科目：統計學【財管系選考】

I. (5 point each, total 50 points)

1. Suppose that you are asked to test the following hypothesis:
"A private-owned firm/industry is productively more efficient than a public-owned firm/industry.' To test this hypothesis, ownership (OS) is treated as an industrial attribute represented by a dummy variable set equal to one if an industry is private-owned and zero if it is public-owned.

Given the following empirical results, answer these questions:

Taiwan Case				
Variable	Estimate	Industry No.	PE_j	Ranking
Constant	3.32 (3.9)	1	0.5296	18
LnK	0.1302 (3.1)	2	0.5165	19
LnL	0.075 (3.7)	3	0.5932	12
OS	0.0046 (3.9)	4	0.6119	7
		5	0.4697	20
		6	0.6025	9
		7	0.5938	11
		8	0.6149	6
		9	0.6269	4
		10	0.5945	10
		11	0.61	8
		12	0.5781	14
		13	0.5325	16
		14	0.6194	5
		15	0.5774	15
		16	0.5911	13
		17	0.6368	3
		18	0.6844	2
		19	0.6997	1
		20	0.5302	17

I.

(i) State the functional form of production.

(ii) Explain the meaning of the hypothesis being stated economically and statistically.

(iii) Interpret the results, including statistical significance and the economic meaning of the estimated coefficients.

(iv) On the average, has the OS increased the industrial efficiency of Taiwan?

(v) Is individual private-owned industry statistically more efficient than those owned by government? Why? Explain.

Note:

(1) Industries nos. 2 and 10 are exclusively government (public) owned. Industries nos. 1, 6, 7, 13, and 18 are mixed (i.e., both private- and public-owned).

(2) K and L are capital and labor, respectively.

(3) PE_j = the measure of productive efficiency which falls between 0 (no efficiency) and 1 (perfect efficienty).

(4) The dependent variable is output.

(5) The figures in parentheses are t-statistics.

2. Please interpret the following statistical concepts concisely and compactly (no more than three sentences each):

(i) Statistical Inference vs. Descriptive statistics

(ii) The effects of heteroskedasticity on the estimates of the parameters and their variances in a normal regression model

(iii) Estimation in levels vs. first differences

(iv) Multicollinearity in a regression model

(v) If the Durbin-Watson test fails in a time-series regression model, what is the problem existent, what are the reasons that cause it? And should you adopt any strategy to correct it?

第二部分 (每題 10 分)

1. 請問什麼是線性重和(multicollinearity)？他會造成什麼問題？有何解決方式？

2. 某一上班族中午通常去吃自助餐或到便利商店買便當，他對吃自助餐與到便利商店的花費是否有差異很感興趣，他認爲吃自助餐應該比較便宜，爲了檢驗這個問題，他打算進行抽樣調查，他在自助餐店與便利商店隨機選擇了兩組樣本，一組人數爲 12 人，是吃自助餐，一組人數爲 15 人，是便利商店買便當，可是他不知用什麼統計方法來檢驗這個費用差異的問題。請你告訴他如何進行這個問題的統計檢定。

3. 要進行一個變異數分析(ANOVA)需要有哪些重要的假設前提？如何檢驗是否符合這些假設？

4. 在點估計的過程中，有哪些標準評估點估計式(point estimator)的優劣？

5. 請解釋以下的兩個名詞在統計學上的意義。
   A. 穩健度(robustness)
   B. 自由度(degree of freedom)

個體部份

一、(20%) Consider a firm with programming a decision work as the following :

$$\min_{(x_1, x_2)} w_1 x_1 + w_2 x_2$$

$$s.t.\ \ A x_1^a x_2^b = y$$

Where w_i denotes factor i's price, y stands for firm's single output which will be offered to the commodity market at price of P per unit. All of the variables in the descriptive statement are exogenously given. To derive the following functions which are useful for firm's production theory :

1. factors demand function 2. cost function 3. supply function 4. profit function

二、(15%) 求解以下數理規畫問題：

$$\max_{Z} E\left\{-\exp(-\frac{1}{\gamma}\tilde{w}_2)\middle|\Omega\right\}$$

$$s.t.\ \ \tilde{w}_2 = w_1 + \mathbf{Z}(\tilde{\mathbf{G}} - \mathbf{P})$$

式中，$\underset{(1\times N)}{\mathbf{Z}}$：風險性資產向量，$\underset{(N\times 1)}{\mathbf{P}}$：風險性資產價格向量，$\underset{(N\times 1)}{\tilde{\mathbf{G}}}$：風險性資產報酬隨機向量，並且，服從常態分配，$w_1$：期初財富，$\tilde{w}_2$：期末財富，$\gamma \in (0,\infty)$：風險係數，$\Omega$：訊息集合，$E\{\bullet|\Omega\}$：條件預期運算

三、(15%) 請以模型列示以下三種均衡(equilibrium)之條件並說明其意義：

1.消費者均衡(consumer's equilibrium)

2.生產者均衡(producer's equilibrium)

3.商品市場均衡(market equilibrium)

【背面還有試題】

95 年博士班經濟學：總體經濟部分

1.

(i) 簡單凱因斯模型的儲蓄函數為何？

(ii) 家庭部門除了消費以外，其購屋支出列為投資，如此其儲蓄函數是否應修改？凱因斯模型是否應修改？(12 分)

2.

(i) 古典模型可貸資金理論認為投資需求透過利率會與儲蓄相等，所以商品市場供需平衡，評估此說。

(ii) 應如何改善可貸資金理論使其成為商品市場均衡的理論？（12 分）

3.

(i) 兩岸總體經濟以何管道互動？

(ii) 建立一包括兩岸的總體經濟模型，分析兩者之間的互動。可以做簡化假設使你的模型可以分析。（12 分）

4.

IS-LM composes the aggregated demand. Suppose in the long run all markets clear.

(i) Build an AS-AD model, making necessary assumptions so that the short run AS curve is positively sloped.

(ii) Would a permanent rise in oil price shift the short run AS? Why?

(iii) Analyze the effect of a permanent rise in oil price on output in the long run. (14 分)

國立中山大學95學年度博士班招生考試試題

科目：財務管理【財管系選考】

Part I: 50 points (Each question in Part I is worth 25 points.)

1. On February 15, 2006, Company X announces to buy Company Y. Under the terms of this merger, 2 shares of Y will be converted into 1 share of X. On February 16, share prices of X and Y become \$30 and \$12 per share, respectively. If the probability that the merger of X and Y will eventually go through is 80%, can we earn abnormal return by trading X (at \$30) and Y (at \$12) on February 16? If no, why not? If yes, how to earn abnormal return? Assume that (1) you do not need to provide deposit when you short sell a stock, (2) investors can get the shortsale proceed back when they short sell a stock, and (3) risk-free rate per year = 2%. (假設放空時投資人不必提供保證金、放空時投資人可以馬上取得放空股票所得之現金)

2. Assume there are only 5 stocks (as follows) in the stock market.

ME/BE of stock	Observed annual stock return	Beta
1= the smallest	22%	1.3
2	18%	1.2
3	15%	1.0
4	6%	0.8
5= the largest	2%	0.7

Risk-free rate of return per year= 2%. ME/BE= market value of equity ÷ book value of equity. Are these stock returns consistent with CAPM? You must use the numbers to explain why.

Part II: 50 points

1. 在 Modigliani-Miller (1958)完美世界(the perfect world)架構下，他們證明公司之資本結構並不會影響公司的價值。於此完美世界中，甲、乙二公司，除其資本結構，其它完全相同。甲公司無負債，其權益市值\$X，每年毛利(earnings before interest and taxes)\$E，不留盈餘，全部發放。乙公司具負債，其負債市值爲\$D。負債之每年利息費用\$I。再者，假設借款利率等於放款利率，此適用於任何個人、公司。問，(a)若投資人投資乙公司股票百分之 y $(0<y<100)$，其年現金股息爲何？ (b) 若投資人欲投資甲公司之股票而得到(a)之結果，該投資人應該如何著手？(c) 若投資人投資甲公司股票百分之 z $(0<z<100)$，其年現金股息爲何？ (d) 若投資人欲投資乙公司之股票而得到(c)之結果，該投資人應該如何著手？ (18分)

2. $E[r_j]=r_f+\beta_j(E[r_M]-r_f)$ 爲資產定價模型(the capital asset pricing model)。問(a)其爲一均衡(equilibrium)模型，爲什麼？敘述其理由？(b)既然其名稱是資產「定價」模型，將此模型以價格形式表示之(含推導過程)。[註：r_j 爲風險資產 j 之報酬率，r_f 爲無風險資產之報酬率，r_M 爲市場投資組合(the market portfolio)之報酬率。] (18分)

3. 效率資本市場(efficient capital market)理論是現代財務學重要領域(paradigms)之一。問：爲何我們需要一個具有效率的資本市場？ (14分)

國立中山大學95學年度博士班招生考試試題

科目：數學【財管系選考】

請按題號順序作答，並請列出推導過程。

1. Define a Cauchy sequence. Show that a convergent sequence is also a Cauchy sequence. Is the converse true? Prove the statement if it is true, or give a counter example. 10%
2. Determine if $f(x) = \sin(1/x)$ defined on $I = \{0 < x \le 1\}$ is uniformly continuous on *I*. 10%
3. Prove that $e^x \ge 1 + x$ for all x 10%
4. Let *M* denote the collection of all bounded sequences, and define $d(x, y) = \sup_{1 \le i < \infty} |x_i - y_i|$. Show that *(M,d)* is a metric space. 10%
5. Show that the sequence $\{f_n(x)\}$ where $f_n(x) = \dfrac{\sin nx}{2nx}$ converges $f(x) = 0$ for each x on $I = \{0 < x < \infty\}$ and determine whether or not the convergence is uniform. 10%
6. Use the cross product to find a unit vector orthogonal to $u = [1,2,5]$ and $u = [-3,4,0]$ 10%
7. Find the eigenvalues and the corresponding eigenvectors of $\begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$, also find the eigenvalues and the corresponding eigenvectors of the inverse of the matrix. 10%
8. a. Find a set of columns that form a basis for the range of M.
   b. Find the basis of the kernel of ***M***.

   $$M = \begin{bmatrix} 2 & 1 & 7 \\ 1 & 2 & 5 \\ 1 & 1 & 4 \end{bmatrix}$$

   10%
9. For the inner product defined on the interval $[-1,1]$, show that $2x^2 + 3$ and x are orthogonal. 10%
10. Determine the project of $b = [3,4,1]$ onto $a = [2,2,1]$. Decompose vector b into two orthogonal components, one component parallel to a and one component orthogonal to a. 10%