＜par)

YTM ＝ coupon rate ➔ bond price＝par

YTM ＜ coupon rate ➔ premium bond (bond price＞par)

(4) The price of a bond when it approaches its maturity date.

Regardless of the bond's market yield, coupon rate or issuing price, its price will converge to par value as maturity approaches➔ **Pull to Par.**



(5) Price of option embedded bonds

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

➔interest rate Volatility ↑ ➔call option value ↑ ➔price of callable bond ↓

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

➔interest rate Volatility ↑ ➔call option value ↑ ➔price of puttable bond ↑

7. Measuring Interest Rate Risk

(1) Kinds of Durations.

i. Macaulay Duration =-(△V/V)/【△r/(1+r/n)】

ii. Modified Duration= -(△V/V)/△r = **Macaulay Duration/(1+r/n)**

iii. Effective (option-adjusted) Duration =$(V_- - V_+) / (2*V_0*\triangle r)$

(2) Interpreting Duration

i. the slope of the price-yield curve at the bond's current YTM.

ii. Weighted average of the time (in year) until each cash flow will be received.

iii. the approximate percentage change in price of a bond for a one percent change in yield.

(3) Duration of a portfolio = $W_1*D_1+ W_2*D_2+....+ W_n*D_n$

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

(4) bond price change =duration effect + convexity effect

(5) Factors affect duration.

i. Longer maturity→Higher interest risk (higher duration)

ii. Higher coupon rate→Lower interest risk.(Lower duration, and higher reinvestment risk)

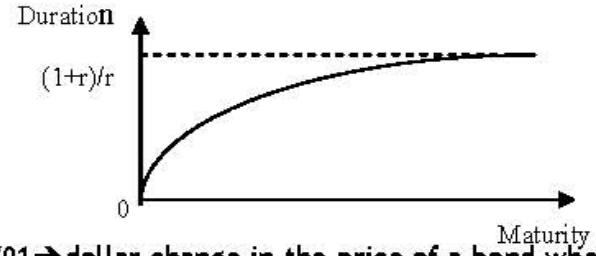
iii.Callable bonds→Lower interest risk.(Lower duration, and higher reinvestment risk)

iv.Puttable bonds→Lower interest risk.(Lower duration)

v. Higher YTM →l lower interest rate risk (lower duration).

vi. The duration of a consol=(1+r)/r

→as long as the extension of maturity, the duration will converge to the limitation--(1+r)/r



vii. PVBP→ also called DV01→dollar change in the price of a bond when the yield changes by 1bp. =duration*bond (portfolio) market value*0.0001

8. Bond Sectors and Instruments

(1) Eurobond V.S. Foreign bond

-→ Eurobonds：a bond issued in a currency other than the currency of the country or market in which it is issued

→ Foreign bond：A bond that is issued in a domestic market by a foreign entity, in the domestic market's currency, e.g., Yankee Bond

(2) 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%)

(3) Mortgage-backed Securities (MBS)

Cash flows from MBS = periodic interest + principal repayment+prepayment

(4) CMO (Collateralized Mortgage Obligations)➔created from passthroughs.

The motivation of creating a CMO

i. To redistribute the prepayment risk.(I/O alter prepayment risk)

ii. To create securities with various maturity

(5) Municipal bonds ➔Tax exempt

i. Tax-backed bond➔also called general obligation(GO) bonds➔lower risk.

ii. Revenue bonds➔higher risk.

iii. Insured Bonds➔ carrying the guarantee of the third party.

iv. Prerefunded bonds➔Collateralized by Treasury securities.

(6) Functions of a **Special Purpose Vehicle (SPV)** in securitization.

➔or special purpose corporation(**SPC**)

➔to protect from the the claims of the corporation's general creditors.➔make the ABS receives a higher rating.➔**bankruptcy remote entity.**

Corporate Finance & Equity

- 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)

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

Decision Rule:

For independent projects

$NPV \geqq 0$ Accept

$NPV < 0$ Reject

- Internal Rate of Return (IRR)

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

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

For independent projects

IRR $\geqq k$ Accept

IRR $< k$ Reject

- Profitability Index (PI)

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

Decision Rule

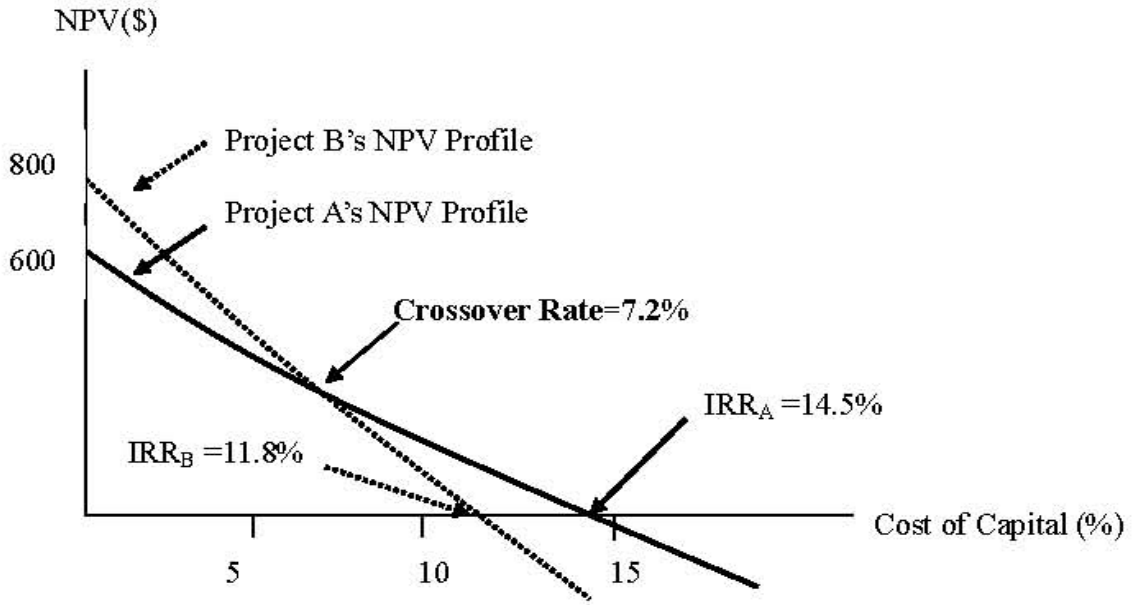
$PI \geqq 1$ Accept

$PI < 1$ Reject

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

■ NPV Profiles

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



■ 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.*

Confliciting 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

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

- 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 stockt k_{ps}

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

The cost of equity capital k_{ce}

1. **The capital asset pricing model approach**

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

2. **The dividend discount model approach**

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

where g = (1-payout rate)(ROE) = (retention rate)(ROE)

$= b \times$ ROE

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

3. **Bond yield plus risk premium approach**

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

- The revised CAPM

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

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:

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

ROE = net profit margin × total asset turnover × financial leverage

■ DuPont Equation (extended):

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

ROE = operating profit margin × effect of nonoperating item × tax effect × total asset turnover × financial leverage

■ 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

Margin purchases trigger price $P_t = P_0 \times (\frac{1-IM}{1-MM})$

Short sales trigger price $P_t = P_0 \times (\frac{1+IM}{1+MM})$

■ 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

$$Index_t = \frac{\sum P_t \times Q_t}{\sum P_b \times Q_b} \times Index_b$$

The direction of Bias:

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

■ 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**

Research and conclusions about such alleged psychological tendencies as *selling winners too soon and holding losing positions too long,* and *making systematic errors of perception and error of estimation*, would fall under the general heading of behavioral finance.

- 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

■ Business cycle stages

1. Recovery

   The economy picks up from its slowdown or recession.

   Good investments to have are *cyclical stocks* and *commodities.*

2. Early Upswing

Confidence is up and the economy is gaining some momentum.

Good investments to have are *stocks* and also *commercial* and *residential property*.

3. Late Upswing

Boom mentality has taken hold. The stocks, commodity and property prices are high.

This is the time to purchase *bonds* (yields are high) and *interest rate sensitive stocks*.

4. Economy Slows or Goes into Recession

The economy is declining.

Good investments to have are *bonds*, which will rally (because of a drop in market interest rates), and its *interest rate sensitive stocks*.

5. Recession

Monetary policy will be eased but there will be a lag before recovery, particularly towards the end of the recession.

Good investments to make are *stocks* and *commodities*.

■ Competition structure in the industry

1. Concentration Ratio

It is calculated as a percentage market share of the N largest firms in an industry.

2. Herfindahl Index (H)

$$H = M_1^2 + M_2^2 + \ldots + M_N^2$$

1. $H = N(\frac{1}{N^2}) = \frac{1}{N}$ if all firms have an equal share.
2. $\frac{1}{H}$ (the reciprocal of H) indicates the "equivalent" number of firms in the industry.
3. The (H) reflects all firms in the industry and it gives greater weight to the companies with larger market shares.
4. The lower the index (H), the higher the industry risk because the competitive pressure is higher and there is less likelihood of corporation.

■ Analysis of Industry Competition

- Rivalry among the existing competitors
- Threat of new entrants
- Threat of substitute products
- Bargaining power of buyers
- Bargaining power of suppliers

■ Evaluate the purchase of a stock

Estimated EPS

Expected EPS = [sales × EBITDA% - deprecation- Interest](1-tax rate)

Note: Sales, depreciation, and interest are estimated per-share values.

Estimated P/E

1. Macroanalysis of Earnings Multiplier

   This approach estimates the company's P/E ratio by *comparing it to industry and market P/E ratio.*

2. Microanalysis of Earnings Multiplier

   - *Estimate the firm's projected dividend payout ratio.*(This is done with comparative analysis of the firm's payout history, stated goals, and industry) $\frac{D_1}{E_1}$
   - *Estimates the firm's required rate of return on equity* $k = R_f + \beta(R_m - R_f)$
   - *Estimate the firm's expected growth rate* $g = (b)(ROE)$
   - *Compute the firm's future earnings multiplier* $\frac{P_0}{E_1} = \frac{D_1 / E_1}{(k-g)}$

Evaluate the purchase of a stock

1. Compare Price

   intrinsic value > current market price

2. Compare Return

   expected rate of return > required rate of return

■ The value of preferred stocks and common stock

Preferred stock valuation

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

Common stock valuation

1. 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.

2. 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

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

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.

Derivatives

- 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 :

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

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/marking 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	$c_0 \geq Max\left[0, S_0 - X/(1+r)^T\right]$	$c_0 \leq S_0$
American call	$C_0 \geq Max\left[0, S_0 - X/(1+r)^T\right]$	$C_0 \leq S_0$
European put	$p_0 \geq Max\left[0, X/(1+r)^T - S_0\right]$	$p_0 \leq X/(1+r)^T$
American put	$P_0 \geq Max(0, X - S_0)$	$P_0 \leq X$

- 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	
↑	European	American	European	American
S	↑	↑	↓	↓
X	↓	↓	↑	↑
T	↑	↑	↑ ↓	↑
σ	↑	↑	↑	↑
r	↑	↑	↓	↓
D	↓	↓	↑	↑

- 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	$S_T - \max(0, S_T - X) - S_0 + c_0$ $= X + c_0 - S_0 \quad if \quad S_T > X$ $= S_T - S_0 + c_0 \quad if \quad S_T < X$	$S_T + \max(0, X - S_T) - S_0 - p_0$ $= S_T - S_0 - p_0 \quad if \quad S_T > X$ $= X - S_0 - p_0 \quad if \quad S_T < X$
Maximum Profit	$X - S_0 + c_0$	∞
Maximum loss	$S_0 - c_0$	$S_0 + p_0 - X$
Breakeven	$S_T^* = S_0 - c_0$	$S_T^* = S_0 + p_0$

Portfolio Management

重點 1:

A simplified portfolio management process

Policy Statement

- Focus: Investor's short-term and long-term needs, familiarity with capital markets, expectations, risk/return objective, constraints (了解客戶風險，限制後訂出報酬率目標)
- Result: Investment Policy Statement

↓

Examine current and projected financial, economic, political, and social conditions (對資本市場的預期)

- Focus: Short-term and intermediate-term expected conditions to use in constructing a specific portfolio
- Result: Strategic Asset Allocation

↓

Implement the plan by constructing the portfolio

- Focus: Active/Passive; Currency hedge; Tactical Asset allocation
- Result: Portfolio optimization and execution (執行及最適化)

↓

4. Feedback Loop: Monitor and update investor needs, environmental conditions, evaluate portfolio performance (監控績效及更新客戶需求)

重點 2:

Definition:

Return Objectives	*Definition*
Capital preservation	Investors want to minimize their risk of loss, usually in real terms
Current income	Investors want the portfolio to concentrate on generating income rather than capital gains

Total return	Investors need the portfolio to grow in real terms over time to meet some future need, while both capital gains and reinvesting current income are important sources
Capital appreciation	Investors need the portfolio to grow in real terms over time to meet some future need, while its return should purely come from capital gain

重點 3:

Investment Constraints

1. **Liquidity Needs:** the need to use invested capital in the short term.
2. **Time Horizon:** usually determines liquidity needs and risk tolerance level.
3. **Tax Concerns:** should deter the tax consequences as much as possible.
4. **Legal and Regulatory Factors:** fiduciary duties; prohibition against insider trading.
5. **Unique Needs and Preferences**

重點 4:

The general definition of risk aversion:

1 Minimize risk for a given level of return

2 Maximize return for a given level of risk

3 Positive relationship between expected return and risk

4 More return is required for an unit increase of the risk measure (standard deviation)

重點 5:

Individual Investment:

$$E(R_i) = \sum_{i=1}^{n} p_i E(R_i)$$

Portfolio:

$$E(R_{port}) = \sum_{i=1}^{n} W_i E(R_i)$$

$$Variance(\sigma^2) = \sum_{i=1}^{n} [R_i - E(R_i)]^2 P_i$$

$$Standard\ Deviation\ (\sigma) = \sqrt{\sum_{i=1}^{n} [R_i - E(R_i)]^2 P_i}$$

$$Cov_{ij} = \sum_{i,j=1}^{n} P_{i,j}[R_i - E(R_i)][R_j - E(R_j)]$$

重點 6:

$$\sigma^2{}_{port} = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \, \mathrm{cov}_{ij}$$

$$\sigma_{port} = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \, \mathrm{cov}_{ij}} = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j r_{ij} \sigma_i \sigma_j}$$

兩個資產投資組合的標準差=

$$\sigma_{port\ i,j} = \sqrt{w_i^2 \sigma_i^2 + w_j{}^2 \sigma_j^2 + 2 w_i w_j r_{i,j} \sigma_i \sigma_j}$$

- 當資產 i，j 的相關係數等於 1 時，上式可簡化成

$$\sigma_{port\ i,j} = \sqrt{(w_i \sigma_i + w_j \sigma_j)^2} = w_i \sigma_i + w_j \sigma_j$$

- 當資產 i，j 的相關係數等於-1 時，上式可簡化成

$$\sigma_{port\ i,j} = \sqrt{(w_i \sigma_i - w_j \sigma_j)^2} = w_i \sigma_i - w_j \sigma_j$$

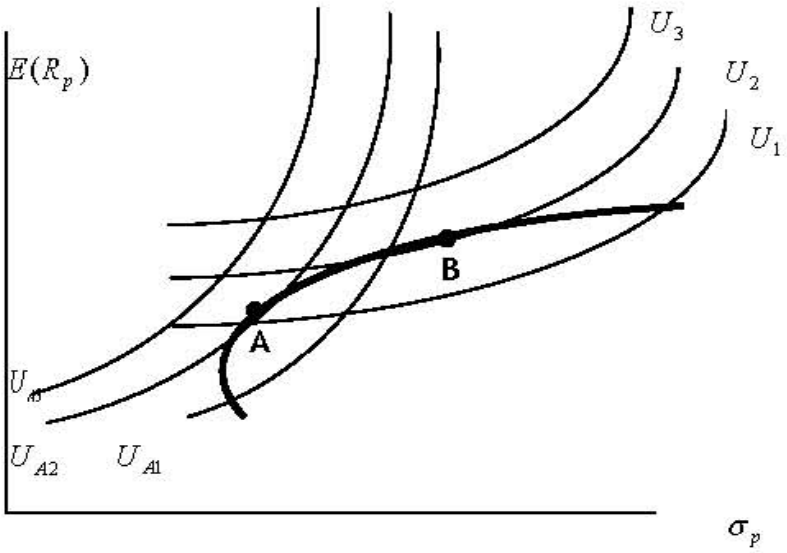
- 一個有風險的資產和一個無風險的資產之投資組合，其變異數和標準差可簡化為

$$\sigma_p^2 = w_i^2 \sigma_i^2 \qquad \sigma_p = w_i \sigma_i$$

重點 7:

- An individual investor's utility curves specify the trade-offs he or she is willing to make between expected return and risk. The optimal portfolios each investor would choose will be different, depending on his utility curve. Different utility curves tangent to the efficient frontier to generate different optimal portfolios for different investors.

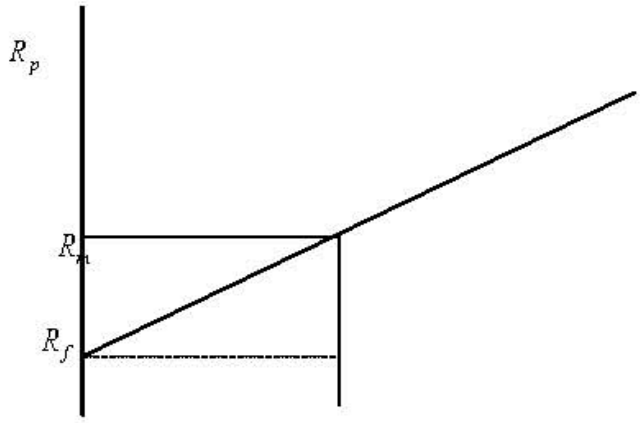
- U_2 represents a 25-year-old's utility curve to tangent to the efficient frontier at point **B** to yield the younger person's optimal portfolio, while point **A** means the desired portfolio for the 65-year-old because his utility curve of U_{A2} intersecting with the efficient frontier at that point.



重點 8:

Capital Market Line:

$$R_p = R_f + \frac{R_m - R_f}{\sigma_m}\sigma_p$$



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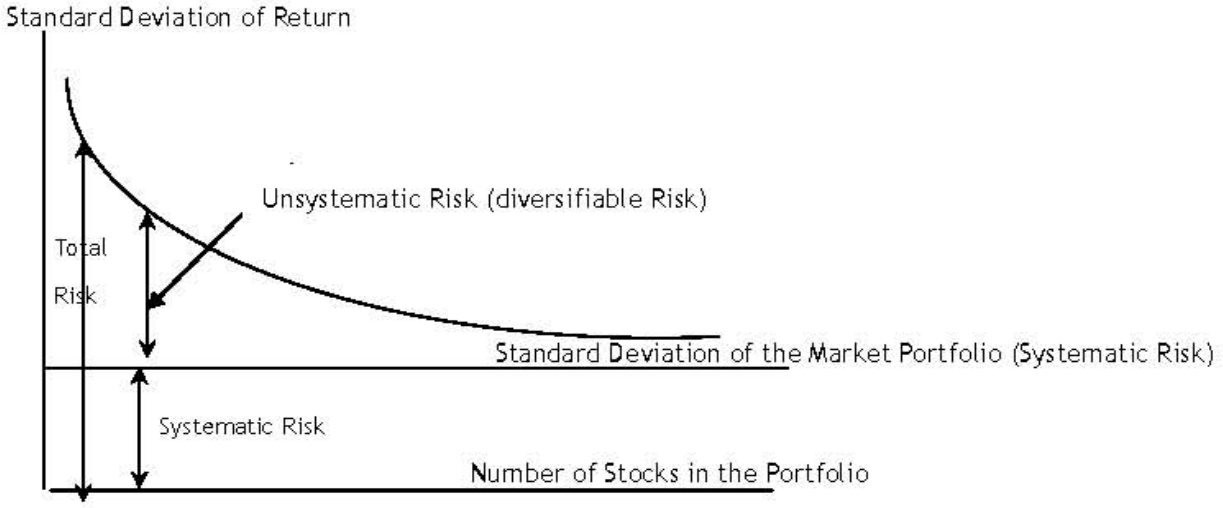
$$Slope = \frac{R_m - R_f}{\sigma_m}$$

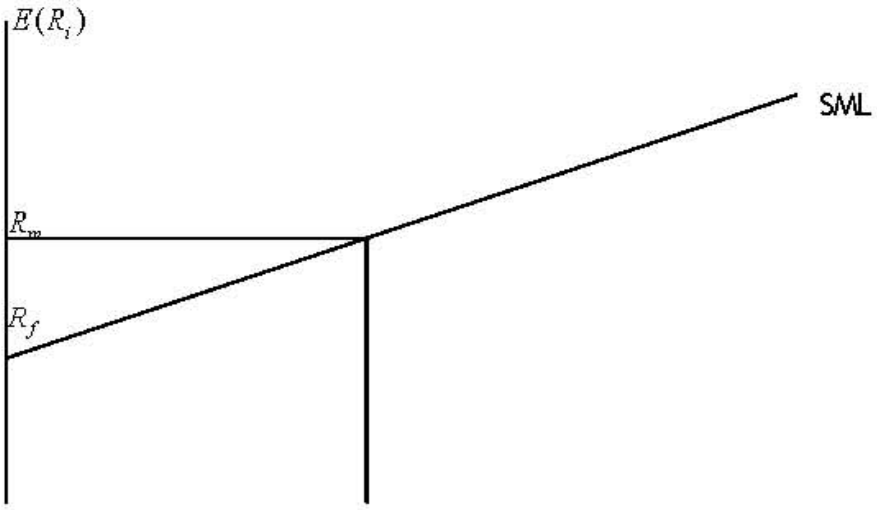
σ_m σ_p

重點 9:



重點 10:

1. The relevant risk to consider when adding a security to a portfolio is its covariance with all other assets in the portfolio. In other words, the relevant risk measure for an individual risky asset is its covariance with the market portfolio $Cov_{i,m}$.
2. In CAPM, we use Security Market Line (SML) to describe the relationship between a stock or portfolio's expected/required return and its risk, and we change our risk measure from standard deviation (in which CML uses) to *standardized covariance* to measure risk for individual asset and portfolios.

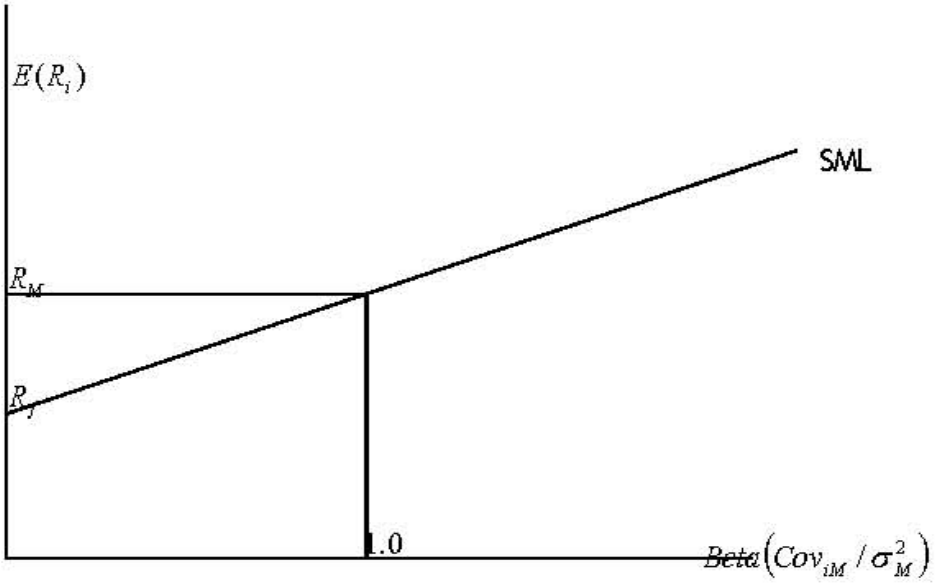


σ_m^2 $Cov_{i,m}$

$$E(R_i) = R_f + \frac{R_m - R_f}{\sigma_m^2}(Cov_{i,m}) = R_f + (R_m - R_f)\frac{Cov_{i,m}}{\sigma_m^2}$$

Define $\frac{Cov_{i,m}}{\sigma_m^2}$ as Beta (β_i), this equation can be stated as:

$$E(R_i) = R_f + \beta_i(R_m - R_f)$$



✎ Market Beta is 1 by definition $(\frac{Cov_{m,m}}{\sigma_m^2} = \frac{\sigma_m^2}{\sigma_m^2} = 1)$

3. The expected (required) rate of return for a risky asset is determined by the risk free return plus a risk premium for the individual asset. In turn, the risk premium is determined by the systematic risk of the asset (Beta), and the prevailing market risk premium $(R_m - R_f)$

重點 11:

❒ In equilibrium, all assets and all portfolios of assets should lie on the SML, meaning the expected return equals to the required rate of return.

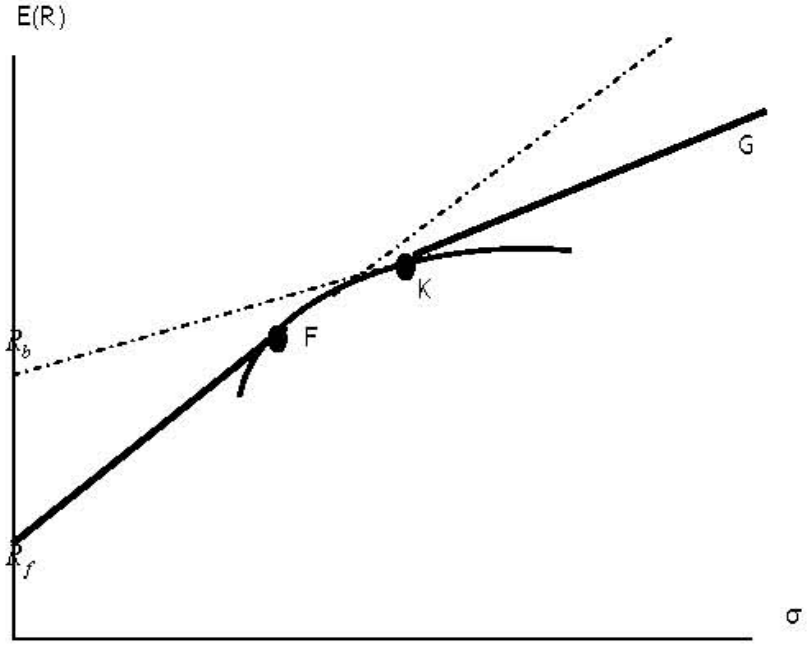
❒ Any securities with an estimated rate of return that plots ***above*** the SML would be considered ***underpriced*** because it implies that you estimated you would receive a rate of return on the security that is above its required rate of return based on its systematic risk(Beta).

❒ In contrast, assets with estimated rates of return that plot ***below*** the SML would be considered ***overpriced.***

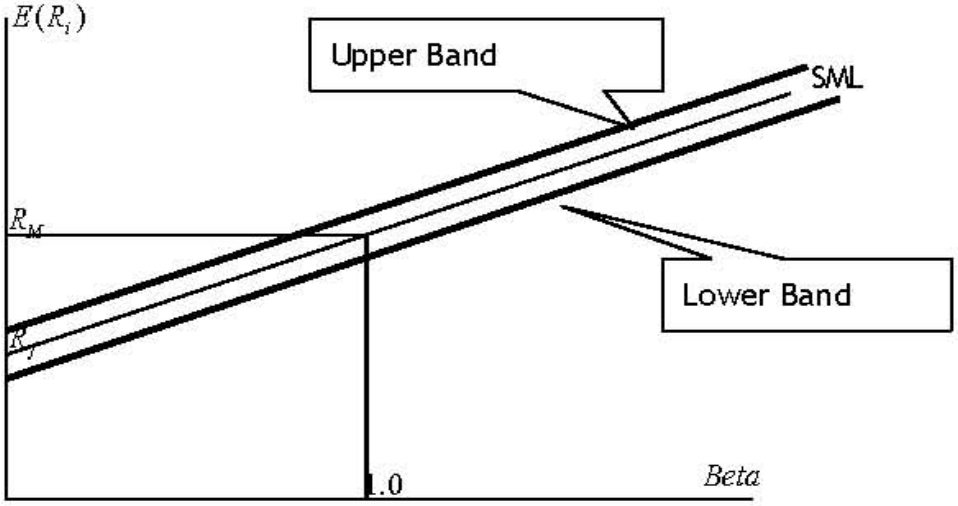
重點 12:

➢ **Different borrowing and lending rates:**

The security market line becomes a three-segment combination: a straight line R_f -- F , reflecting more conservative investors investing a portion of the money in market portfolio F and the rest in risk-free T-bills;. F—K (a curve segment); and a straight line from K—G, reflecting a more expensive borrowing rate (R_b) and another market portfolio G tangent to the new line.



➢ The security market line becomes a band once transaction costs are included.



➢ The security market line also becomes a band once different expectations and different planning periods are considered.

Alternative Investments

一、開放式、封閉式及 ETF 的比較:

	Open-end	Closed-end	ETF
買賣價格依據	根據基金公司當日計算出的 NAV	市場成交價格	市場成交價格
受益憑證單位數是否固定	受益憑證數可增加或減少	固定	受益憑證數可增加或減少
等級/法人形式	有很多不同的等級(A,B,C,T)	封閉式投資公司	1. 投資公司形式 2. 單位投資信託 3. 讓與信託(Grantor Trust)
折溢價問題?	沒有	時常發生	市場價格少有偏離 NAV 情形，因為有創造贖回機制
各式費用	1. 申購費 2. 贖回費 3. 持續行銷費(12b-1 fee) 4. 管理費 5. 保管費 (3+4+5/NAV=expense ratio)	1. 券商手續費 2. 管理費 3. 保管費	1. 券商手續費 2. 管理費 3. 保管費
可否要求基金公司贖回	可	不可以	1. 通常參與券商才可以為之 2. 分成實物贖回及現金贖回
優點	沒有折溢價問題	可以在集中市場直接買賣交易	1. 管理費低，流動性佳，少有折溢價問題(因為有 in-kind redemption and creation process) 2. 風險分散 3. 可融資融券 4. 一日多價，進出方便 5. 有對應的期貨及選擇權 6. 投資組合透明 7. 現金股利自動再投資 8. 實物贖回不會產生資本利得稅
缺點	因為有管理費和其它費用，不容易擊敗大盤	有折溢價問題及流動性問題	對定期定額投資人而言，因為 ETF 有 commission，因此相較免銷售傭金的開放式基金(No load Fund)，ETF 較不適合

二、房地產評價

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.

1. $$\text{the income approach : market value(V)} = \frac{\text{annual net operating income(NOI)}}{\text{market capitalization rate(R)}}$$

2. 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

三、避險基金的績效偏誤

Biases

- ☐ Self-selection bias (歷史成績好的避險基金也會像指數編製公司呈報)
- ☐ Instant history bias
- ☐ Survivorship bias: Return
  unsuccessful funds and managers tend to disappear over time. Only successful ones search for new clients and present their track records
- ☐ Survivorship bias: Risk
  Hedge funds that exhibited highly volatile returns in the past tend to disappear because investors shy away from high risk as well as from negative returns, only strategies that have experienced low volatility in the past survive.
- ☐ Smoothed pricing to under-estimate the standard deviation and correlation
- ☐ Option-like investment strategies to over-estimate Sharpe ratio and under-estimate traditional VAR and risks
- ☐ Fee structure and gaming

四、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

* 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.