

第一部分 (每題 10 分) 共 50 分。

1. 在古典線性迴歸模型下，何謂自我迴歸(Autocorrelation)? 它會造成什麼問題? 有何解決方式?
2. 在古典線性迴歸模型下有哪些假設?
3. 統計的檢定中，顯著性測試(Significance Test)，有型一誤差(Type I Error)與型二誤差(Type II Error)
 - (1) 繪圖說明其意義(以單尾機率表示即可)
 - (2) 若以平均值為檢定對象，當樣本數變大時，這兩類誤差有何變化? 若 n 固定， α 、 β 的消長情況如何?
4. 請討論
 - A. The Normal approximation of Binominal distribution.
 - B. The Poisson approximation of Binominal distribution.
5. 請說明 Logistic 迴歸的原理與估計方式。

【背面還有試題】

國立中山大學96學年度博士班招生考試試題

科目：統計學 【財管系選考】

共 2 頁 第 2 頁

PART TWO (50%)

1. Several time series from U Nation considered are: (a) GDP (gross domestic product), (b) PDI (personal disposable income), (3) PCE (personal consumption expenditure); all data are for the periods of 1970 – 1991, for a total of 88 quarterly observations. The first differences of the GDP series are computed as $\Delta GDP_t = GDP_t - GDP_{t-1}$, where Δ denotes the first difference operator. Some models are estimated and the results are reported as follows.

$$(1) \Delta \hat{GDP}_t = 0.00576 GDP_{t-1}$$

$$t = (5.798) \quad R^2 = -0.0152 \quad d = 1.34$$

$$(2) \Delta \hat{GDP}_t = 28.2054 - 0.00136 GDP_{t-1}$$

$$t = (1.1576) \quad (-0.2191) \quad R^2 = -0.00056 \quad d = 1.35$$

$$(3) \Delta \hat{GDP}_t = 190.3857 + 1.4776t - 0.0603 GDP_{t-1}$$

$$t = (1.8389) \quad (1.6109) \quad (-1.6252) \quad R^2 = -0.0305 \quad d = 1.31$$

$$(4) \Delta \hat{GDP}_t = 234.973 + 1.892t - 0.0786 GDP_{t-1} + 0.356 \Delta GDP_{t-1}$$

$$t = (2.3833) \quad (2.1522) \quad (-2.2152) \quad (3.4647)$$

$$R^2 = -0.1562 \quad d = 2.0858$$

For the above four equations:

- (i) Explain the meaning of the hypothesis being stated economically and statistically. (7%)
 - (ii) Interpret the results, including statistical significance and the economic meaning of the estimated coefficients. (7%)
 - (iii) Which of the above models may be appropriate? Why? Explain. (8%)
2. Some statistical results for the Regression models for 3-Month and 6-Month Treasury Bill Rates are estimated below. The data obtained from U Nation is for the period of 1982.01 – 2001.06.

$$(1) \hat{TB6}_t = -0.0456 + 1.0466TB3_t$$

$$t = (-1.1207) \quad (171.624)$$

$$R^2 = 0.9921 \quad d = 0.4055$$

$$(2) \Delta \hat{TB6}_t = -0.0067 + 0.9360 \Delta \hat{TB3}_t - 0.2030 \hat{u}_{t-1}$$

$$t = (0.8662) \quad (41.9592) \quad (-5.3837)$$

$$R^2 = 0.8852 \quad d = 1.5604$$

Please answer the following questions:

- (iv) Is regression (1) spurious? How do you know? (7%)
- (v) From the result of regression (2), would you change your conclusion in (i)? and why? (7%)
- (vi) Explain the relationship between 3-Month and 6-Month Treasury Bill Rates statistically and economically. (7%)
- (vii) Are the U Nation money markets efficient in view of the regression results? (7%)

國立中山大學96學年度博士班招生考試試題

科目：經濟學 【財管系選考】

共 2 頁 第 1 頁

個體經濟學部份：

- (1) Consider a two-person, two-commodity pure exchange competitive economy. The consumers' utility functions are:

$$U^A = X_1^A X_2^A + 12X_1^A + 3X_2^A$$

$$U^B = X_1^B X_2^B + 8X_1^B + 9X_2^B$$

Consumer A has initial endowments of 8 and 30 units of commodity 1 and 2 respectively; Consumer B is endowed with 10 units of each commodity. Determine the Equilibrium quantity for each consumer. Determine and Equilibrium price ratio for this economy. (20 分)

- (2) Tom has initial wealth $W_0 = \$1200$ and faces an uncertain future with two possible future states, $S=1$ or $S=2$. He can invest in two different securities, j and k , with initial prices of $P_j = 10$ and $P_k = 12$, and the following payoff table:

Security	Payoff	
	S=1	S=2
j	\$10	\$12
k	\$20	\$8

- (a) If he buys only security j , how many shares can he purchase? If he buys only security k , how many can he buy? What would his final wealth, W_s , be in both cases and each state? (2 分)
- (b) Suppose Tom can issue as well as buy security; however, he must be able to meet all claims under the occurrence of each state. What is the maximum number of shares of security j he can sell to buy security k ? What is the maximum number of shares of security k he can sell to buy security j ? What would his final wealth be in both cases and in each state? (2 分)
- (c) What is the price of "pure securities" implicit in the payoff table. (2 分)
- (d) What is the initial price of a third security i , for which payoff in state 1, $Q_{i1} = \$5$ and payoff in state 2, $Q_{i2} = \$12$? (2 分)
- (e) Summarize the results from (a) through (d) on a graph with axis W_1 and W_2 . (2 分)
- (f) Suppose Tom has an utility function: $U = W_1^{0.6} W_2^{0.4}$. Find the optimal portfolio. Assuming issuing security is possible. If she restricts himself to a portfolio consisting only of j and k , how do you interpret your result? (5 分)
- (3) 請簡要說明下列均衡的觀念：
- (a) 不合作納許均衡 (Non-cooperative Nash Bargaining Solution) (3 分)
- (b) 合作納許均衡 (Cooperative Nash Bargaining) (4 分)
- (c) 貝氏納許均衡 (Bayesian Nash Equilibrium) (4 分)
- (d) 分離均衡 (Separating Equilibrium) (4 分)

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共 2 頁 第 2 頁

總體經濟部份：共五十分

1.

(a) 建立一 IS-LM-BP 的數學模型，述明其假設。(10 分)

(b) 以此模型導出所得，利率，匯率及出口淨額。(10 分)

2.

(a) 凱因斯的 liquidity preference theory 假設貨幣市場及債券市場互為 mirror image，請以數學模型說明，述明假設。(10 分)

(b) 若除貨幣市場及債券市場外還有一股票市場，則貨幣市場及債券市場是否仍互為 mirror image？建立一模型說明之。(10 分)

3.

古典學派認為市場機能可以充分發揮，經濟經常處於充分就業狀態，但其他學派則認為經濟未能經常保持充分就業，請以模型說明其他學派的主張。(10 分)

國立中山大學96學年度博士班招生考試試題

科目：財務管理 【財管系選考】

共 2 頁 第 / 頁

一、簡答題(請說明答案之完整理由並寫出所有的計算過程。只有答案但無解釋並無分數)

1. (5 points) 有兩家上市公司A與B，市場目前給A公司與B公司的定價分別為 $PE=30$ 及 $PE=40$ ，但你知道A公司EPS在未來4年有30%成長率，B公司在未來4年有40%，兩家公司在4年之後EPS都停止成長但也不衰退，假設目前市場給成長股的定價為 $PEG=1$ ，不成長的公司的定價為 $PE=10$ ，投資A公司或B公司較有利？或投資A與B公司都有利或都不利？

2. (10 points) ABC company is investigating a possible merger with DEF company. Here is the basic financial information about the two companies:

	ABC	DEF
Expected Earnings per share	\$6.00	\$8.80
Expected Dividends per share	\$3.6	\$5.28
Number of shares	10 million	5.5 million
Stock price	\$60	85

Both ABC and DEF are mature firms, with forecasted growth of 2.5 percent per year. However, ABC's treasurer believes that post-merger cost savings could generate a one-time, 15 percent increase in the two firms' combined earnings. Dividend payout would increase proportionally, although long-term growth would remain at 2.5 percent per year.

- What is the merger gain? (4 points)
- What is the cost of the acquisition if ABC borrows \$650 million and pays this amount in cash for DEF? (3 points)
- Suppose that ABC offers 1.65 ABC shares for each DEF shares. What is the merger cost in this case? (3 points)

3. (10 points) 私募股權基金最近看上台灣的上市公司，通常私募股權基金一旦買下上市公司就會透過減資、增加負債與下市來改造公司，並宣稱這些動作可以讓公司經營得更有效率，能增加公司的價值，試說明私募基金的這些動作如何能或不能增加公司的價值？

4. (5分) 根據2004年7月公告的臺灣會計準則公告第35號公報「資產減損之會計處理準則」，企業必須確保資產帳面價值不可超過「可回收金額」，資產帳面價值如果超過可回收金額，就產生資產減損。所謂可回收金額指資產的「淨公平價值」與其「使用價值」中較高的一個。這裡所謂「使用價值」是指預期可由資產產生之估計未來現金流量的折現值，試說明要算出使用價值所用的折現率是什麼？與股權評價的現金股利折現模型的折現率一樣嗎？

5. (10 points)

(a) 淨現值法(NPV)與內部報酬率法(IRR)之再投資率假設是什麼？哪一種之假設較合理？

(b) 若某一五年期之投資計畫之IRR是25%而未來五年之現金流量也如原先預估一樣，該計畫之實現之投資報酬率是否也真如IRR所估之25%，若不是解決之道是什麼？

6. (10 points) 台灣中油買了一家美國的油田探測公司，Alaska Drilling Company 在阿拉斯加擁有一些荒地，但不清楚是否有石油。若要鑽探測試油井(exploratory well)，成本為2000萬美元。有80%的機率鑽出的測試油井是乾的，但不管測試油井是不是乾的，只要在一年內裝上一億美元的生產設備(production capacity)，都能期獲得石油收益。設折現率為10%。

若測試油井鑽探成功，亦即不是乾的，年收入每年為3000萬美元，若不成功，則為每年仍有收入750萬元直到永遠，Alaska Drilling 是否應投資測試油井的鑽探？作答時請畫出決策之二元樹狀圖。

二、申論題

Please read the following questions carefully and answer as completely as possible, define all notations and assumptions.

1. Why should (or shouldn't) a firm hedge its risk?
 - (1) Explain the theories behind your arguments. (12 points)
 - (2) How would you test your arguments? Please describe your empirical methodology and explain all the variables in your models.(8 points).

2. (1) H1: "All else equal, firms with greater institutional holdings or greater concentration of institutional holdings will pay out more cash."
What theories can explain this hypothesis? (9 points)
 - (2) H2: "All else equal, firms that pay larger dividends will attract more institutional investors."
What theory may explain this hypothesis? (9 points)
 - (3) How would you test whether H1 or H2 (or both) is true? Please describe your methodology in details. (12 points)

國立中山大學96學年度博士班招生考試試題

科目：數學 【財管系選考】

共 / 頁 第 / 頁

本試題共計四大題，每一大題 25 分，滿分 100 分

- 一、請就一次投擲兩枚硬幣的隨機實驗，分別列出其最小與最大的 σ -finite，並以此為例，說明何謂 σ -field？何謂 probability measure？以及，何謂 Lebesgue measure？
- 二、If the conditional mean of one random variable (\tilde{x}) does not depend on the realization of another (\tilde{y}), then \tilde{x} is said to be conditionally independent of \tilde{y} , i.e. $E(\tilde{x}|\tilde{y} = y) = E(\tilde{x})$ for all realizations y . Based on this definition, firstly to answer what is "fair game" ? Second, to prove that \tilde{x} is conditionally independent of \tilde{y} if and only if $\text{cov}[\tilde{x}, g(\tilde{y})] = 0$ for all functions $g(\tilde{y})$. And lastly, to prove that $x_n \equiv E(\tilde{x}|y_0, y_1, \dots, y_n)$ are always the realizations of a martingale.
- 三、Prove that if M is a symmetric and idempotent matrix of order $(n \times n)$, and let L be a $(k \times n)$ matrix such that $LM = 0$, then the linear form $L\varepsilon$ and the quadratic form $\varepsilon M \varepsilon$ are distributed independently, where $\varepsilon \sim N(0, \sigma^2 \mathbf{1}_n)$ and $\mathbf{1}_n$ is an identity matrix of order $(n \times n)$.
- 四、Prove that $f(Z) = P(Z) + iQ(Z)$, $Z = x + iy$ is a complex number, i.e. $f(Z) = P(x, y) + iQ(x, y)$ is a complex function, then $\frac{\partial P(x, y)}{\partial x} = \frac{\partial Q(x, y)}{\partial y}$ and $\frac{\partial Q(x, y)}{\partial x} = -\frac{\partial P(x, y)}{\partial y}$