《健行學報》第三十二卷　第四期
～～目　　錄～～

電資類

商管類

人文社會類

附錄

本期論文審查通過率為 33.3%

學報序

　　光輝十月，新的紀元即將展開，《健行學報》整裝待發，即將出航。本校於民國一〇一年八月一日起奉准恢復原校名健行科技大學，彭董事長壽春表示，此次學校更名乃是因應許多畢業校友與師長的建議，將「清雲」復名為「健行」，期盼以「天行健、君子以自強不息」的精神，期待健行科技大學繼續往更優質的高等教育邁進！是故學報亦由本期更名為《健行學報》，重新出發，邁向學術新標竿！

　　本期共有六篇論文通過審查：其中電資類一篇、商管類三篇、人文社會類二篇，茲大致說明各篇論文審查之概況於下：

　　電資類收有王開源、李勝義兩位的〈運用低軌衛星星系場景機率密度函數分析衛星路徑分集之接收效能〉一文，審查委員評為「可讀性高且論述完整」，是具有「學術價值」及「實質意義」的一篇論文。

　　商管類共收有三篇論文：分別一為邱吉鶴老師的〈應用 DEA 評估行政機關施政計畫績效〉，本篇論文題目乃是針對行政機關的施政績效做評估，其摘要能清楚引導讀者閱讀本篇論文的目的及其評估的面向，且本論文於「結果的呈現清楚，根據不同的效率分析研究結果，推論及闡釋適切。」；二為吳佩珊、余思隆兩位的〈本國銀行財務特徵與衍生性金融商品之關聯性〉一文，審查意見為「研究有著不錯的創意及研究議題設計，更將『衍生性金融商品』以風險別及商品別分別進行分類，並設定九大假說來進行實證研究，有其實證價值。」；三為施淑惠、楊主行所撰寫的〈官僚對工作倦怠之影響〉一文，本研究主題與當前組織發展之主流趨勢相當契合，相關文獻之探討亦相當豐富與適切，尤其是研究變項間關係之分析與假設之建立，推論相當具有合理性，而統計方法之運用亦相當中規

中矩，結果之討論與研究建議亦能扣緊統計分析所呈現的資訊。就整體而言，「這是一篇具學術與實務管理價值之論文。」

　　人文社會類亦收二篇論文：分別為黃美金、莊維貞、郭壽旺、曾春鳳、湯河松等五位所發表的〈合作教學在大學英文教學之運用：個案研究〉一文，本文旨在探討大學教師應用「合作模式」教授英文課程，審查意見肯定本文：「研究主題與研究發現具教學參考價值」；二為陳淑芬、吳茂昌、蕭人姝等三人的〈太魯閣族原始信仰與基督教教義之嫁接〉一文，審查委員評為：「本文的題目新穎，取徑和觀點都有原創性，研究方法亦合乎學術論文的規格，是一篇相當好的論文」，尤其「對於太魯閣族「編織之神」的起源、性質及其如何與西方基督教的上帝連結在一起，有精彩的論述！」

　　綜上，本期共收投稿18件，其中校內8件，校外10件，可見學報之公平、公開、客觀之送審制度，已為校內外學者認可，期待校內外學者踴躍投稿，以灌溉此一學術園地。

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健行學報編輯委員會謹識

中華民國一○一年十月

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運用低軌衛星星系場景機率密度函數分析衛星路徑分集之接收效能

Application of LEO Satellite Constellation Scenario PDF to Analyze the Satellite Path Diversity Performance

王開源[1]
Kai-Yuan Wang
國防大學理工學院國防科學研究所
研究生
samulew@gmail.com

李勝義[2]
Sheng-Yi Li
國防大學理工學院電機電子系
副教授

摘　　要

在低軌道衛星星系中，地面站於衛星仰角遮罩範圍內結合多顆可視衛星形成衛星分集後，可有效克服衛星通道衰落情形，以提昇通信傳輸效能。由於低軌衛星相對地面站之傳輸場景具有時變性，為求得有效衛星分集的傳輸效能，運用低軌衛星星系場景機率密度函數分析所有可視衛星的場景機率，並結合每一場景下多顆可視衛星分集後之接收信號機率密度函數，進而得到整體平均接收信號機率密度函數。經以類全球星(Globalstar- like) Walk T/P/F=48/8/1 低軌衛星星系架構，採 k 顆衛星分集模擬，經由接收信號機率密度函數與位元錯誤率分析後，證明該星系架構運用衛星路徑分集，所需衛星數目二顆即可達到最佳的傳輸效能提升。因此，運用本文所提出新的、快速又正確的方法，不需軌道模擬與統計資料處理，可指定任一地面觀測站位置與低軌衛星星系架構參數後，快速有效分析 k 顆低軌衛星分集傳輸效能。

關鍵詞：低軌道衛星、仰角遮罩、星下點、機率密度函數、分集

Abstract

In the low earth orbiting satellite constellation, satellite diversity will promote communication quality and overcome the channel fading situation if we combine all the visible satellites in the range of the satellite elevation mask. However, the scenario of satellite communication from low earth orbiting satellite to the earth station is time varying. In order to obtain the performance of the satellite diversity, a new method is proposed to quickly and exactly evaluate the probability of scenarios of low earth orbiting satellite constellation observed from the earth station location to all visible satellites in the satellite elevation mask. Through the simulation for the Globalstar-like Walk T/P/F=48/8/1 low earth orbiting satellite constellation, we have verified that only two low earth orbiting satellites can offer the optimal diversity performance. The development does not need any orbital simulations and statistical data processing. Results are used to evaluate the probability density function of the received signal with k-fold combining diversity for any user-specified earth station locations and low earth orbiting satellite constellation parameters.

Keywords: LEO satellite, elevation mask, sub-satellite point, PDF, diversity

壹、研究動機與目的

　　對於衛星通訊而言，衛星可視為太空中的無線通訊基地台，因為衛星間、或站台間彼此距離很遠，故衛星與地面站台間傳輸通道路徑可視為彼此相互獨立，運用分集的手段[1]-[5]，可避免傳輸路徑同時遭受通道衰落、遮蔽等阻礙因子的影響，如文獻[1][2]是運用多顆同步軌道衛星組成衛星分集(Satellite Diversity)、或利用不同地面接收站形成站台分集(Site Diversity)[3]，克服雨衰影響，以提升衛星信號接收品質。上述利用不同衛星或地面站台處理分集接收信號，實屬巨觀分集(Macroscopic Diversity)的手段。另外有些文獻[4][5]，則描述利用最大比率結合(MRC)、等效增益結合(EGC)及選擇分集結合(SDC)等技術，分析並評估接收端克服衛星傳輸通道因多重路徑環境所影響接收信號的效能，則是屬微觀分集(Microscopic Diversity)的手段。

　　低軌道衛星具有軌道距離短，發射成本低、傳送訊號延遲效應最小等優點，同時利用多顆衛星透過不同軌道面的建置，組合而成低軌道衛星系，將可提供連續的涵蓋範圍，達成全球無死角的整體通訊。因為透過星系設計，可讓地面站台或接收者在任何地點、時刻都獲得兩顆以上的可視衛星，使得在通訊環境上，可依巨觀分集的概念，使用選擇分集(SD)，選取最佳可視衛星通訊鏈路(LOS)，或是利用多顆衛星路徑分集(path diversity)結合，克服因通道衰落或遮蔽造成接收信號品質的影響，進而提昇通訊傳輸的效能。例如文獻[6]作者 Karaswa et al.等發表一個 LMSS 通道模型，其將通道分類成晴朗(C)、遮蔽(S)與阻礙(B)等三種狀態，並考慮每一種狀態的發生機率後，透過馬可夫鏈機率轉置程序後，獲得不同階段通道狀態，用以評估 BPSK 信號在此通道模型下衛星分集傳輸技術的性能，以保證獲得高服務品質的信號。又有文獻[7]，作者 Amaya and Nauyen 亦透過選擇與地面站台具有直視位置或最高仰角的衛星，於多階通道狀態下評估低軌道衛星分集傳輸性能，而文獻[8]之作者 Efthymoglou 與 Aalo，在路徑分集場景下，利用所有可視衛星同時傳輸共同信號，接收端重複接收後，經各自接收路徑解調結合後，推導出 DS-CDMA 系統未經信號編碼的 L 支路徑分集傳輸性能，與文獻[9]之作者 Akturan 與 Vogel 依不同通道路徑之仰角，定義都會環境中低軌衛星通道三種狀態：晴朗(C)、遮蔽(S)與阻礙(B)之機率並組合後，用以分析衛星個人通信系統(S-PCS)利用衛星路徑分集的傳輸性能。

　　以上研究論文的分析，均可說是著重在某個或特定的固定場景下處理最佳訊號的接收情況，然而對於低軌道衛星星系架構而言，衛星相對地面站台的位置是變動的，故衛星鏈路通道具有時變性。換言之，在不同時間點的場景下，衛星鏈路通道衰落統計特性亦有所不同，所以必需加以考量每種場景的可能性，或是每種場景發生的機率為何。我們已於文獻[10]中運用衛星軌道幾何分析，提出低軌道衛星星系場景機率模型，運用此一模型，能夠得知每一個場景會發生的機率，並配合該場景下多顆衛星路徑分集後接收信號振幅機率密度函數，將可正確估算衛星路徑分集後整體平均傳輸效能，其最大好處就是不需要再經過耗時的衛星軌道模擬分析與統計，對於系統設計人員進行衛星星系設計規劃與評估時，將有重大助益。

　　本論文內容組織說明如下：於第二節中說明低軌道衛星通訊場景機率密度函數模型推導程序，第三節敘述衛星傳輸通道模型，並結合路徑分集結合後接收信振幅機率密度函數的推導，第四節則以類全球星(Globalstar-like) Walker 48/8/1 之低軌衛星星系架構進行模擬與理論數值驗證。最後，於第五節中敘述本篇論文之結論與貢獻。

貳、場景機率密度函數

　　假設某一參考衛星星下點(Sub Satellite Point)的位置已知，則可透過球面幾何的關係，可進而求得其他衛星星下點的位置，如此一來觀測者所在位置的場景便可確定，故求得此一場景的機率，即等於是求得該參考衛星星下點落在假設位置的機率。其演算法過程，說明如下：

一、 決定仰角遮罩大小

　　地面觀測者為中心，以最小仰角看到所有可視衛星的範圍，我們稱之仰角遮罩 (Elevation Mask)。假設地面站所在位置的緯度與經度等於(ϕ_0, λ_0)，證明仰角遮罩的邊界是緯度ϕ與經度λ的函數，而且形成一個半徑等於γ的小圓，在 ECF(Earth Centered Fixed) 座標系中，由球面幾何定理[11]，表示成

$$\cos\gamma = \sin\phi\sin\phi_0 + \cos\phi\cos\phi_0\cos(\lambda - \lambda_0) \tag{1}$$

其中γ為中心角與仰角θ的對應關係如(2)式

$$\theta = \tan^{-1}\left(\frac{\cos\gamma - \dfrac{r_E}{r_E + h}}{\sin\gamma}\right) \tag{2}$$

依(1)式的關係，經度λ的大小可表示為緯度ϕ與中心角γ的函數如(3)式所示，

$$\lambda = \cos^{-1}\left(\frac{\cos\gamma - \sin\phi\sin\phi_0}{\cos\phi\cos\phi_0}\right), \quad -\gamma_{max} \le \phi - \phi_0 \le \gamma_{max} \tag{3}$$

　　圖 1.表示了在特定中心角γ下，仰角遮罩的幾何性質。例如假定某星下點 P 位於(ϕ_P, λ_P)的位置，具有最大中心角γ_{max}，其所對應經度大小$\lambda_P = \Delta\lambda_{max}$，可表示為(4)式，

$$\Delta\lambda_{max} = \cos^{-1}\left(\frac{\cos\gamma_{max} - \sin\phi\sin\phi_0}{\cos\phi\cos\phi_0}\right) \tag{4}$$
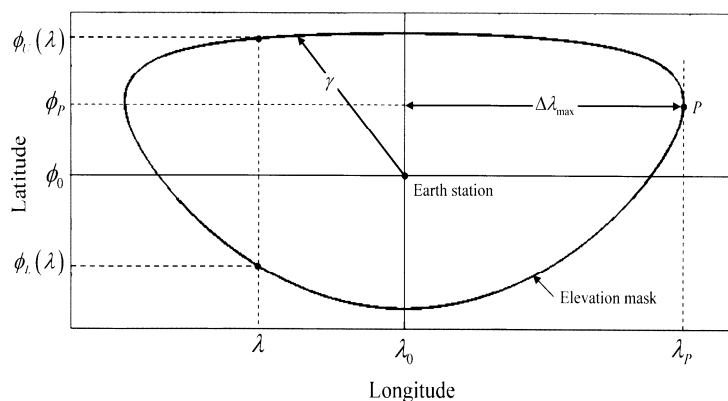

圖 1. 仰角遮罩幾合圖
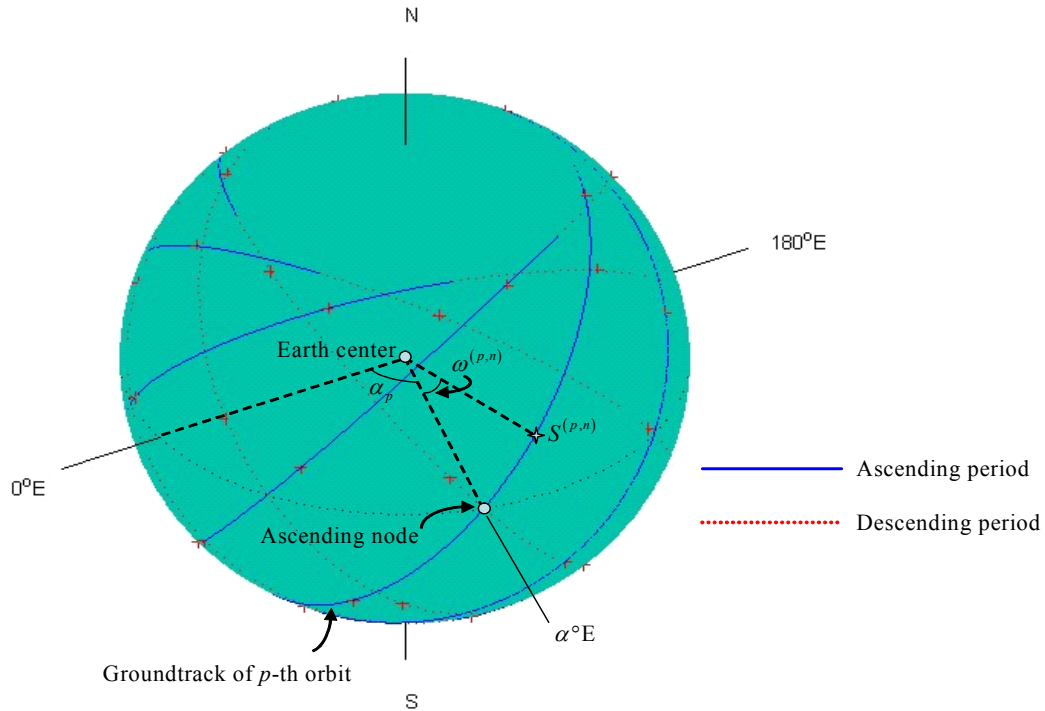
二、 決定仰角遮罩內星下點之機率分佈

圖 2. 類全球星(Globalstar-Like) Walker 48/8/1 之低軌衛星星系

(一)、決定第 p 軌道平面的上昇點與相位

　　根據類全球星(Globalstar-Like) Walker 48/8/1 之低軌衛星星系架構，繪製圖 2. 低軌衛星星系軌道圖，其中藍色軌道代表衛星上昇週期，紅色軌道代表衛星下降週期，第 p 軌道平面第 n 顆衛星星下點位置，記為 $\left(\phi^{(p,n)}, \lambda^{(p,n)}\right)$，決定該軌道面的上昇點 α_p 及每一衛星星下點的相位為 $\omega^{(p,n)}$， $p=1..P, \ n=1..N$。若衛星 $S^{(p,n)}$ 位於上昇週期，也就是 $\alpha_p - \pi/2 \le \lambda^{(p,n)} < \alpha_p + \pi/2$ 與 $-\pi/2 \le \omega^{(p,n)} < \pi/2$，藉由(1)式，我們可得

$$\alpha_p = \lambda^{(p,n)} - \sin^{-1}\left(\frac{\tan\phi^{(p,n)}}{\tan i}\right) \tag{5}$$

$$\omega^{(p,n)} = \sin^{-1}\left(\frac{\sin\phi^{(p,n)}}{\sin i}\right) \tag{6}$$

其中 i 為軌道面傾斜角。

(二)、決定第 p 軌道平面的下降昇點與相位

　　當 $S^{(p,n)}$ 位於下降週期，也就是 $\alpha_p + \pi/2 \le \lambda^{(p,n)} \le \alpha_p + 3\pi/2$ 與 $\pi/2 \le \omega^{(p,n)} \le 3\pi/2$， α_p 與 $\omega^{(p,n)}$ 將為

$$\alpha_p = \lambda^{(p,n)} + \sin^{-1}\left(\frac{\tan\phi^{(p,n)}}{\tan i}\right) - \pi \tag{7}$$

$$\omega^{(p,n)} = \pi - \sin^{-1}\left(\frac{\sin\phi^{(p,n)}}{\sin i}\right) \tag{8}$$

(三)、決定瞬間場景下所有星下點位置

$$\phi^{(p,n)} = \sin^{-1}\left(\sin\omega^{(p,n)}\sin i\right) \tag{9}$$

$$\lambda^{(p,n)} = \begin{cases} \alpha_p + \tan^{-1}\left(\cos i / \cot\omega^{(p,n)}\right), & \phi^{(p,n)} \geq 0 \\ \alpha_p + \tan^{-1}\left(\cos i / \cot\omega^{(p,n)}\right) + \pi, & \phi^{(p,n)} < 0 \end{cases} \tag{10}$$

一旦所有星下點位均得到後，故將仰角遮罩依所要的解析度，切割成 N 個格點，例如緯度、經度解析度為 $1°$，則每一格點之分佈機率 $p(\phi,\lambda)$，即等於是該參考衛星星下點 (SSP)落至該仰角遮罩內之機率密度函數 $f(\phi,\lambda)$ 積分得到，如第(4)式所示，

$$p(\phi,\lambda) = \int_{\lambda-\frac{\Delta\lambda}{2}}^{\lambda+\frac{\Delta\lambda}{2}} \int_{\phi-\frac{\Delta\phi}{2}}^{\phi+\frac{\Delta\phi}{2}} f(\phi,\lambda) d\phi d\lambda \tag{11}$$

其中 $\Delta\lambda$ 與 $\Delta\phi$ 分別表示為每一分割後，格點之經度與緯度大小，另

$$f(\phi,\lambda) = \frac{1}{T_v} \frac{\cos\phi}{\pi\sqrt{\sin^2 i - \sin^2\phi}} \tag{12}$$

第(12)式之詳細推導過程，可由參閱文獻[10]，而 T_v 是一正規畫(normalization)常數，可由(13)式得到

$$\begin{aligned} T_v &= \int_{\lambda_0-\Delta\lambda_{max}}^{\lambda_0+\Delta\lambda_{max}} \int_{\phi_L(\lambda)}^{\phi_U(\lambda)} \frac{\cos\phi}{\pi\sqrt{\sin^2 i - \sin^2\phi}} d\phi d\lambda \\ &= \int_{\lambda_0-\Delta\lambda_{max}}^{\lambda_0+\Delta\lambda_{max}} \left(\sin^{-1}\left(\frac{\sin\phi_U(\lambda)}{\sin i}\right) - \sin^{-1}\left(\frac{\sin\phi_L(\lambda)}{\sin i}\right) \right) d\lambda \end{aligned} \tag{13}$$

參、衛星路徑分集接收信號機率密度函數

衛星鏈路距離遙遠，傳輸過程可能會歷經各種環境，依文獻[9]所提出之衛星通道模型，對某一衛星鏈路而言，接收信號之機率密度函數可以下式表示:

$$f_v(v) = P_C \cdot f_{Rice}(v) + P_S \cdot f_{Loo}(v) + P_B \cdot f_{Rayleigh}(v) \tag{14}$$

其中 v 表示接收信號振幅大小，為一隨機變數，另 P_C，P_S，與 P_B 分別表示晴朗(C)、遮蔽(S)與阻礙(B)狀態之發生機率，各狀態的機率密度函數分別為

$$f_{Rice}(v) = 2Kv \cdot \exp\left[-K\left(v^2+1\right)\right] I_0\left(2Kv\right) \tag{15}$$

$$f_{Loo}(v) = 8.686\sqrt{\frac{2}{\pi}} \frac{Kv}{\sigma} \cdot \int_0^\infty \frac{1}{z} \exp\left[\frac{-\left(20\log(z)-m\right)^2}{2\sigma^2} - K\left(v^2+z^2\right)\right] \cdot I_0\left(2Kvz\right) dz \tag{16}$$

$$f_{Rayleigh}(v) = 2Kv\exp\left(-Kv^2\right) \tag{17}$$

以上(15)至(17)各式，參數定義表列於參考文獻[9]之表 2。在特定場景中，假定傳遞路徑彼此相互獨立，選定 k 顆最佳衛星傳遞路徑分集後，接收信號機率密度函數，等於 k 顆衛星之個別接收信號機率密度函數折積(convolution)運算後之結果。藉由上節所述場景機率，則多顆衛星路徑分集(path diversity)後，機率密度函數可由下述步驟獲得：

一、求得全部 N 種場景所對應發生機率為 $p_i,\ i=1...N$。

二、就第 j 個場景而言，假設有 k 顆衛星彼此傳遞路徑環境是同等且相互獨立，k 顆衛

星的仰角從高至低排定，決定各顆可視衛星鏈路為 $L_1, L_2, \ldots L_{kj}$，其中常數 k_j 表示在第 j 個場景中，共有 k 顆衛星可以分集結合。則此場景下 k 重的接收信號機率密度函數，如下式

$$f_{v,j}\left(v|L_1, L_2, \ldots L_{kj}\right) = f_{v_{1,j}}(v) * f_{v_{2,j}}(v) * \cdots * f_{v_{k,j}}(v) \tag{18}$$

其中*代表折積運算。

三、多顆衛星路徑分集(path diversity)後，接收信號平均機率密度函數即等於結合每一場景發生機率的加權平均結果，可以(19)式表示

$$f_{avg}(v) = \sum_{j=1}^{N} p_j f_{v,j}\left(v|L_1, L_2, \ldots L_{kj}\right) \tag{19}$$

肆、數值與軌道模擬

為模擬驗證場景機率，我們運用 Boland C++開發一視窗軌道模擬工具，並以類全球星(Globalstar-like)Walker 48/8/1 之低軌衛星星系為架構，其具有 48 顆衛星，高度 1414 公里，軌道面傾斜角 52°，相鄰軌道面衛星相位偏差 7.5°。假設地面站位於(25°N,120°E) 具最小仰角 $\theta_{min} = 10°$，仰角遮罩格點解析度設定，分別訂為 0.2 度、0.02 度、0.01 度，可分割格點數目及利用(11)式所得之理論值結果整理如表 1，

表 1. 場景機率數值模擬結果表

仰角遮罩格點解析度	格點數目	$P\left(\phi_{ref}, \lambda_{ref}\right)$
0.2 度	61212	3.568×10^{-4}
0.02 度	6121200	4.332×10^{-4}
0.01 度	24484800	4.788×10^{-4}

為驗證數學模型所推導之正確性，我們以軌道模擬工具進行類全球星低軌衛星星系連續 20 天的軌道模擬，當中每格 5 秒記錄一次場景，故在此仰角遮罩範圍下，共記錄了 345600 場景，每一場景平均可視衛星數量為 2.8 顆；圖 3.展示參考衛星 S_{ref} 之星下點位於參考點 $\left(\phi_{ref}, \lambda_{ref}\right) = (18°,140°)$ 之可視衛星場景狀況。

模擬結果顯示當 S_{ref} 位於上升(ascending)周期，則有 169 個場景，每一場景包含 3 顆可視衛星，其衛星星下點落於仰角遮罩內格點的位置分別是(18°,140°), (5.44°,121.03°) 及 (42.72°,124.13°)；當 S_{ref} 位於下降(descending)周期，則有 167 個場景，每一場景包含 2 顆可視衛星，分別落於仰角遮罩格點的位置是(18°,140°)與 (38.33°,102.86°)。如此，上升周期與下降周期之場景機率分別是 $P_A = 169/345600 = 4.890 \times 10^{-4}$、 $P_D = 167/345600 = 4.832 \times 10^{-4}$，與利用(11)式所得之理論值結果如表 1.，當格點解析度愈小時，即格點數目增多，S_{ref} 場景機率理論值與軌道模擬後，不論是上升或下降週期，

所得參考點 S_{ref} 之場景機率模擬值，是非常接近。
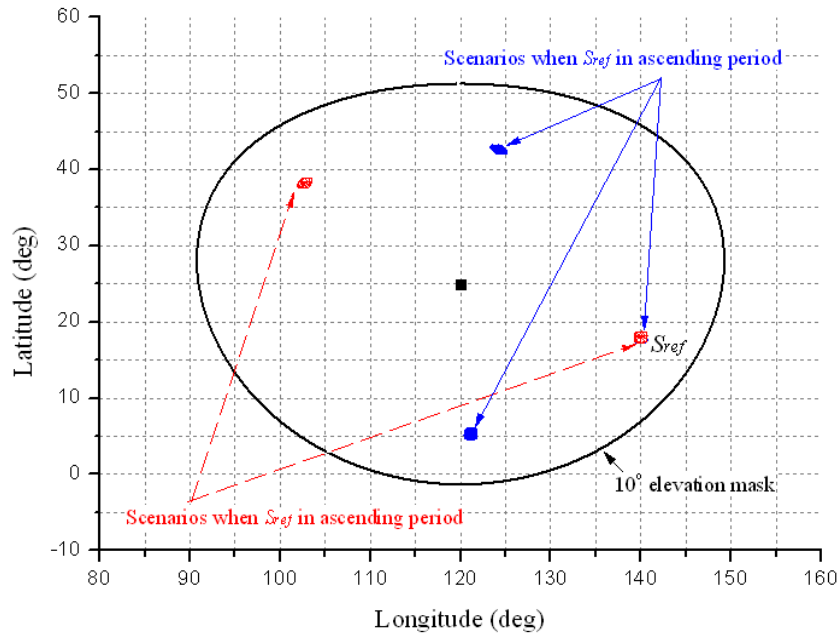
圖 3. 參考衛星 S_{ref} 之星下點位於參考點 $\left(\phi_{ref},\lambda_{ref}\right)=\left(18°,140°\right)$ 之可視衛星場景狀況

　　已知某一觀測者所在位置，令其可視範圍最小仰角 $\theta_{\min}=10°$，則利用(19)式計算 k 顆可視衛星路徑分集之接收信號機率密度函數。如圖 4.所示，分別比較了位於緯度 10° 與 40°處接收信號振幅機率密度函數大小的比較，其中於仰角遮罩內之場景機率可參閱文獻[10] 獲得，並依文獻[9]之表 2 所列之仰角大小，決定在特定場景下每一顆可視衛星鏈路路徑狀態參數，每一場景均包含多顆可視衛星，選取其中最佳的一顆、二顆或三顆衛星，分別實作爲衛星交遞分集(Hand-off Diversity)、雙重分集(Two-fold Diversity)或三重分集(Three-fold Diversity)[9,12]，經計算並比較其接收信號機率密度函數。從圖 4. 我們可看出在緯度 40°處衛星路徑分集增益明顯，然而，在緯度 10°處，雙重或三重衛星分集後，接收信號機率密度函數重疊，其所表達的意義是說明在緯度 10°的位置，同時可見超過三顆以上衛星的機率機乎是等於 0。

圖 4. 衛星路徑分集結合場景機率密度函數後之接收信號機率密度函數圖

伍、結論

　　本文中，我們證明低軌道衛星星系參數與任一地面觀測站所在位置皆為已知或指定之條件下，我們所提的演算法是不需藉由衛星軌道模擬與相關統計資料處理，利用低軌衛星場景機率模型即可推導出該地面觀測站之可視衛星場景機率。此場景機率精確度，可將仰角遮罩經度、緯度解析度愈小，則格點數目愈多，得到參考衛星之場景機率理論值愈準確。另運用此可視衛星場景機率模型於類全球星(Globalstar-like) Walker 48/8/1 低軌衛星星系架構中，分析 k 顆可視衛星路徑分集結合接收信號機率密度函數，則發現使用二顆衛星分集，即可達到最大的分集增益，故運用此場景機率模型於路徑狀態相依(Path-State-Dependent)或仰角相依(Elevation-Angle-Dependent) 之衛星通道下，進行衛星通信系統傳輸效能分析將是非常有助益的。
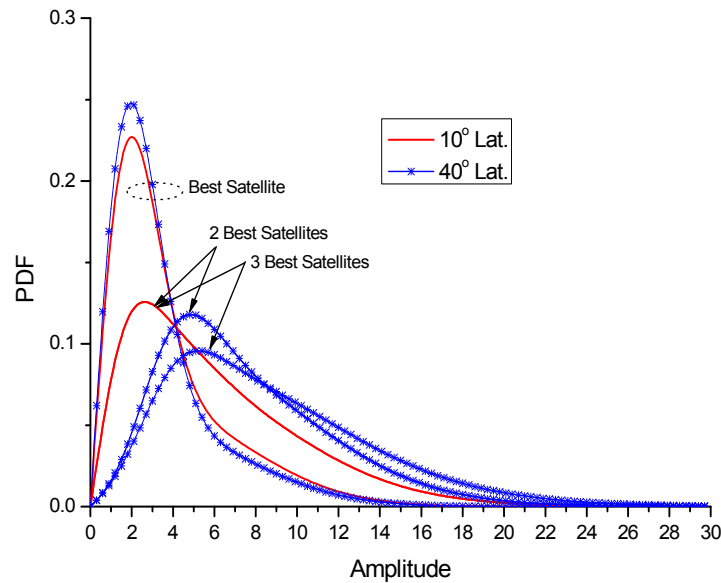
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應用 DEA 評估行政機關施政計畫績效

Application of DEA for Evaluating the Performance of Public Program

邱吉鶴

Chi-Ho Chiou

健行科技大學企管系

副教授

chiho@uch.edu.tw

摘　　要

　　本文試圖解決行政機關應用傳統績效指標法之指標不夠客觀、評估過程冗長、評估結果不易橫向比較及無法即時回饋等問題，採用資料包絡分析法（DEA）評估行政機關施政計畫績效。研究結果發現，DEA 方法之相對效率分析，可以快速量化比較不同個案計畫績效，並顯示不同個案計畫其無效率的來源；效率強度分析，可以明顯區分不同個案計畫效率高低；差額變數分析，可以指出不同個案計畫投入與產出項的效率值；因此，DEA 方法確實可以解決上述相關部分問題。但是，DEA 方法的應用必須考慮：計畫執行過程可能受到不可控制環境因素影響、執行機關是否提供充分正確資料（訊）、評估人員專業能力、及選擇投入與產出評估指標是否適當等，所產生效率值偏差問題。本文研究結果將可提供未來相關研究及行政機關實務應用參考。

關鍵詞：資料包絡分析法、施政計畫、績效評估、投入導向、產出導向

Abstract

In this study, due to the problems of subjectivism, over-long process of evaluation, difficulty for horizontal comparison of the result from evaluation, and incapability to respond immediately; therefore this article adopts application of DEA in order to solve problems above. The result examine that, based on relative efficiency analysis of DEA method, the comparison of different cases plan performance could be quickly quantly, the inefficiency source of different plan could be investigated explicitly; efficiency of intensity, the level of plan efficiency of different cases can be clearly differentiated; slack variable analysis, which can be pointed out that differentcase plan value of the efficiency of input and output, the application of DEA does solve the problems above. However, it should also be taken into consideration about the efficiency deviations generated by uncontrollable environmental effects under the executing process of the project, and the possibilities of uncompleted and incorrect information provided by the executing association, professional level of the evaluators, as well as the appropriation of indexes for evaluating. The results of this article can be the reference for future research, and the practical application for administrative organization.

Keywords: data envelopment analysis(DEA), Public Program, Performance evaluation, input-oriented, output-oriented

壹、緒論

近二十年來，績效評估的研究進展頗為迅速，許多不同績效評估架構的發展，提供了瞭解組織績效的工具（Neely, 2002）。績效評估像是維持組織生存和成長的萬靈丹，並成為一個重要的研究領域（Neely and Bourne, 2000），無論是企業、政府或非營利組織均投入大量的資源，從不同管理層面研究組織績效的評估，諸如股東價值（Rappapost, 1986）、作業基礎成本（Kaplan and Cooper, 1997）、平衡計分卡（Kaplan and Norton, 1992; 1996； Sureshchandar and Leisten, 2005）、績效結構（Lynch and Cross, 1990）、多元方法模式（Brown, 1996）、事業計分卡（Kanji and Sa, 2002）、績效金字塔（Neely et al., 2002）及其他相關模式，提供了掃描組織績效的理論架構（Marr and Schiuma, 2003）。

我國行政機關績效評估制度建立於 1968 年，其間幾經變革，自 2002 年開始將績效評估制度劃分為「機關施政績效評估」及「個別施政計畫評估」兩大主軸，機關施政績效評估依據「行政院所屬各機關施政績效評估要點」辦理，採以結果導向的評估原則，評估層次為策略層次之組織績效；個別施政計畫評估則依據「行政院所屬各機關施政計畫評核作業要點」等相關規定辦理，採分級列管，管考一元化作法，從計畫擬訂、先期審議及管制評核等階段，依計畫管理過程進行事前（規劃）、事中（執行）及事後（結果）評估（行政院研考會, 2003）。

政府績效評估制度縱使幾經變革，仍然採行傳統的績效指標法。由於一般行政機關施政計畫評估大多應用共同指標，鮮少採用關鍵指標；行政機關施政計畫分為社會行政、公共建設及科技發展或研究等三個類型，其性質、規模與困難度差異頗大，採用相同指標評估與比較，有失公平；且每年施政計畫績效評估結果，均在次年度五個月後才完成，已失評估結果回饋與課責的意義。讓各界普遍認為無法如實呈現行政機關真實的施政成效，不僅評估結果的信度、效度與過程的速度常受質疑，且評估作法過於繁複且流於形式，難以達到績效評估即時回饋的效果（邱吉鶴, 2001）；其次，由於個別施政計畫性質不同、預算規模不一等因素，採取績效指標評估法，不易進行個案計畫橫向的比較（林嘉城, 2004; 2012）。

本文應用 DEA 方法進行行政機關施政計畫績效評估，試圖解決傳統績效指標法之績效指標不夠客觀、評估過程過於冗長、不同性質或大小計畫不易橫向比較，以及評估結果無法即時回饋等問題。因此，本研究目的包括：1.應用 DEA 瞭解個案計畫相對整體效率、投入規模效率及執行技術效率，並進行個案計畫績效比較與排序；2. 評估個案計畫效率強度；3. 瞭解個案計畫資源使用的情形，以及其投入資源與產出數量有多少改善空間；4.瞭解應用 DEA 方法進行行政機關績效評估的限制與問題。

除了本節研究動機與目的外，第二節進行績效評估文獻探討，第三節提出研究設計及介紹 DEA 方法，第四節應用 DEA 進行資料分析，最後提出結論與建議。

貳、文獻回顧

一、施政計畫績效評估

績效評估係指一個行政機關試圖達成某項目標，如何達成目標與是否達成目標的系統化過程；基本上，績效評估是指任何利用追蹤與評估方法，瞭解一個機關工作項目執行「效果」和「效率」的過程。Peter Drucker 認為「效率」即是把目前正在進行的任務

做得更好，其意謂著「把事情做好」(doing things right);「效能」則為成功的根源，亦即「做對的事情」(doing the right thing)。Robbins（2003）認為效能在追求組織目標之達成，效率則在強調投入與產出間的關係，同時尋求資源成本最小化。組織的資源是有限的，所以效率問題便為管理階層所重視的，然而效率與效能間具有相互關聯關係。當管理者以一定的投入產生更多的產出，或以較少的投入產生一定的產出，稱之為有效率；當管理者達成組織所設定的目標時，則稱之為有效能。因此，效率的追求著重於方法(means)之使用，而效能的追求則為結果(ends)之衡量。

　　Peter Drucker（1973）指出：管理工作的基本要素之一就是衡量與評估，管理者建立衡量尺度，對於組織績效而言，很少有其他因素如此重要。其中建立衡量尺度所指的就是建立評估標準與衡量模式，也就是績效衡量(Performance Measurement)與績效指標(Performance Indicators,Pls)體系的建立。而績效衡量與績效指標事實上是互為因果的，由於政府績效衡量的困難性，使績效指標不易設計，如缺乏有效的績效指標，將使績效衡量難以進行。「經濟合作與發展組織」(OECD,1994)的會員國均認為，績效衡量的主要目的為提供較佳的決策與改善產出的結果，且其為公部門現代化與行政革新的關鍵要素。

　　同時，自 1980 年以來，績效指標乃公共服務的焦點所在，適當的績效指標設計已成為有效績效管理系統的必要條件(Rose and Lawton, 1999)。De lancer Julnes 等（2001）提出三個類型評估指標，包括效率、成本、利益和效果指標；計畫產出和影響指標；組織政策與流程指標。Behn（2003）提出需求結果與預算分配效率二類型評估指標；kravchuk and Ronald（1996）提出預算、組織發展及改變組織條件與環境等多元指標；Berman（2006）在公部門與非營利組織與生產力一書中提出生產力的觀點，主張行政機關應有效率與效果的使用資源，以達成績效目標。

　　近年來以「績效」作為政府再造的核心價值，已成為當代政府的共識，而評估績效的優劣與否，端賴有效的績效指標設計與運用。OECD 在檢視其會員國進行績效管理的努力時，曾對績效指標定義為：「對績效從事量化衡量，對績效是否恰當提供表面上的標示」；除此之外，績效指標乃執行非干涉控制(hand-off control)以及課以機關責任的工具，它亦是目標設定機制的核心，更是資源分配的管道。換言之，一個理想的績效指標本身除作為一種評估工具外，也應能夠正確且具體的反應組織的目標，以及應負的責任。

　　施政計畫為展現行政機關績效的主軸，施政計畫績效評估制度的建構，有助於行政績效控制與課責。我國行政機關施政計畫績效評估制度幾經變革，惟仍然採行績效指標法，頗受質疑的地方包括：績效指標不夠客觀、評估過程過於冗長、不同性質或大小計畫不易橫向比較，以及評估結果無法即時回饋等問題。根據行政院所屬各機關施政計畫評核作業要點（地方政府參照自訂要點或準用）規定，施政計畫績效指標分為共同指標及關鍵指標；共同指標包括目標達成、計畫挑戰性、計畫執行進度、預算執行進度及行政作業配合等指標，適用任何施政計畫；關鍵指標係指根據個別計畫特性訂定的指標；但是一般行政機關施政計畫大多應用共同指標，鮮少採用關鍵指標。其次，行政機關施政計畫可分為社會行政、公共建設及科技發展或研究等三個類型，其 計畫性質、規模與困難度差異頗大，採用相同指標評估與比較，有失公平；且每年施政計畫績效評估方式採取自評、初核及複核等冗長過程，其評估結果必須在次年度五個月後才能完成，已失去評估結果回饋與課責的意義。

　　近年來，學者逐漸走向平衡計分卡及 DEA 應用的研究，但事實上沒有一套方法是毫無缺點的，在績效評估時，必須考量評估方法的侷限性（莊淳淩等, 2007），例如平

衡計分卡爲近年來熱門的策略績效管理與評估工具，雖然可選擇財務及非財務之多構面績效評估指標，但對於評估結果僅能產生量表與分數，並無法告知管理者對績效不佳如何進行改善，或改善幅度有多少（黃寓平, 2004; 莊淳淩等, 2007），DEA 方法亦同樣有其侷限性。

二、資料包絡分析法理論發展

資料包絡分析法爲 Charnes、Cooper 與 Rhode 三位學者，首先於 1978 年提出的一種績效衡量方法。主要是利用「包絡線」(envelopment)的技術代替一般個體經濟學中的生產函數，該包絡線在經濟學上，意指在各種可能生產組合中「最有利的各組合點」所形成的「邊界」。資料包絡分析法模式將所有被評估單位的投入項與產出項對應到幾何空間中，並尋找其邊界，凡是落於邊界上的單位，資料包絡分析法認爲其投入與產出組合最有效率，其績效指標定爲 1；至於其他不在邊界上的單位，則以特定的有效率點爲基準，給予一個相對的績效指標(大於零，小於一)，亦即這些點皆在該包絡線所形成之凸集合內，不在邊界上。根據假設的不同，分別有 CCR 模式、BCC 模式、加法模式(Additive Model)及差額基礎模式(SBM)。

回顧績效評估相關文獻，資料包絡分析法（data envelopment analysis; DEA）已大量應用在企業、政府或非營利組織相關績效評估，例如評估銀行業（莊淳淩等, 2007）及政府部門（邢台平, 2002;劉春初, 1998）等績效。DEA 爲一無母數方法，無須預設生產函數的形態，亦無須估計函數參數係數，可以避免函數形態的誤設(Lewin and John, 1986)，該項方法爲顛覆傳統經濟學有母數之生產函數。 DEA 可同時處理多項投入與產出之間的效率衡量，有效解決多項投入與產出問題，可視爲總要素生產力的一般化形式；DEA 可透過數學規劃方式客觀產生權數，可有效處理投入或產出項目單位不一致的問題，即單位不變性 (Banker, Cooper, Lewin, Morey, and Rousseau, 1985)，亦可有效處理定性與定量投入或產出指標的問題，即可處理比率尺度與順序尺度，具資料相容性 (Banker and Morey, 1986)。換言之，即能將多項投入及產出的作業特徵，彙集成爲單一的效率值。其次， DEA 較不易受觀察值多寡之限制，就某個指定的受評單位群體中，可求算出個別受評單位相對於群體的效率值；同時，可以提供非效率受評單位投入要素或產出項目可改善空間（Lewin et al., 1986;蘇雲一, 1997），進而提供其管理上可行的改善建議。

DEA 雖具上述優點，但亦存有許多限制與缺點，包括：1.受評單位需較高同質性；2.投入與產出項不宜過多，否則易造成衡量結果的偏差；3. 投入與產出項必須滿足單調性的限制，即符合投入增加而產出不減少原則；4. 必須考量受評單位投入與產出項的相對重要性；5.只能顯示出效率值，無法進一步瞭解影響效率的因素。爲了解決上述 DEA 缺點點與限制，學者建議增加其他方法解決 DEA 所產生的問題，例如在單調性部分，學者建議採用 Pearson 積差（James and Wier, 1990; Roll, Golany, and Seroussy, 1989; 曾志榮, 2003）及 Spearmen 等級（邢台平, 2002）進行投入與產出項相關分析；在投入與產出項相對重要性之判斷力部分，Thompson 等（1986）提出保證範圍模式（assurance region model），即增加投入與產出項權重比例之上下限；劉春初（1998）則利用層級程序分析法，納入專家意見進行權重設限，可提升 DEA 在效率分析上鑑別力；在瞭解影響效率因素方面，郭振雄（2000）及黃英彥（2002）建議應用迴歸分析，將 DEA 所求出的效率值作爲被解釋變數，影響因子作爲解釋變數，以進一步探討影響效率的因素。

其次，DEA 屬無參數-線性規劃方法，無法探討不可控制的外在環境因素（Fried, Schmidt & Yaisawarng, 1999）及隨機干擾因素對效果水準的影響。因此，DEA 應用在評

估不受環境影響之決策單位（DUM）的效率，是一個簡便且較爲正確的分析工具；然而，在實際經營的環境中，一個組織營運或計畫執行有可能受到天災和經濟等不可控制環境因素的影響，DEA 所估計的無效率值，可能包含管理無效果（managerial inefficiency）、環境因素（environmental effect）與隨機干擾（statistical noise）（許鎦響,2009），應在模式中考慮如何排除後二者影響因素，才能獲得較爲精確的估計結果，以致學者持續發展出不同的 DEA 調整法。Banker and Morey（1986）首先提出一階段 DEA 法，直接將外生環境變數納入 DEA 線性規劃中估計效率值，由於外生環境變數無法事前知道，如果歸類方式錯誤，其估計結果會完成相反；另外生環境變數增加，其效率單位（效率值=1）的個數會隨之增加（Pastor, 2002; Fried et al., 2002 ），該方法採用完全確定性之模型，無法將隨機干擾因素納入模型。

Timmer（1971）最先提出二階段 DEA 法，此方法第一階段使用傳統 DEA 法估計效率值；第二階段以外生環境變數爲自變數，並以第一階段估計效率值爲應變數，利用迴歸模型分析不可控制環境變數對於效率值的影響。應用二階段 DEA 法不會增加效率單位（效率值=1）的個數，且不需事先知道外生環境變數對於效率值影響方向，但未考慮差額變數（slack variables）的影響，而使外生環境變數對於效率值的影響產生偏差（Fried et al., 1999）。

Fried and Lovell（1996）提出三階段 DEA 法，此方法第一階段僅使用傳統 DEA 法估計效率值；第二階段以類似 SFA 迴歸模型分析第一階段之投入差額值（input slacks）與外生環境變數的關係，進行調整投入項；第三階段將調整後的投入項與原來的產出項代入傳統 DEA 模型中，重新估計決策單位（DUM）的效率值。此方法優點爲當變數增加時，不會增加效率單位（效率值=1）的個數，不需事先知道外生環境變數對於效率值影響方向，且己考慮隨機性；惟其缺點爲計算相當費時（Pastor, 2002），且在第二階段未考慮隨機干擾（statistical noise）對投入差額值的影響（許鎦響,2009）。

參、研究方法

一、研究設計

本文以連江縣政府 99 年度離島建設基金補助計畫 48 項爲分析單位（decision making unit, DMU）。首先，協調連江縣政府蒐集 99 年度離島綜合建設補助工作計畫及執行情形資料；其次，根據原計畫執行目標、執行事項、執行進度及經費使用等建立評鑑指標，依據執行計畫事項及評估指標，進行資料分析，並訪問執行機關（單位）及施作現場；接著，運用資料包絡分析法進行 99 年度連江縣離島綜合建設補助工作計畫之整體與個案計畫的績效評估，提出評估結果。

選擇評估投入項包括：每單位計畫預算數、計畫複雜度及符合政策程度。計畫預算數：係指 99 年度個案計畫中央政府核定可執行預算，爲個案計畫年度投入資源的多寡；計畫複雜度：係指個案計畫執行內容的豐富性、計畫執行所需協調溝通事項及執行機關（單位）所需投入的人力與設備等；符合政策程度：係爲個案計畫符合第二期四年綜合建設實施方案願景、目標、策略及 99 年度離島建設基金補助計畫政策程度。

選擇產出項包括：年度預算執行率、計畫進度執行率及整體執行績效。年度預算執行率：係指個案計畫會計年度實際核銷預算與年度可執行預算的比例；計畫進度執行率：係指個案計畫年度工作內容預定完成進度與實際完成進度的比例；整體執行績效

係：為個案計畫年度目標、工作內容及預算執行整體的觀察值。

上述 6 項投入與產出項指標，其中計畫預算數、年度預算執行率、計畫進度執行率 3 項可從連江縣政府企劃室提供的 48 項計畫執行報告擷取外；其他計畫複雜度、符合政策程度及整體執行績效 3 項為非量化指標，採取專家評鑑法，首先由執行機關（單位）進行自我評鑑，再由學者專家組成五人評鑑小組，根據連江縣政府企劃室提供的 48 項計畫執行報告，以及執行機關（單位）自我評鑑結果進行複評，以建立 3 項指標量化資料，作為本評估分析的依據。

二、資料包絡分析法之應用

本文限於連江縣政府執行計畫期間，不可控制環境因素等資料蒐集困難，僅採用傳統資料包絡分析法，其主要包括 CCR-DEA 及 BCC-DEA 二種模型，茲分述如下：

（一）、CCR-DEA 模型

CCR-DEA 模型是由 Charnes、Cooper 與 Rhodes (1978)提出，主要在分析企業的技術效率(technical efficiency)，係根據柏拉圖最適的觀念，應用數學規劃模型來衡量效率邊界(efficiency frontier)。CCR--DEA 模型是根據實際決策單位 (decision making unit, DMU)，亦稱受評單位的資料，透過 CCR--DEA 模型的分析，可建立出一條效率值為 1 的目標生產邊界，當某個決策單位落在生產邊界上，視為柏拉圖最適化，是其他決策單位的比較標準，其餘的決策單位則被歸為非柏拉圖最適化，其效率值小於 1。DEA 的有效率單位是相對效率 (relative efficiency)，而非絕對效率 (absolute efficiency)，受評單位其相對效率值為 1，表示在其他產出不減少或投入不增加的情形下，該受評單位無法再減少投入或增加產出；反之，受評單位其相對效率值小於 1，表示在投入不變下，產出可再增加，或是產出不變下，投入可再減少。在投入導向 (input-oriented)的模型，無效率值係介於 0 與 1 之間，而若為產出導向 (output-oriented)模型，無效率值則介於 1 與 ∞ 之間，至於其效率值的計算，則依無效率單位／柏拉圖最適單位值來加以計算。

DEA 法技術效率 (technical efficiency, TE)值的估計，可由分數線性規劃 (fractional linear programming)問題來解決。以 Yjn 表示第 j 個決策單位的第 n 個產出，以 Xjm 表示第 j 個決策單位的第 m 個投入，若第 j 個決策單位係以 M 種投入 來生產 N 種產出，則該決策單位的相對效率值 TEj，即為分數線性規劃問題的解，CCR--DEA 模型如下：

$$\text{Max} \quad TE_j = \sum_{n=1}^{N} U_n Y_{jn} \bigg/ \sum_{m=1}^{M} V_m X_{jm}$$

$$\text{s.t.} \quad \sum_{n=1}^{N} U_n Y_{jn} \bigg/ \sum_{m=1}^{M} V_m X_{jm} \quad ; \forall r$$

$$U_n, V_m \geq 0 \quad m = 1,2,....,M ; n = 1,2,....,N ; r = 1,2,....,j,...,R$$

Un 及 Vm 分別為第 n 個產出及第 m 個投入的虛擬乘數 (virtual multiplier)。將上述的分數線性規劃問題轉換為可以運算的線性規劃問題，也就是求解：

$$\text{Max} \quad TE_j = \sum_{n=1}^{N} U_n Y_{jn}$$

$$\text{s.t.} \quad \sum_{m=1}^{M} V_m X_{jm} = 1$$

$$\sum_{n=1}^{N} U_n Y_{rn} - \sum_{m=1}^{M} V_m X_{rm} \leq 0, \ \forall \ r$$

$$U_n, V_m \geq 0, \ \forall \ n \ and \ m$$

由於此問題的限制式個數大於變數的個數,故將原比率型式 (ratio form),取其對偶 (duality)問題,即轉換為包絡型式 (envelopment form),如下所示:

$$\text{Min} E_r = \phi_r - \varepsilon \sum_{m=1}^{M} S_m^- - \varepsilon \sum_{n=1}^{N} S_n^+$$

$$\text{s.t.} \quad \sum_{r=1}^{R} X_{rm} \lambda_r + X_{jm} \phi_K - S_m^- = 0$$

$$\sum_{r=1}^{R} X_{rm} \lambda_r - S_n^+ = Y_{jn}$$

$$S_m^-, S_n^+, \lambda_r \supseteq 0, \ \forall \ m, n, r$$

其中 $\sum_{r=1}^{R} \lambda_r = \text{free}$

其中 Sm- 與 Sn+ 為惰變數 (slack variable),在投入與產出已知下,DEA 是根據各決策單位所形成的可行解集合 (feasible solution set)中,尋找對決策單位最有利的虛擬乘數,盡量使該決策單位之效率最大,由模型中可衡量出技術效率值。

（二）、BCC-DEA 模型
　　BCC-DEA 模型是由 Banker、Charnes 與 Cooper (1984)三人提出,主要在分析企業的純技術效率(pure technical efficiency)與規模效率(scale efficiency),係將 CCR-DEA 模型加以延伸,加上生產技術滿足凸性假設、且可變動規模水平的情形下的限制條件要求,如此可確保所衡量的是純粹的技術效率 (即避開規模變動之效果)。BCC-DEA 模型純技術效率可由下式求得:

$$\text{Min PTE} = \theta_0 - \varepsilon \left(\sum_{m=1}^{M} S_{im}^- + \sum_{n=1}^{N} S_{in}^+ \right)$$

$$s.t. \quad \sum_{r=1}^{R} \lambda_r X_{rm} - \theta X_{im} + S_{im}^- = 0$$

$$\sum_{r=1}^{R} \lambda_r Y_{rn} - S_{in}^+ = Y_{in}$$

$$\sum_{r=1}^{R} \lambda_r = 1$$

$$\lambda_r, S_{im}^-, S_{in}^+ \geq 0$$

　　其次，BCC-DEA 模型所得出純技術效率值，具有的含義包括：1.利用技術效率= 規模效率 × 純技術效率的數學關係，可求得規模效率值；2.經由規模效率及純技術效率數據的比較，可以判斷分析對象其無效率的主要來源，究竟是生產要素組合數量的技術問題，或是整體規模大小的規模問題；3.非效率決策單位中，若其純技術效率值大於規模效率值，即須調整其生產規模，以提高其技術效率值；4.若純技術效率值小於規模效率值，則顯示其非效率主要來自於要素組合的技術性因素，可能使用過多的投入要素，或產出太少，若欲提高其效率值，當由此重點著手改善。

肆、結果分析與討論

　　本文利用 DEA 來評估連江縣政府 99 年度各綜合建設專案的績效，其中投入項為年度預算數、計畫複雜度、符合政策程度，產出項為預算執行率、進度執行率與整體績效，透過資料分析結果求出各專案計畫之 CCR 相對效率值、BCC 純技術效率、規模效率與整體效率排序(如表 1.)、效率強度分類(如表 2.)與差額變數結果(如表 3.)。

一、相對效率分析

　　一般而言，CCR相對效率值為1者表示為最有效率的個案計畫，即整體運作上是屬於最佳狀態，由表1.顯示，99年度48項個案計畫中，CCR相對效率值為1者有17項，占總體計畫決策單位（decision making unit, DMU）數的35.4%。BCC純技術效率值愈高者，表示投入的資源使用愈有效率。由表1.顯示，BCC純技術效率值為1者有23項，佔總DMU數之47.9%。CCR相對效率與BCC純粹技術效率的比值可以求出規模效率，規模效率值愈接近1，表示愈接近最適規模；若規模效率等於1，則顯示受評單位處於固定規模報酬狀態，若規模效率不等於1，則顯示受評單位屬於規模報酬遞增或遞減的無效率階段，由表1.顯示，規模效率值為1者有39項，佔總DMU數之81.1%。而表1.根據上述三個效率值進行受評單位（DMU）的整體效率排序，受評單位（DMU）之參考集合次數愈高者，表示其效率愈佳。

　　由表1.統計結果顯示，連江縣政府99年度各綜合建設專案計畫達CCR相對效率最佳狀態者有17項，其餘31項尚有改善空間；其次，規模效率值為1者佔總DMU數81.1%，較BCC純技術效率值為1者47.9%高出甚多，顯示其未達最佳效率原因，主要在於個案計畫

執行效率問題。

表1.相對效率及排序					
DMU	CCR 相對效率	BCC 純技術效率	規模效率	整體效率排序	參考集合次數
99-1	1	1	1	1	35
99-2	0.7500	0.7500	1	42	0
99-3	1	1	1	1	12
99-4	1	1	1	1	1
99-5	1	1	1	1	0
99-6	1	1	1	1	0
99-7	0.8437	1	0.8437	34	0
99-8	0.8437	1	0.8437	34	0
99-9	0.8437	1	0.8437	34	0
99-10	0.8437	1	0.8437	34	0
99-11	0.7500	0.8571	0.8750	42	0
99-12	0.8437	1	0.8437	34	0
99-13	0.7500	0.7500	1	42	0
99-14	1	1	1	1	0
99-15	1	1	1	1	0
99-16	1	1	1	1	0
99-17	0.9000	0.9000	1	22	0
99-18	0.9473	0.9473	1	18	0
99-19	0.8571	0.8571	1	26	0
99-20	0.9473	0.9473	1	18	0
99-21	0.9205	0.9286	0.9931	21	0
99-22	0.8750	0.8750	1	23	0
99-23	0.8571	0.8571	1	26	0
99-24	1	1	1	1	13
99-25	0.8750	0.8750	1	23	0
99-26	1	1	1	1	4
99-27	0.8571	0.8571	1	26	0
99-28	0.8571	0.8571	1	26	0
99-29	0.6520	0.7500	0.8750	48	0
99-30	0.75	0.75	1	42	0
99-31	1	1	1	1	0
99-32	0.6667	0.6667	1	47	0
99-33	0.8571	0.8571	1	26	0
99-34	0.8667	0.8667	1	25	0
99-35	0.8437	1	0.8437	34	0
99-36	0.7500	0.7500	1	42	0

99-37	1	1	1	1	0
99-38	1	1	1	1	0
99-39	0.8571	0.8571	1	26	0
99-40	1	1	1	1	2
99-41	0.8000	0.8000	1	40	0
99-42	1	1	1	1	1
99-43	0.8571	0.8571	1	26	0
99-44	0.7778	0.7778	1	41	0
99-45	0.9210	0.9210	1	20	0
99-46	0.8571	0.8571	1	26	0
99-47	1	1	1	1	0
99-48	1	1	1	1	1
平均值	0.8920	0.9190	0.9751	-	-

二、效率強度分析

在經過相對效率分析後，本文以效率強度標準來分析各項個案計畫，效率強度標準共分為四種類型(如表2.)：強勢效率專案、邊緣效率專案、邊緣非效率專案、明顯非效率專案。上述四類之分類標準是以參考組合（compaision set）之出現次數為準，所謂參考組合是指可以做為年度單位改善的參考對象，出現次數愈多，代表該專案的效度愈強(Norman & Barry, 1991；鄭惠文，2002)。強勢效率專案是指此個案計畫之CCR相對效率值為1，且出現在其他個案計畫的參考組合次數三次以上為標準，如果參考組合超過3次以上，則屬於強勢效率專案；對於強勢效率專案而言，除非在未來對其個案計畫規模有重大改變，不然此個案計畫通常可維持在有效率的水準。連江縣政府99年度48項個案計畫中，有4項是屬於此強勢項效率專案，這些強勢效率專案的執行效率可以做為無效率專案的學習標竿。

邊緣效率專案係指個案計畫之CCR相對效率值為1，但出現在各個案計畫的參考組合僅有一次或兩次（包括出現於自己的參考集合）。由表2.顯示有13項屬於邊緣效率專案，其表示如果投入、產出項稍有變動，則其整體效率就可能變動，以便使其經營效率達成最佳狀態。邊緣非效率專案係指該個案計畫的整體效率值介於0.9與1之間， 表示這些個案計畫只要在投入、產出項方面稍做調整，便可以提升其效率值。由表2.顯示有5項個案計畫是屬於此邊緣非效率專案，只要在其規模上加以擴充，則其整體效率值必能獲得改善。相對效率值小於0.9 者為無效率專案，表示該受評個案計畫的經營效率不彰，想在短期內變得有效率較為困難，而在表2.可以發現，有26項計畫是屬於明顯非效率專案，占整體比例的54.1%；因此，各個案計畫負責單位必須深入找出效率低的原因，以期未來提高相對效率。

表 2.受評估之個案計畫整體效率分類		
效率分類	DMU	合計
強勢效率專案 $h_k=1$	99-1　　99-3　　99-24　　99-26	4 項
邊緣效率單位 $h_k=1$	99-4　　99-5　　99-6　　99-14　　99-15　　99-16　　99-31　　99-37　　99-38　　99-40　　99-42 99-47　　99-48	13 項
邊緣非效率專案 $0.9< h_k<1$	99-17　　99-18　　99-20　　99-21　　99-45	5 項
明顯非效率單位 $h_k<0.9$	99-2　　99-7　　99-8　　99-9　　99-10　　99-11　　99-12　　99-13　　99-19　　99-22　　99-23 99-25　　99-27　　99-28　　99-29　　99-30　　99-32　　99-33　　99-34　　99-35　　99-36　　99-39 99-41　　99-43　　99-44　　99-46	26 項

三、差額變數分析

　　差額變數分析主要目的在於提供相對效率值小於1 之DMU，目前資源使用的情形及其投入資源與產出數量仍有多少改善空間，本評估以CCR模式及BCC 模式來運算差額變數，通常CCR模式的差額變數分析代表長期應努力的方向；而BCC模式則代表短期內應即改善的事項。從分析的結果出現在投入項的差額變數表示應予減少的投入量；而在產出項的差額變數即表示應增加的產出量，透過投入項的投入資源的減少與產出項的產量增加，藉以達到有效率的水準(歐陽國順，2001)。由表3.差額分析可以發現，CCR相對效率平均值為0.8920，有31項專案必須提升整體效率，其中來自於BCC純技術無效率為0.0840（1-0.9160），有25項專案必須提升執行效率；來自於規模無效率為0.0249（1-0.9751），在投入項方面年度預算數有23項專案必須要減少支出，而產出項方面有25項專案預算執行率是最必須要提升的地方。

表 3. 差額變動								
DMU	CCR-相對效率值	BCC- 相對效率值	投　入　項			產　出　項		
			年度預算數	計畫複雜度	符合政策程度	預算執行率	進度執行率	整體績效
99-1	1	1	0	0	0	0	0	0
99-2	0.7500	0.7500	13000000	0.7500	0	8.0002	0	0
99-3	1	1	0	0	0	0	0	0
99-4	1	1	0	0	0	0	0	0
99-5	1	1	2000000	0	1	0	0	0
99-6	1	1	1000000	0	1	0.2100	0	0
99-7	0.8437	1	0	0	0.7031	0.2000	0.1250	0
99-8	0.8437	1	281250	0	0.8438	0.3050	0.1250	0
99-9	0.8437	1	1968750	0.8438	0	0.3150	0.1250	0
99-10	0.8437	1	1968750	0.8438	0	0.1750	0.1250	0
99-11	0.7500	0.8571	5000000	0	0.7500	0.1050	0.0750	0
99-12	0.8437	1	281250	0	0	0.1450	0.1250	0
99-13	0.7500	0.7500	13750000	0.7500	0	0.7000	0	1

99-14	1	1	8000000	0	2	0	0	0
99-15	1	1	13000000	0	2	0	0	0
99-16	1	1	38000000	0	2	0	0	0
99-17	0.9000	0.9000	0	0	0	0	0	0
99-18	0.9473	0.9473	0	0	0	0	0	0
99-19	0.8571	0.8571	1428571.429	0	0	0	0	0
99-20	0.9473	0.9473	0	0	0	0	0	0
99-21	0.9205	0.9286	0	0.1255	0	0	0	1
99-22	0.8750	0.8750	0	0	0	0	0	0
99-23	0.8571	0.8571	571428.5714	0	0	0	0	0
99-24	1	1	0	0	0	0	0	0
99-25	0.8750	0.8750	0	0	0	0	0	0
99-26	1	1	0	0	0	0	0	0
99-27	0.8571	0.8571	571428.5714	0	0.8571	0.1900	0	0
99-28	0.8571	0.8571	0	0	0.1428	5.0002	0	0
99-29	0.6520	0.7500	0	0.3946	0	0.5950	0.2090	0
99-30	0.7500	0.7500	1300000	0.7500	0	0.1287	0.1000	0
99-31	1	1	0	0	1.5000	5.2802	0	0
99-32	0.6667	0.6667	4666666.667	0	0	0.9700	0	1
99-33	0.8571	0.8571	0	0	0.1428	1.0002	0	0
99-34	0.8667	0.8667	0	0	0	0	0	0
99-35	0.8437	1	281250	0	0	0.1250	0.1250	0
99-36	0.7500	0.7500	10750000	0.7500	0	0.1165	0.3392	0
99-37	1	1	0	0	1	0	0	0
99-38	1	1	4500000	0	2	3.0002	0	0
99-39	0.8571	0.8571	0	0	0.1428	0.1470	0	0
99-40	1	1	0	0	0	0	0	0
99-41	0.8000	0.8000	0	0	0	0.1700	0	0
99-42	1	1	0	0	0	0	0	0
99-43	0.8571	0.8571	571428.5714	0	0.8571	8.0002	0	0
99-44	0.7778	0.7778	0	0	0	0.0955	1.0001	0
99-45	0.9210	0.9210	0	0	0	1.0002	0	0
99-46	0.8571	0.8571	400000	0.8571	0	5.0002	0	0
99-47	1	1	1000000	3	0	0.7200	0	2
99-48	1	1	0	0	0	0	0	0
平均值	0.8920	0.9160	-	-	-	-	-	-

伍、結論與建議

　　本文採用 DEA 方法，評估連江縣政府 99 年度各綜合建設個案計畫的績效。從前節研究結果顯示，例如相對效率分析，可以快速量化比較不同個案計畫績效，並顯示不同個案計畫其無效率的來源；效率強度分析，可以明顯區分不同個案計畫效率高低；差額變數分析，可以指出不同個案計畫投入與產出項的效率值。其研究結論如下：

1. 48 項個案計畫中，達 CCR 相對效率最佳狀態者有 17 項，其餘 31 項尚有改善空間；其次，規模效率值為 1 者佔總 DMU 數 81.1%，較 BCC 純技術效率值為 1 者 47.9%高出甚多，顯示其未達最佳效率原因，主要在於個案計畫執行效率問題。此外，根據上述三個效率值可進行受評單位（DMU）的整體效率排序，受評單位（DMU）之參考集合次數愈高者，表示其效率愈佳。

2. 48 項個案計畫中，有 4 項是屬於強勢效率專案，可以做為無效率專案的學習標竿。13 項屬於邊緣效率專案，其表示如果投入、產出項稍有變動，則其整體效率就可能變動，以使其經營效率達成最佳狀態；5 項屬於邊緣非效率專案，只要在其規模上加以擴充，則其整體效率值必能獲得改善；26 項計畫屬於明顯非效率專案，占整體比例的 54.1%，各個案計畫負責單位必須深入找出效率低的原因，才能提升相對效率。

3. 由差額分析發現，CCR 相對效率平均值為 0.8920，其無效率主要來源，來自於 BCC 純技術無效率為 0.0840（1-0.9160），來自於規模無效率為 0.0249（1-0.9751）；在投入項方面年度預算數有 23 項專案必須要減少支出，而產出項方面有 25 項專案預算執行率是最必須要提升的地方。

　　由上述結論顯示，DEA 方法確實可以解決傳統績效指標法之績效指標不夠客觀、評估過程過於冗長、不同性質或大小計畫不易橫向比較，以及評估結果無法即時回饋等部分問題。但是，本文在實務操作的過程中，發現下列問題為未來應用 DEA 方法必須注意事項，包括：

1. 傳統 DEA 法未考量計畫執行過程中，有可能受到天災和經濟等不可控制環境因素的影響，其效率值容易產生偏差；因此，傳統 DEA 法評估時，除了量化資料的統計外，必須搭配不可控制環境因素等質性資料分析。

2. 執行機關提供資料必須正確，例如執行機構提出的年度預算執行率為 100%，實務上除了補助性或補貼性計畫如（體貼的關懷網絡）實施「以工代賑」方案、馬祖島際海運基本航次補貼計畫及臺馬間海運交通基本航次補貼計畫等預算可能完全使用外，一般工程或社會行政計畫預算較難在年度內執行率達到 100%，同樣的計畫進度執行率亦是類同情形。

3. 注重質性資料評鑑的客觀性，例如計畫複雜度、符合政策程度及整體執行績效 3 項為非量化指標的評鑑，易受到執行機關（單位）是否提供充分資料（訊）及評鑑人員專業能力的影響。

4. 重視選擇投入與產出評估項指標的適當性，例如 99 年度離島建設基金補助計畫 48 項含蓋社會行政、公共工程及科技研究性計畫，不同類型計畫的投入與產出有共同性評估指標如年度預算執行率及計畫進度執行率等，亦有個案計畫特殊指標，要找到完全適用不同計畫投入與產出評估指標，有其困難之處等，僅能在有限的資料（訊）、時間及資源下力求嚴謹。

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本國銀行財務特徵與衍生性金融商品之關聯性

The Relationship of Domestic Banks Financial Characteristics and Derivatives

吳佩珊[1]
Pei-Shan Wu
健行科技大學財金系
副教授
pasun@uch.edu.tw

余思隆[2]
Szu-Lung Yue
聯邦銀行
業務組長

摘　　要

近年來本國銀行對衍生性金融商品的使用量越來越高，我國從 1991 年 7 月起逐漸開放銀行辦理衍生性商品業務，截至 2010 年 11 月底為止，我國衍生性商品有 20 餘種且逐漸增加。本研究之目的在探討台灣地區本國銀行使用衍生性金融商品與財務特徵間的關係，針對金融監理機關監控的財務構面挑選出資本額、負債資產比、淨值比、放款比、流動比、流動資產比、淨利息邊際、資產報酬率、董監事持股比等。根據 Gonza'lez, Terasvirta and Dijk(2004,2005) 修正後的縱橫門檻迴歸模型，稱為縱橫平滑移轉迴歸模型(Panel Smooth Transition Regression Model，簡稱 PSTR)來檢定衍生性金融商品使用與銀行財務特徵的關係。因 PSTR 模型可設定門檻變數將樣本資料分組(本文設定資本額為門檻變數)，於研究過程中可了解分組銀行間的衍生性商品使用的差異。本研究結果顯示：在淨放款比、公司規模、負債資產比、淨值比、流動比、流動性資產比、董監事持股比越高的情況下大規模銀行會增加衍生性金融商品操作。淨利息邊際愈高則大規模銀行衍生性金融商品操作可能性愈低。實證結果與國外文獻大致符合，顯示本國銀行的衍生性金融商品使用尚在合理的範圍當中。

關鍵詞：財務特徵、衍生性商品、PSTR模型

Abstract

In recent years, the use of financial derivatives for domestic banks in Taiwan is getting greater. Since July 1991, derivatives products were launched and a wide variety of derivatives are accepted. So far, there are more 20 derivatives that are released. The objective of this paper is to study the relation between the use of financial derivatives and characteristic of financial institutions. We focus on several variables, such as the capital, debt asset ratio, net worth ratio, loan deposit ratio, liquidity ratio, current asset ratio, net interest margin, asset return, and stock holding ratio of boards. According Gonza'lez, Terasvirta and Dijk (2004,2005) modified panel threshold regression model, called the Panel Smooth Transition Regression(PSTR) model to test the relationship between using financial derivatives and financial characteristics. Because PSTR model can set the threshold variable and group the sample data, (this study use capital as threshold variable). In this research can help us to know the difference of using derivatives between grouping bank. The results indicated that: when debt asset ratio, net worth ratio, loan deposit ratio, liquidity ratio, current asset ratio and stock holding ratio of boards are higher, the large scale banks will use more derivatives. When net interest margin is higher, the large scale banks will use less derivatives. The empirical results are same with foreign literatures; it shows domestic banks use financial derivatives at reasonable range.

Keywords: Financial Characteristics, Derivatives, PSTR Model

壹、研究背景

近年來本國銀行對衍生性金融商品的使用量越來越高。我國從 1991 年 7 月起逐漸開放銀行辦理衍生性商品業務，截至 2010 年 11 月底爲止，我國衍生性商品有 20 餘種且逐漸增加，我國的衍生性金融商品已更多元化且複雜。由於新種的衍生性金融商品工具種類增加及使用量不斷上升，造成個別銀行和整個銀行體系風險增加的可能性升高，使得銀行監理機關-行政院金融監督管理委員會(以下簡稱金管會)及中央銀行相當關注衍生性金融商品使用量的上升。

以美國爲例，衍生性商品的使用規模是本國銀行的數倍，金融監理機關及學術界針對銀行擴大衍生性金融商品業務的因素與財務構面間關係進行研究，如 Nance, Smith and Smithson(1993)認爲企業進行衍生性金融商品避險的主因在於發生財務危機的機率與降低發生財務危機的所需支付的成本、Sinkey and Carter(1997)認爲銀行會利用存款保險所提供的風險轉移機會來取代避險的動作，有時甚至會產生更冒險的道德危機行爲去從事衍生性金融商品的操作、Brewer et al.(2001)認爲銀行爲改善財務績效會使用兩種參與衍生性商品市場的方式來獲得收益。近期則有 Adkins, David and Simpson (2007)、Shiu and Peter (2010)、Wang, Alam and Makar (2005)等文獻進行相關研究，顯示出衍生性金融商品使用量的增加越來越被美國金融監理機構重視。

相較於美國有大量的研究報告仍舊無法避免次貸風暴的發生，造成美國金融業的危機，顯示衍生性金融商品使用量的增加提高了銀行的財務風險。我國銀行因爲衍生性金融商品業務在 1991 年 7 月才陸續開放且商品種類較少，在管理上較美國簡單，但是隨著近年來商品種類的增加及使用量的提升，金融監理機構仍應防範於未然。

國內金融監理機構目前針對銀行業衍生性金融商品操作的限制是以銀行資本適足率來做管制，初步分爲 2%、4%、6%、8%，分別會有不同的處分方式。另外操作部位的限制爲(1)國內及國外之部位不得超過業主權益之 40%、(2)國外之部位不得超過業主權益之 20%、(3)以單一公司爲標的之衍生性金融商品，不得超過業主權益之 5%。在我國積極開放衍生性金融商品業務之際，銀行對於衍生性金融商品的使用除原先避險的原因以外，是否會因爲其他的因素而增加衍生性金融商品的使用。所以本研究對於銀行衍生性金融商品的使用的影響因素，選取銀行財務特徵作爲影響變數加以探討。

而國內相關研究並未考慮不同銀行規模其銀行財務特徵對本國銀行操作衍生性金融商品的影響，因此本研究以國內上市銀行爲主要研究對象，所獲得的資料來自臺灣經濟新報資料庫，包含代表銀行財務特徵的變數，如負債資產比、淨值比、放款比、流動比、流動資產比、淨利息邊際、資產報酬率、董監事持股比等，利用 Gonza'lez, Terasvirta and Dijk (2004,2005)所提的縱橫平滑移轉迴歸模型(PSTR 模型：Panel Smooth Transition Regression)，令資產總額爲門檻變數，試圖探討不同規模銀行其財務特徵對操作衍生性金融商品之影響差異。並試圖去驗證下列問題：

1. 資本額愈大的銀行其淨值佔總資產比愈高、負債比率愈高、放款佔總資產的比率愈高、淨利息邊際愈高，使用衍生性金融商品的數量是否愈多？
2. 資本額愈大的銀行其流動性資產比愈高、流動比愈高、董監事持股比愈高，衍生性商品的使用數量是否愈少？
3. 在不同銀行規模下，其資產報酬率與衍生性金融商品的使用是否有一致性關係？

本研究是以衍生性金融商品使用及銀行風險管理的理論爲本，進而研究銀行財務特

徵與衍生性金融商品使用量的關係。先選取相關變數並設定本研究的預期關係，然後進行相關資料蒐集，進而利用縱橫平滑移轉迴歸模型的實證方法，分析其結果得到研究結論。透過本文的研究結果並與其他國家研究結果作比較，可提供監理機關、金融業者、交易人員、信用評等機構及投資者做決策時的參考依據。

貳、文獻回顧與假說設定

　　銀行通常以交易商或最終使用者或同時以二種身分參與衍生性金融商品市場。利用不同的身分參與金融商品市場以賺取銀行業主要的收入，包含存放利差收益基準(Interest- earning)與費用基礎(Fee-based)。如上述所言，銀行管理本身的風險(避險)賺取升息資產及提供客戶風險管理的服務(投機)賺取費用基礎。故銀行會利用衍生性金融商品的操作來達成這兩項目的。

　　以前者來說，銀行業主要的收入來源來自於兩方面，存放利差收益基準與費用基礎，其中費用基礎逐漸成為銀行擴展收入的重要項目。因為升息資產的收入在利率持續低迷的趨勢下導致利差逐漸縮小，擴大費用基礎的收入成為銀行提升收益的重要課題。費用基礎的收入就是銀行提供服務向客戶收取的手續費收入，因此銀行在原先傳統的借貸業務以外提供包含供風險管理服務給客戶，以增加手續費收入。此動機與King and Lipin(1994)研究發現銀行降低傳統的借貸業務，利用操作衍生性商品向客戶提供風險管理服務收取手續費，增加銀行收益，顯示銀行傳統的借貸業務重要性逐漸下降相符。

　　除費用收入以外，交易動機也包含降低風險與強化客戶關係，利用出售風險管理服務給客戶，可利用衍生性金融商品的操作避險降低客戶廠商發生財務危機的機率，同時透過交叉行銷強化客戶關係為銀行創造價值。Smith(1993)主張銀行出售風險管理服務的利益包括手續費收入、強化客戶關係及降低客戶財務風險，銀行對客戶的曝險降低而獲益。

　　在銀行操作衍生性金融商品的同時，會增加銀行的成本。因為操作衍生性金融商品需要投入資本，在銀行考量資源配置及規模效率下，規模愈大的銀行愈會操作衍生性金融商品，規模小的銀行在資源限制下有較少的機會提供風險管理服務給客戶。Tufano(1989)分析投資金融中，發展新產品與高成本有關。Hunter and Timme(1986)主張規模及技術效率使規模最大的的銀行容易達到規模經濟之效果。

　　銀行面臨的風險程度、管理風險的成本及總體的管制環境，使得銀行利用衍生性金融商品操作進行避險策略，茲將避險的因素列述於下：

一、　公司規模與避險

　　銀行在實行風險管理計畫所投入的成本，可能使較小型的銀行避開使用衍生性商品。這些成本包括僱用有技術的員工、參與衍生性金融商品市場的內部控制系統、保證金的要求及維持法定資本等。

　　Booth, Smith and Stolz(1984)，認為避險行為具有資訊上的規模經濟效果，所以規模較大企業會有較大的意願及能力去僱用具備風險管理專業知識的管理人員從事相關的避險策略。Nance et al. (1993)主張衍生性金融商品包括交換契約、期貨及選擇權明顯的存在交易成本的規模經濟效果，因此公司規模應與銀行避險具有正向的關係。但是Nance et

al. (1993)也提出了另一個論點，規模小的公司因稅前所得落入累積稅率級距範圍的機會較高，導致其進行避險的意願也較高。

銀行執行風險管理計畫的成本可能限制銀行使用衍生性金融商品，因為負擔交易成本及手續費、保證金要求，很多研究顯示大型金融機構更可能涉入衍生性金融商品的使用。本研究以資本額作為變數衡量規模，將資本額設定為門檻變數將資料分組，預期不同規模銀行其財務特徵對使用衍生性金融商品的影響有差異，設定假說一如下：

假說一：不同規模銀行其財務特徵對使用衍生性金融商品的影響有差異。

二、 資本適足性與避險

資本適足性(Capital-adequacy requirements)及存款保險也提供銀行是否使用衍生性金融商品的誘因。目前世界各國針對銀行業發展衍生性金融商品的業務都有設定一定的資本標準(risk-based capital standards)要求銀行業遵守。此要求與Merton and Bodie(1992)主張的資本要求不謀而合，保證資本的限制提供一個損失的保護，並以此取代頻繁的監督，所以淨值應與衍生性金融商品的使用有正向關係。

淨值比率與衍生性金融商品使用的研究，另外有學者發現不同的結果。Sinkey and Carter(1997及2000)及Brewer et al.(2001)研究結果發現淨值比率愈低，其衍生性金融商品的使用程度反而愈高。

對於保證資本的說法除了上述法規環境的限制外，也可以將銀行資本視為市場對信用的衡量。在OTC的衍生性金融商品工具，例如遠期匯率契約，交易對手的信用是銀行操作時的考量因素。Gunther and Siems(1996)研究發現資本佔資產比率越高的銀行，衍生性金融商品的參與程度越高。Simons(1995)認為使用衍生性金融商品管理利率風險可能比資產負債表內管理更受歡迎的原因是資產負債表外的契約需要的資本要求較低，因此資本比率低的銀行，預期是衍生性金融商品的較大使用者，原因可能為他們的資本受限制或更喜愛冒險。關於資本適足性的關聯，本研究使用淨值佔總資產的比率為衡量變數，預期衍生性金融商品的使用與銀行淨值比率呈正相關，設定假說二如下：

假說二：衍生性金融商品的使用與淨值比呈正相關。

三、 財務危機成本與避險

企業發生財務危機的成本愈高，有較高的機會利用避險策略來降低財務危機成本，同時較大財務危機機率的銀行更可能從避險計畫中獲利，此理論與Nance, Smith and Smithson(1993)認為企業進行避險的主因在於發生財務危機的機率即發生財務危機的所需支付的成本。

因此，避險的程度應該與銀行資本結構中的債務總額有關。但是Sinkey and Carter(1997)則認為財務危機與銀行避險的關係是複雜的，由於美國銀行擁有聯邦存款保險的保證，故銀行會利用存款保險所提供的風險轉移機會來取代避險的動作，有時甚至會產生更冒險的道德危機行為去從事衍生性金融商品的操作，所以他們認為避險降低企業財務危機成本的觀念可能不適用於銀行。

對於銀行的道德危機行為，Merton and Bodie(1992)認為限制資本需求會迫使銀行必須擁有保證資本才能去參與新的衍生性金融商品活動，因此只有一定權益資本比率的銀行才有可能去使用衍生性金融商品，所以管制紀律會降低道德危機行為的發生。銀行藉避險降低發生財務危機的機率，所以銀行發生財務危機的成本愈高其採行避險策略的機

率也愈高(Mayers and Smith, 1982 及Smith and Stulz, 1985)。本研究使用負債佔總資產的比率來衡量財務危機，假設預期財務危機成本愈高的樣本銀行使用衍生性金融商品避險的可能性愈大，設定假說三如下：

假說三：衍生性金融商品的使用與負債資產比呈正相關。

四、 風險與避險

存款者提供資金給銀行，銀行再將資金貸款給借款者，此為銀行中介角色，同時提供債務契約給存款者與借款者。現代的銀行中介角色理論描述衍生性金融商品與貸款如何相輔相成，也衍生出新的課題"衍生性金融商品是否可取代傳統貸款業務"。

銀行執行貸款業務即負擔了信用風險，雖然銀行可透過分散資產來降低風險，但銀行仍面臨系統風險，衍生性金融商品可以用來解決利率敏感性資產與負債的不配合，使銀行中介更有效率。Daimond(1984)的模型預測利率衍生性商品能輔助貸款業務。

Schrand and Unal(1998)調查美國儲貸機構(thrifts association)信用與利率風險避險及統合管理(coordinated risk management)，認為銀行若實行統合風險管理，那麼使用利率衍生性商品規避利率風險應該會與銀行的信用暴險有關。如果銀行使用衍生性金融商品(避險或投機)規避信用風險，則預期放款損失與衍生性金融商品的使用呈正相關。

Brewer et al.(2001)認為銀行為改善財務績效會使用兩種參與衍生性商品市場的方式來獲得收益。第一種是使用衍生性金融商品當做投機工具，從投機利率改變中獲取收入；第二種是扮演OTC的交易商向建立衍生性部位的機構收取費用。若銀行使用上述兩種方式來改善財務績效，則衍生性金融商品的使用會取代傳統的貸款業務。本研究預期信用風險與衍生性商品的使用呈正相關。信用風險的關聯以放款佔總資產的比率來衡量，設定假說四如下：

假說四：衍生性金融商品的使用與放款比呈正相關。

五、 流動性與避險

除了使用衍生性金融商品來避險外，銀行也可以使用資產負債表內的工具來管理風險。資產負債表內的工具包括缺口管理及存續期間管理。

(一) 缺口管理(Gap Management)

所謂的利率敏感性缺口(Gap)是指利率敏感性資產(Rate Sensitive Asset, RSA)與利率敏感性負債(Rate Sensitive Liabilities, RSL)差額。利率敏感性的定義是指當利率改變，利息收入或支出會隨之改變的資產及負債。一般缺口期間都以一年為基礎。差額為正數稱為正缺口，表示資產大於負債，有利率下跌的風險；差額為負數稱為負缺口，表示負債大於資產，有利率上升的風險。

"缺口管理"是指先確定某段期間內銀行的資產負債結構是處於正缺口或負缺口的狀態來預測期間內的利率走勢，再設法調整銀行的資產負債結構，目的是將缺口歸於零。不過缺口管理未考慮資產負債表中利率對淨值的影響。

(二) 存續期間管理(Duration Management)

針對缺口管理未考慮淨值的影響，可利用存續期間管理來衡量。存續期間是指每一筆現金流量的現值作時間的加權平均。存續期間缺口(Duration Gap)即以資產存續期間減去負債存續期間，若為正存續期間缺口當利率下跌，不利於銀行。若為負存續期間缺口，當利率上升時不利於銀行。

存續期間管理即為銀行存在著存續期間缺口時，銀行可以調整其資產與負債使存續期間缺口為零。如此，銀行的淨值可以免於受到利率變動的影響。

Sinkey and Carter (1997,1998及2000)的研究，衍生性商品的使用者其利率敏感性缺口比較大，亦即利率敏感性缺口越大，衍生性金融商品的使用越多。

如果銀行可投資更安全、流動性高的資產來管理資產負債表內的風險，因為流動性高的資產能輕易的轉換為現金，銀行將不會使用衍生性金融商品來管理風險，此即為Nance et al.(1993) 的替代避險假說。但是Sinkey(1997)研究卻有不同的結果，流動比在使用衍生性商品的銀行會較高，Sinkey推測原因為銀行的投機心理及出售風險管理服務給客戶。而本研究採用流動性資產比及流動比率來衡量流動性，認為投資更多的流動性資產將較少使用衍生性金融商品避險，設定假說五、六如下：

假說五：衍生性金融商品的使用與流動比呈負相關。

假說六：衍生性金融商品的使用與流動性資產比呈負相關。

六、 獲利性與避險

淨利息邊際是綜合的衡量控制利息收入與利息成本間的利差能力。銀行可使用衍生性金融商品鎖住利差，淨利息邊際高的銀行越可能經由使用衍生性金融商品避險，來減少利率變動導致利差縮小的機率。

Sinkey(1997)研究顯示，銀行可能進行投機行為或是道德危機行為，導致淨利息邊際在使用衍生性商品的銀行會較低，此外，帳面資產報酬率是一種績效的指標，資產報酬率顯示銀行成功的管理將銀行資產轉換成淨盈餘的程度。因此本研究預期衍生性金融商品的使用與淨利息邊際呈正相關，而與資產報酬率沒有一致性的關聯，設定假說七、八如下：

假說七：衍生性金融商品的使用與淨利息邊際呈正相關。

假說八：衍生性金融商品的使用與資產報酬率呈沒有一致性關係。

七、 權益代理與避險

Jensen and Meckling(1976)對於權益代理問題做出了精闢的描述，管理者一味追求個人財富極大化及鞏固自己的地位，會採取一些自利行為而偏離股東財富極大化的企業經營目標，進而引起管理者與股東的利益衝突。但是若管理者持股比率愈高，則雙方的立場會趨於一致。

因為管理者在企業營運績效不佳的情況下會被公司解職，所以管理者的財富會是企業價值的凹性函數，因此管理者被監控的程度與銀行避險是有正向的關係。董監事的職責在監控公司管理者的表現是否符合股東的利益，但是當董監事擁有公司實質股權愈多的情況下，董監事也變成了公司的擁有者，所以他們的財富會是一個凸性的收益函數。Whidbee and Wohar(1999)認為董監事擁有公司實質股權時，銀行愈不可能去避險，所以本研究假設當銀行董監事持股比愈高時，愈不可能去使用衍生性金融商品避險，設定假說九如下：

假說九：衍生性金融商品的使用與董監事持股比呈負相關。

參、研究方法

縱橫資料迴歸模型藉由個別效果(individual effect)與時間效果(time effect)來完全補捉資料中之異質性(heterogeneity)。在一般的縱橫資料模型中，大部分皆假設參數是固定的，但實際上，參數固定的假設將無法適當的描述模型中變數之間的實際關係，可能導致實證結果錯誤。

Hansen(1999)發展出縱橫門檻迴歸模型，門檻迴歸模型是採用樣本資料中的門檻變數(Threshold variable)決定不同的分區點，進而估計出合適的門檻值，這種方式可以避免研究者所使用的主觀判定分區點所造成的缺失。縱橫門檻模型之特徵即利用與時而變(time varying)之門檻變數，將縱橫資料區分成數個不同的區間，觀察值遭遇門檻值時會產生一跳躍的效果，但此現象在實證上並不合理。Gonza'lez, Terasvirta and Dijk(2004,2005)針對 Hansen(1999)的縱橫門檻迴歸模型做出修正，將模型中之跳躍過程修正為平滑移轉，在模型設計上增加了一個移轉速度，利用移轉速度此一參數來描述模型在轉換門檻值附近的平滑轉換現象而不是一種單純的跳躍過程。修正後的縱橫門檻迴歸模型稱為縱橫平滑移轉迴歸模型(Panel Smooth Transition Regression Model，簡稱 PSTR 模型)。

PSTR 模型可視為具外生迴歸係數之固定效果(fixed effect)的一線性異質性縱橫模型。異質性是假設這些係數為觀察變數之連續函數下，透過一移轉函數(transition function)在有限個不同區間內產生波動之情況。也因為移轉函數在各區間不同且隨時間不同而變動，故縱橫資料中各區間之迴歸係數會隨時間改變而改變。

另外有學者將 PSTR 模型用另一種方式來解釋。Terasvirta (1994,1998)將其視為一非線性同質(homogeneous)縱橫模型，較常用於單一方程式之平滑移轉迴歸(Smooth Transition Regression, STR)模型或單變量平滑移轉自我迴歸(Smooth Transition Autoregressive, STAR)模型都是屬於此種解釋方式下的模型。

因為有兩種不同的解釋方式，在使用縱橫平滑移轉迴歸模型(PSTR)的時候須先檢驗縱橫資料是否存在異質性的現象，若檢定證實資料存在異質性的現象，此一模型可視為非線性的縱橫模型。非線性的縱橫模型透過轉換變數的設定會將模型區分成 N+1 個區間，在每個區間內的縱橫模型是屬同質模型。根據 Terasvirta(1994,1998)的平滑移轉模型(Smooth Transition Autoregressive, STAR)的最基本設定如下：

$$y_{it} = \mu_i + \beta_0 x_{it} + \beta_1 x_{it} g(q_{it}; \gamma, c) + \varepsilon_{it} \tag{3.1.1}$$

其中，i = 1,…,N 表示個體數

　　　　T 表示時間

　　y_{it} 表示一純量

　　x_{it} 表示一 k 維向量，表與時而變之外生變數

　　μ_i 表示個體的固定效果

　　ε_{it} 表示誤差

$g(q_{it};\gamma,c) \Rightarrow$ 轉換函數，為一連續函數，介於 0 至 1 之間

q_{it} 為轉換變數

γ 為轉換速度

c 為轉換門檻值

又根據 Granger and Terasvirta (1993)、Terasvirta (1994)及 Jansen and Terasvirta (1996)，轉換函數設定如下：

$$g(q_{it};\gamma,c) = (1 + \exp(-\gamma \prod_{j=1}^{m}(q_{it} - c_j)))^{-1} \tag{3.1.2}$$

其中，$\gamma > 0$ 且 $c_1 \le c_2 \le \ldots \le c_m$

$c = (c_1,\ldots,c_m) \Rightarrow$ m 維向量的位置參數(location parameter)

無論 m = 1 ,2 …，γ 值皆影響 g 函數的斜率，γ 值愈大，g 函數圖形愈陡峭，當 $\gamma \to \infty$ 時，其意義近似單一時點的結構性改變，也就是說模型會與 Hansen(1999)的縱橫門檻迴歸模型的單點跳躍模式相同，如下式所列：

$$y_{it} = \mu_i + \beta_0' x_{it} + \beta_1' x_{it} \phi(q_{it};c) + \varepsilon_{it} \tag{3.1.3}$$

$$\phi(q_{it};c) = \begin{cases} 1 \ if \ q_{it} \ge c \\ 0 \ if \ q_{it} \le c \end{cases}$$

若 $\gamma \to 0$ 時，g 函數近似線性函數，結構性轉變不明顯。因 g 函數值介於 0 與 1 之間，所以迴歸係數的極端值即為 β_0' 與 $\beta_0' + \beta_1'$。

一般化的 PSTR 模型(generalized － PSTR)允許多個不同區間，其模型如下：

$$y_{it} = \mu_i + \beta_0 x_{it} + \sum_{j=1}^{r} \beta_j' x_{it} g(q_{it};\gamma_j,c_j) + \varepsilon_{it} \tag{3.1.4}$$

這些轉換函數 g 的形狀由式(3.1.2)決定，j→r 代表可能存在 r 個平滑移轉函數，使模型在 2^r 個不同影響區間。當 m = 1 且 γ 趨近無窮大，此模型為一 U 型特例，即當 q 介於 c_1 及 c_2 時則呈 0 至 1 單點跳躍變化，模型可視為 Hansen(1999)多重門檻區間模型。

而本研究以銀行規模資本額作為門檻變數，探討銀行的財務特徵對銀行使用衍生性金融商品有何影響，其 PSTR 實證模型設定如下：

$$衍生性商品餘額_t = \mu_{it} + \beta_0^{'}(負債資產比_{it} + 淨值比_{it} + 放款比_{it} + 流動比_{it}$$
$$+ 流動性資產比_{it} + 淨利息邊際_{it} + 資產報酬率_{it} + 董監事持股比_{it})$$
$$+ \sum_{j=1}^{\gamma} \beta_0 g(資產總額_t ; \gamma_j , c_J)(負債資產比_{it} + 淨值比_{it} + 放款比_{it} + 流動比_{it}$$
$$+ 流動性資產比_{it} + 淨利息邊際_{it} + 資產報酬率_{it} + 董監事持股比_{it})$$

肆、實證結果分析

一、資料來源

實證分析資料取自 2006 第一季到 2010 第二季「台灣經濟新報資料庫」。所有衍生性金融商品總餘額、利率衍生性金融商品餘額及匯率衍生性商品餘額，資料取自「台灣經濟新報資料庫」衍生性商品餘額風險別與商品別。總資產、流動性資產、負債、放款金額、資產報酬率、利息收入、利息支出、淨利資料取自「台灣經濟新報資料庫」-未上市財報金融產業及合併財報金融業。董監事持股比取自「台灣經濟新報資料庫」-董監事持股狀態與未上市公司董監事持股狀態。

本研究選取樣本銀行為台灣本國銀行，因部分本國銀行合併至外商銀行，外商銀行衍生性商品操作策略與本國銀行略有差異，故此類本國銀行不納入本次樣本中。選取樣本包括第一銀行、中信銀、元大銀行、台北富邦銀行、台新銀行、台灣工銀、台灣企銀、永豐銀行、兆豐銀行、國泰世華銀行、華南銀行、開發銀行、新光銀行、彰化銀行、大眾銀行、聯邦銀行、高雄銀行、萬泰銀行、遠東銀行、安泰銀行、三信商銀、上海銀行、陽信銀行、土地銀行、合庫、日盛銀行、台灣銀行、華泰銀行等 28 間銀行。

二、變數定義

本研究的樣本銀行的各變數有資本額、負債資產比、淨值比、放款比、流動資產比、淨利息邊際、資產報酬率、董監事持股比，變數計算如下：
(一) 公司規模之衡量變數
　　資本額：銀行自有資本
(二) 財務危機成本的衡量變數
　　負債資產比：負債帳面價值/總資產帳面價值
(三) 資本適足性的衡量變數
　　淨值比：淨值/總資產
(四) 風險的衡量變數
　　放款比：銀行放款金額/總資產
(五) 流動性的衡量變數
　　1. 流動比率：流動資產/流動負債
　　2. 流動性資產比：(現金+存放同業+政府債券)/總資產
(六) 獲利性的衡量變數
　　1. 淨利息邊際：(總利息收入-總利息支出)/總資產
　　2. 資產報酬率：稅前純益/平均資產

（七）權益代理的衡量變數

董監事持股比：董事及監事持股比率的加總

三、敘述統計分析

　　財務特徵基本統計分析如表 1。樣本銀行操作衍生性商品現況如下，衍生性金融商品風險別資料整理成表 2，樣本銀行主要使用的商品為利率契約 27 家(使用率 96.42%)跟匯率契約 28 家(使用率 100%)。僅有萬泰銀行沒有使用利率契約，一般而言銀行面對最多的就是利率跟匯率風險，因此會使用利率跟匯率契約來管理風險，顯示樣本銀行基於避險的理由都會有基本的衍生性金融商品的使用。

表 1 樣本銀行之基本統計資料

銀行財務特徵	變數名稱	平均數	中位數	標準差	最大值	最小值
公司規模	資本額(百萬)	33312.37	27293	20128.69	84367	3337
財務危機	負債資產比(%)	0.918135	0.941532	0.093044	0.991712	0.387477
資本適足	淨值比(%)	8.254405	5.77	9.383289	60.72	1.85
風險	放款比(%)	0.616847	0.621419	0.103181	0.821628	0.247187
流動性	流動比(%)	3.591058	2.110614	5.475989	56.53945	0.520482
	流動資產比(%)	1.342953	0.8003	1.87441	16.05829	0.005093
獲利性	淨利息邊際(%)	0.004278	0.00341	0.005265	0.107148	-0.00337
	資產報酬率(%)	0.010952	0.14	1.161804	5.25	-7.88
權益代理	董監事持股比(%)	61.2898	79.285	40.15111	100	0

附註：資本額單位為百萬，其餘變數單位為百分比。

表 2 衍生性金融商品分類風險別

共 28 間	風險別				
利率契約	匯率契約	權益契約	商品契約	信用契約
27 (96.42%)	28 (100%)	16 (57.14%)	9 (32.14%)	22 (78.57%)

表 3 衍生性金融商品分類商品別

共 28 間	商品別				
店頭市場契約	遠期契約	買權契約	賣權契約	期貨契約
28 (100%)	28 (100%)	23 (82.14%)	27 (96.42%)	13 (46.42%)

商品契約最少僅有 9 家(32.14%)銀行使用，其次是權益契約 16 家(32.14%)跟信用契約 22 家(78.57%)。其中，中信銀、台新銀、永豐銀及大眾銀使用這三種契約的數量較多，顯示新銀行在衍生性金融商品的使用上較具多元化以及較能接受新形式的衍生性金融商品。

若以衍生性金融商品商品別來細分，店頭市場契約及遠期契約都是 28 家(100%)樣本銀行都有使用，至於期貨契約使用較少僅 13 家(46.42%)，另外賣權契約 27 家(96.42%)，買權契約 23 家(82.14%)， 顯示樣本銀行較偏向買賣權的契約使用，而期貨契約的使用量較少。其中中信銀、台新銀、開發銀行及永豐銀在期貨契約的使用量較多，與風險別商品的結果相似顯示新銀行在衍生性金融商品的使用上較具多元化。

另外，商品別的分類請見表 3，從表 3 整理發現樣本銀行使用商品別的衍生性金融商品契約較為平均。

伍、實證分析

一、衍生性金融商品風險別總額

研究結果整理成表 4。本研究按照縱橫門檻轉換迴歸模型(PSTR model)依銀行資產規模分為四個群組，分別為資本總額<47717 佰萬為小規模銀行，當資本總額為 47717 佰萬≦資本總額<54860 佰萬為中規模銀行，當資本總額為 54860 佰萬≦資本總額<65932 佰萬為中大規模銀行，當資本總額為 ≧65932 佰萬為大規模銀行，並以風險別商品的結果來看，淨放款比與操作部位有顯著關係，亦即放款比率與衍生性金融商品的使用呈正相關，與預期相符。正相關的結果在資本額分類的小組和中組又特別明顯。

流動比與流動性資產比與衍生性金融商品使用之間有顯著關係，卻是正相關與預期不符，不支持 Nance et al.(1993) 的替代避險假說，反而與 Sinkey (1997) 研究相符，銀行因為投機的動機及出售風險管理服務而增加衍生性金融商品的使用。資產負債比與衍生性金融商品使用有顯著正向關係，有較大財務危機的銀行可藉由衍生性金融商品的操作以降低利率非預期改變的暴險所帶來的財務危機的機率，與預期相符。資產報酬率與衍生性商品的使用沒有一致性關係，與預期相符。表示銀行不論規模大小並不會以追求獲利性的前提下大量操作衍生性商品，一般而言還是以規避利率或匯率風險來作為衍生性商品的操作。淨利息邊際比與衍生性金融商品的使用呈現顯著負相關，與預期不符。但是與 Sinkey (1997)研究邊際淨利息比在使用衍生性商品的銀行會較低相符，此可視為銀行的投機訊號。淨值比與衍生性金融商品的使用在資本額分類大組中有顯著正向關係顯示資本額越大的銀行有較多的資本部位支撐衍生性金融商品的業務，與預期相符。董監事持股比與衍生性金融商品的使用呈顯著正向關係，與預期不符。根據邱正仁、高蘭芬、盧素珍(2003)的研究，若成正向關係則是因為在避險成本小於合約補償成本，銀行會使用衍生性金融商品。結果整理成表 4。

表 4 衍生性金融商品風險別餘額實證結果

Y=風險別總額	小 (資本總額<47717 佰萬)		中 (47717 佰萬≦資本 總額<54860 佰萬)		中大 (54860 佰萬≦資本 總額<65932 佰萬)		大 資本總額≧65932 佰萬		預期
	coefficient	effect	coefficient	effect	coefficient	effect	coefficient	effect	effect
淨放款總資產比	0.0034***	+	0.0502***	+	-0.0032	-	-0.0136**	-	+
流動比	0.0000***	+	-0.0010*	-	-0.0006	-	0.0031***	+	-
負債資產比	0.0016	+	-0.0467***	-	0.0077***	+	-0.0052	-	+
資產報酬率	0	+	-0.0004	-	0.0004	-	0	-	X
淨值佔總資產比例	-0.0014	-	0.362	+	-0.3617**	-	1.0376***	+	+
流動性資產	0.0000***	+	0.0067***	+	0.0022***	+	-0.0058***	-	-
總利息收入-總利息費用/資產總額	0	-	-0.0008***	-	-0.0009***	-	0.0012***	+	+
董監持股	0	-	0.0002***	+	0.0000**	+	0.0000**	+	-

附註：*,**,***分別表示 α =10%,5%,1%的顯著水準

二、衍生性金融商品商品別總額

　　研究結果整理成表 5。本研究按照縱橫門檻轉換迴歸模型(PSTR model)依銀行資產規模分為四個群組，分別為資本總額<47718 佰萬為小規模銀行，當資本總額為 47718 佰萬≦資本總額<54860 佰萬為中規模銀行，當資本總額為 54860 佰萬≦資本總額<65940 佰萬為中大規模銀行，當資本總額為 ≧65940 佰萬為大規模銀行。實證結果顯示淨放款比與操作部位有顯著關係，其中，資本額分類的小組和中組其放款比率與衍生性金融商品的使用呈正相關，與預期相符，即當銀行放款(信用風險)增加時，會積極使用衍生性金融商品來規避風險；而資本額分類為大組的銀行其結果卻呈顯著負相關，表示資本額大組的銀行不會透過衍生性金融商品(避險或投機)規避信用風險，除了大規模銀行會較謹慎衍生性金融商品的使用，亦與大規模銀行其放款的信用風險相對較低有關。

　　流動比與衍生性金融商品使用之間有顯著關係，其中資本額分類的小組和大組卻是正相關與預期不符，不支持 Nance et al.(1993) 的替代避險假說，反而與 Sinkey(1997) 研究相符，顯示大組與小組規模銀行會因投機的動機及出售風險管理服務而增加衍生性金融商品的使用，而中組的實證結果則支持 Nance et al.(1993) 的替代避險假說，其會投資更安全、流動性高的資產替代衍生性金融商品來管理資產負債表內的風險。至於資產負債比與衍生性金融商品使用有顯著正向關係，此關係在資本額分類的中大組中較為顯著，有較大財務危機的銀行可藉由衍生性金融商品的操作以降低利率非預期改變的暴險所帶來的財務危機的機率，與預期相符。

　　資產報酬率與衍生性商品的使用沒有一致性關係，與預期相符。表示銀行不論規模大小並不會以追求獲利性的前提下大量操作衍生性商品，一般而言還是以規避利率或匯率風險來作為衍生性商品的操作。淨利息邊際與衍生性金融商品的使用呈現顯著負相

關，與預期不符。但是與 Sinkey(1997)研究邊際淨利息比在使用衍生性商品的銀行會較低相符，此可視為銀行的投機訊號。

淨值比與衍生性金融商品的使用在資本額分類大組中有顯著正向關係顯示資本額越大的銀行有較多的資本部位支撐衍生性金融商品的業務，與預期相符，但中大組則呈現顯著負向關係，顯示中大組銀行在資本愈少的情況下反而會增加衍生性金融商品的使用，此與 Sinkey and Carter(1997 及 2000)及 Brewer et al.(2001)研究結果相同，認為衍生性金融商品需要的資本要求較低，因此資本比率低的銀行，會因資本受限制或更喜愛冒險的原因而被預期是衍生性金融商品的較大使用者。董監事持股比與衍生性金融商品的使用呈顯著正向關係，與預期不符。根據邱正仁、高蘭芬、盧素珍(2003)的研究，若成正向關係則是因為在避險成本小於合約補償成本，銀行會使用衍生性金融商品。

表 5 衍生性金融商品商品別餘額實證結果

Y=商品別總額	小 (資本總額<47718 佰萬)		中 (47718 佰萬≦資本總額<54860 佰萬)		中大 (54860 佰萬≦資本總額<65940 佰萬)		大 資本總額≧65940 佰萬		預期
	coefficient	effect	coefficient	effect	coefficient	effect	coefficient	effect	effect
淨放款總資產比	0.0034***	+	0.0500***	+	-0.0032	-	-0.0136**	-	+
流動比	0.0000***	+	-0.0010**	-	-0.0006	-	0.0031***	+	-
負債資產比	0.0015	+	-0.0467***	-	0.0077***	+	-0.0051	-	+
資產報酬率	0	+	-0.0004	-	0.0004	+	0	-	X
淨值佔總資產比例	-0.0014	-	0.3478	+	-0.3588**	-	1.0299***	+	+
流動性資產	0.0000**	+	0.0069***	+	0.0022***	+	-0.0059***	-	-
總利息收入-總利息費用/資產總額	0	-	-0.0008***	-	-0.0010***	-	0.0012***	+	+
董監持股	0	-	0.0002***	+	0.0000*	+	0.0000**	+	-

附註：*,**,***分別表示 α=10%,5%,1%的顯著水準

三、資本額分類

本研究設定資本額為門檻變數，將樣本銀行分為小、中、中大及大資本額四組，結果整理如下表 6。

在小資本額組中,在淨放款總資產比、流動比、流動性資產比三項變數有顯著關係,在 α=1%的顯著水準下,淨放款總資產比正相關與預期相符,流動比及流動性資產正相關與預期不符,資產報酬率無相關與預期相符,流動比及流動性資產正相關與預期不符,原因可能為銀行可利用衍生性金融商品投機或出售風險管理服務給客戶 Sinkey1997)。

在中資本額組中，在 α=1%的顯著水準下，淨放款總資產比正相關與預期相符，負債資產比負相關與預期不符(王芳萍 民 89)，流動性資產比正相關與預期不符，總利息收入-總利息費用/資產總額負相關與預期相符，董監持股比正相關與預期不符，負債資產比與預期不符，根據王芳萍(民 89)。對於衍生性金融商品是否能解決企業投資不足的問題的研究，使用衍生性金融商品避險者的財務槓桿比率相對較低，其原因為投資支出與內部現金流量相關性愈高使用衍生性金融商品的比例就越低。

流動比及流動性資產正相關與預期不符，原因可能為銀行可利用衍生性金融商品投機或出售風險管理服務給客戶 Sinkey (1997)。董監持股比正相關與預期不符，邱正仁、高蘭芬、盧素珍(2003)認為董事會持股比率愈高，代表契約成本愈高（代理成本愈高），在避險成本小於合約補償成本之假說下，銀行愈會去從事衍生性金融商品操作。

在中大資本額組中，在 α=1%的顯著水準下，負債資產比與預期相符，流動性資產比正相關與預期不符，總利息收入-總利息費用/資產總額負相關與預期不符。在 α=5%的顯著水準下，淨值比呈負相關與預期不符，董監事比呈正相關與預期不符。Sinkey(1997)研究顯示，淨利息邊際在使用衍生性商品的銀行會較低，亦即衍生性金融商品的使用與淨利息邊際呈負相關，此可能為投機訊號或是道德危機行為。Simons(1995)認為使用衍生性金融商品管理利率風險可能比資產負債表內管理更受歡迎的原因是資產負債表外的契約需要的資本要求較低，因此資本比率低的銀行，預期是衍生性金融商品的較大使用者，原因可能為他們的資本受限制或更喜愛冒險。

在大資本額組中，在 α=1%的顯著水準下，流動性資產比呈負相關與預期相符，淨值比呈正相關與預期相符，淨利息邊際比呈正相關與預期相同符。在 α=5%的顯著水準下，放款比呈負相關與預期不符，董監事比呈正相關與預期不符。Whidbee and Wohar (1999)對於金融控股公司使用衍生性金融商品避險的程度研究顯示，總放款與衍生性金融商品的避險使用呈負相關，此情況出現在公司內部人士持股較高的情況下愈明顯。

表 6 資本額分類實證結果

參數	預期	小		中		中大		大	
	effect	風險	商品	風險	商品	風險	商品	風險	商品
淨放款總資產比	+	+***	+***	+***	+***	-	-	-**	-**
流動比	-	+***	+***	-*	-**	-	-	+***	+***
負債資產比	+	+	+	-***	-***	+***	+***	-	-
資產報酬率	X	+	+	-	-	-	+	-	-
淨值佔總資產比例	+	-	-	+	+	-**	-**	+***	+***
流動性資產	-	+***	+**	+***	+***	+***	+***	-***	-***
總利息收入-總利息費用/資產總額	+	-	-	-***	-***	-***	-***	+***	+***
董監持股	-	-	-	+***	+***	+**	+**	+**	+**

附註：*,**,***分別表示 α=10%,5%,1%的顯著水準

四、結果彙整

彙整結果如表 7，本研究發現規模愈大的銀行在淨放款比、負債資產比、淨值比越

高的情況下會增加衍生性金融商品操作。資產報酬率則是與衍生性金融商品的操作無關。其實證結果支持假說一、假說二、假說四、假說五、假說六。由此可推論足夠的資產規模提供銀行資源去調整衍生性商品的操作，此結論與 Simons(1995)及 Sinkey and Carter(2000)等先前研究一致。

　　而規模愈大的銀行其流動比、流動性資產比、董監事持股比愈高則衍生性金融商品操作愈多，淨利息邊際愈高則衍生性金融商品操作可能性愈低，結果不支持假說三、假說七、假說八、假說九。

　　董監事持股比原先以 Whidbee and Wohar(1999)的凸性收益函數理論，假設銀行董監事持股比愈高時，愈不可能去使用衍生性金融商品避險。結果卻是正相關，反而與邱正仁、高蘭芬、盧素珍(2003)的研究相符，該研究說明董監持股雖高但是若避險成本小於合約補償成本（代理成本）的話，銀行愈會去從事衍生性金融商品操作。

　　流動比、流動性資產比原先以 Nance et al.(1993) 的替代避險假說理論設定，銀行流動比、流動性資產比愈高時，愈不可能去使用衍生性金融商品避險。研究結果卻是正相關，此結果與 Sinkey(1997)研究相同，該顯示銀行可能利用衍生性金融商品投機或出售風險管理服務給客戶，使得流動比及流動資產比愈高，在衍生性商品的使用會愈高會較高。

　　淨利息邊際原先按照銀行鎖住利差避險的理論基礎下，假設衍生性金融商品的使用與淨利息邊際呈正相關。本研究結果卻為負相關，與 Sinkey(1997)研究相符，淨利息邊際在使用衍生性商品的銀行會較低，原因可能是銀行的投機訊號或道德危機行為。

表 7 研究結果與國內外文獻比較

參數	預期 effect	本研究 effect	Sinkey (2000) effect	Merton and Bodie (1992) effect	Simons (1995) effect	Smith and Stulz effect	Schrand and Unal (1998) effect	Nance et al. (1993) effect	Sinkey (1997) effect	Whidbee (1999) effect	盧素珍 (2003) effect	王芳萍 (2000) effect
公司規模	+	+	+									
淨放款總資產比	+	+					+			-		
流動比	-	+						-	+			
負債資產比	+	+				+						-
資產報酬率	X	X							X			
淨值佔總資產比例	+	+		+	-							
流動性資產	-	+						-	+			
總利息收入-總利息費用/資產總額	+	-							-			
董監持股	-	+								+	-	

陸、結論與建議

一、結論

　　本研究主要在探討本國不同規模銀行其衍生性金融商品使用的數量變化與銀行財務特徵之間的關係。經由上述各章節之探討分析，於本章歸納整理下列幾點結論。

(一) 銀行使用衍生性商品的現況

　　我國銀行操作衍生性金融商品的業務量大幅提升，從 2005 年 12 月底衍生性金融商品名目本金餘額新台幣 30 兆 201 億元，到 2010 年 9 月底衍生性金融商品流通在外名目本金為新臺幣 77 兆 190 億元。面對利率及匯率風險，國內銀行基於避險及鎖住利差維持收益的目的之下，對於衍生性金融商品都有一定的使用數量；另外基本統計資料也顯示，新銀行在衍生性金融商品的使用上較具多元化以及較能接受新形式的衍生性金融商品。因為多元化的衍生性金融商品上市，使得銀行除了使用衍生性金融商品避險外，為提升獲利機會而增加了衍生性金融商品的投機性操作。

(二) 衍生性金融商品的操作與銀行財務特徵結果

　　本研究實證發現規模愈大銀行其淨放款比、公司規模、負債資產比、淨值比、流動比、流動性資產比、董監事持股比越高的情況下會增加衍生性金融商品操作。淨利息邊際愈高則規模愈大銀行操作衍生性金融商品的可能性愈低。

　　本研究認為，公司規模越大的銀行因為有較多的資本保護，會操作較多的衍生性金融商品，而金融監理機構可利用資本額來限制銀行的衍生性金融商品的業務，來控制銀行操作衍生性金融商品的風險。而淨值佔資產比與衍生性金融商品的使用在資本額分類大組中有顯著正向關係顯示資本額越大的銀行有較多的資本部位支撐衍生性金融商品的業務，與預期相符，但中大組則呈現顯著負向關係，顯示中大組銀行在資本愈少的情況下反而會增加衍生性金融商品的使用，此與 Sinkey and Carter(1997 及 2000)及 Brewer et al.(2001)研究結果相同，認為衍生性金融商品需要的資本要求較低，因此資本比率低的銀行，會因資本受限制或更喜愛冒險的原因而被預期是衍生性金融商品的較大使用者。此外，本研究亦發現負債資產比與衍生性金融商品呈正比，由於 Mayers and Smith(1982)及 Smith and Stulz(1985)認為銀行藉避險降低發生財務危機的機率，所以銀行發生財務危機的成本愈高其採行避險策略的機率也愈高，與本研究實證結果相同。

　　另一方面，本研究實證發現淨放款比與操作部位有顯著關係，其中，資本額分類的小組和中組其放款比率與衍生性金融商品的使用呈正相關，與預期相符，即當銀行放款(信用風險)增加時，會積極使用衍生性金融商品來規避風險；而資本額分類為大組的銀行其結果卻呈顯著負相關，表示資本額大組的銀行不會透過衍生性金融商品(避險或投機)規避信用風險，除了大規模銀行會較謹慎衍生性金融商品的使用，亦與大規模銀行其放款的信用風險相對較低有關。流動比與衍生性金融商品使用之間有顯著關係，其中資本額分類的小組和大組卻是正相關與預期不符，不支持 Nance et al.(1993) 的替代避險假說，反而與 Sinkey(1997) 研究相符，顯示大組與小組規模銀行會因投機的動機及出售風險管理服務而增加衍生性金融商品的使用，而中組的實證結果則支持 Nance et al.(1993)的替代避險假說，其會投資更安全、流動性高的資產替代衍生性金融商品來管理資產負債表內的風險。

最後，本研究顯示淨利息邊際與衍生性金融商品的使用呈負相關，由於 Sinkey(1997)
認為淨利息邊際在使用衍生性商品的銀行會較低，此可能為投機訊號或是道德危機行
為，因為本研究實證結果顯示本國銀行除操作衍生性金融商品鎖住利差外，更希望從中
獲得更多的利潤，使得銀行承擔了更高的風險。而本研究實證指出董監事持股比與衍生
性商品的操作呈正向關係與邱正仁、高蘭芬、盧素珍(2003)研究結果相符，認為董事會
持股比率愈高，代表契約成本愈高（代理成本愈高），在避險成本小於合約補償成本之
假說下，銀行愈會去從事衍生性金融商品操作。

　　本研究實證結果顯示本國銀行財務特徵與衍生性金融商品的使用關係，與國外文獻
大致符合，本國銀行的衍生性金融商品使用與國外銀行的使用特徵無太大差異，尚在合
理的範圍當中，國內主管機關在衍生性金融商品市場發展的管理與政策的擬定要多加考
量以避免銀銀行過度投機操作衍生性金融商品造成金融市場的不良影響。

二、建 議

(一) 對主管機關的建議

　　本研究顯示本國銀行的衍生性金融商品使用尚在合理範圍中，主管機關目前的管理
政策是有效的，但是隨著衍生性金融商品的多樣化，銀行使用衍生性商品的數量增加，
使得銀行承受的風險逐漸升高，主管機關因應此種狀況須有所準備，加強對銀行操作衍
生性商品的監理。

　　我國的衍生性金融商品業務發展起步較晚，從 1991 年 7 月起才逐漸開放銀行辦理
衍生性商品業務，但隨著全球衍生性金融商品的蓬勃發展，我國的金融監理機構應隨著
世界的潮流開放衍生性金融商品的業務種類，與世界接軌。

　　2008 年美國監管和決策部門為了追求經濟向上的政績，或滿足於標準化的監管模
式，默認或忽視華爾街不惜代價地透支美國經濟基本面所能支撐的市場規模來過度操作
衍生性金融商品這一不負責任的行為，造成了華爾街的創新業務越來越在滋長"道德風
險"的毒瘤，進而發生美國金融風暴對美國金融業造成重創。對於此一前車之鑑，我國
的金融監理機構如何在適度的監理與衍生性金融商品業務的開放上取得平衡點，是我國
金融監理機構的艱鉅任務。防患於未然，找出問題的根源並採取相應的糾正措施，以維
持未來台灣經濟的健康發展。

(二) 對銀行經營者的建議

　　本研究顯示本國銀行除維持原有的放款業務收入外，有逐漸利用衍生性金融商品來
獲利的情況，尤其是新銀行的狀況更明顯，會去操作一些多元化組合式的新金融商品並
出售給客戶賺取服務手續費。因為操作組合式的新金融商品所承擔的風險較操作單一形
式的衍生性商品要高，且衍生性金融商品的潛在風險不易辨識，若是要銷售給客戶須審
慎評估客戶的適合性並加強風險告知。此外，銀行經營者還需加強風險的控管以及培訓
相關的人才，才能在獲利與風險控制間取得平衡點。

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官僚對工作倦怠之影響
The Effect of Bureaucracy on Job Burnout

施淑惠 [1]
Shu-Hui Shih
台北商業技術學院
兼任助理教授
shshih@fdc.gov.tw

楊主行 [2]
Chu-Hsing Yang
樹德科大
助理教授

摘　　要

　　工作倦怠會產生許多負面的結果，例如降低承諾、增加缺席率、影響工作績效(Schaufeli and Enzmann,1998)，因此與工作壓力併列為組織行為中最常被探討的主題(Martin, 2000)。Vallen (1993) 的研究中發現個人的工作倦怠與組織結構有明顯關係，Mastach and Jackson(1986)亦發現組織因素對工作倦怠的影響大於人口統計因素，而 Maslach, Schaufeil and Leiter(2001)，更明白指出階級(hierarchies)制度下會產生工作倦怠。官僚體制的組織對工作倦怠的影響已被文獻探討，本研究旨在釐清官僚制度如何影響工作倦怠。本研究針對 203 位公部門員工及 240 位私部門員工所填寫之問卷進行檢測，結果發現官僚制度導致工作倦怠的原因係因(1)正式化的特性會增加無力感因此產生工作倦怠(2)集權的特性產生無意義感及減少工作自主因此產生工作倦怠，本研究建議建議應該適量授權給員工及讓員工有工作自主以減少工作倦怠。

關鍵詞：自主、官僚、工作倦怠、集權化、正式化

官僚對工作倦怠之影響

施淑惠[1]　楊主行[2]

Abstract

Job burnout produces many negative effects, such as lowering commitment, increasing absentee rates, affecting job performance (Schaufeli and Enzmann, 1998). Therefore job burnout and job stress are equally most commonly discussed issues of organizational behavior (Martin, 2000). Vallen (1993) found that individual burnout is significantly related to organizational structures. Mastach and (1986) also found that organizational factors can affect job burnout, of which working environmental factor has more effect on job burnout than population statistical factor does. Maslach, Schaufeil and Leiter (2001) even clearly pointed out that job burnout is generated under hierarchies system. The effect of organizational structures on burnout has been confirmed by the literature. This study aims to clarify the relationship between bureaucracy and job burnout. The study examined questionnaire surveys answered by Taiwanese that 203 employees working in public departments and 240 employees in private sectors. An analysis of the investigation results showed that (1) higher degree of formalization would promote sense of powerlessness, causing job burnout; (2) higher degree of centralization would increase meaninglessness and decrease job autonomy, causing job burnout. Thus, this study suggests that appropriate authorization and flexibility should help in solving job burnout problem.

Keywords: autonomy, bureaucracy, job burnout, centralization, formalization

Introduction

Job burnout produces many negative effects, such as lowering commitment, increasing absentee rates, affecting job performance (Schaufeli & Enzmann, 1998). Therefore job burnout and job stress are equally most commonly discussed issues of organizational behavior (Martin, 2000). Vallen (1993) categorized organization into exploitive-authoritative, benevolent-authoritative, consultative and participative types and found that individual burnout is significantly related to organizational structures. Mastach and Jackson (1996) also found that organizational factors can affect job burnout, of which working environmental factor has more effect on job burnout than population statistical factor does. Maslach, Schaufeil and Leiter(2001) even clearly pointed out that job burnout is generated under hierarchies system. Bureaucratic rules have been found as a major cause of burnout (Leiter, 1991). Then why does bureaucratic system produce job burnout?

According to Weber, "bureaucratic" system is described as a completely rational and efficient organization, with characteristic of hierarchy system, of which everything is processed by rules, impersonal, and has detailed records and documents (Martin and Knopoff, 1997, cited from Martin, 2000). Hierarchy system and processing by rules are for the creation of large efficient organization (Olorunsola, 2000). However, in Taiwan when present the word "bureaucracy" seems to become a pronoun of "inefficient, undisciplined, and irresponsible". Bendix (1968, cited by Riggs, 1979) also defined bureaucracy as "unclear distribution of responsibilities, strict rules, misstep officials, slow operation, unclear goals, and centralized in few people". Bureaucracy seems to be full of defects. Mannheim (1975) even found that among seven job categories public office workers have the lowest involvement rates. Is bureaucratic result in job burnout? Is it due to centralization? Or a result of the emphasis of formalization and everything needs to be run according to rules?

When employees encounter rules, regulations, or procedures that seem pointless yet burdensome, these encounters may simultaneously trigger the key psychological ingredients of alienation—powerlessness and meaninglessness (DeHart-Davis and Pandey, 2005). On the point of Nauratil (1989) that bureaucracy discourages professionalism, having components of suppressed autonomy (Cited by Olorunsola, 2000). Chan and Wing (2011) adopted an agency theoretical perspective to propose a workload mechanism, the delegation of power from supervisors to service employees is increases their perceived workload. Do centralization and formalization cause powerlessness and meaninglessness, or lowering job loading and autonomy, thus resulting in job burnout?

The dimension of job burnout, such as emotional exhaustion and personal professional efficacy, is significantly related to job performance (Gmelch & Gates, 1998). One of the important factors of job burnout is organizational characteristics (Lambert, Hogan & Jiang, 2010). Therefore, the understanding on whether bureaucratic system produces job burnout and the reasons is important. Previous research has successfully identified the effect of bureaucracy on powerlessness, meaninglessness, job loading and autonomy. The study aims to clarify the relationship between bureaucracy and job burnout and trace the cause of the

bureaucracy through a series of medicating process to the job burnout.

Literature Review

The basis of bureaucracy is formalized rules and centralized power and decision (Hetherington & Hewa, 1997). Bureaucracy is a power structure specifically designed for large organizations and can be implemented in both public and private organizations (Dugger, 1980).

The measurement dimension of bureaucracy is centralization and formalization (Martin & Gilsson, 1989). Centralization means that decisions are controlled by high rank supervisors and most problems must be reported from lower levels to the next higher one until reaching high rank supervisors. Formalization means that employees' behaviors or working activities are constrained by formalized regulations, rules and procedures. Under structure of bureaucracy employees may feel setback, thus taking revenge actions, such as opportunistic (John, 1984, cited by Ramaswami, 1996).

Burnout is a term proposed by a psychiatrist Freudenberger in 1974 (Liu, 2002). It is a biological and psychological combined symptom of emotional exhaustion, a sense of lacking personal accomplishment and depersonalization of clients (Marslach & Jackson, 1982, cited by Acker, 1999). Job burnout is a worker's psychological negative feeling generated by pressure related to work (Daley, 1979). When interpersonal relationship, belief, lifestyle and development in work cannot reach one's expectation, the pressure, emotional distress, setback and tiredness produced is job burnout (Freudenberger, 1974). Job burnout is a combined phenomenon that individual losing aggressive attitude to work, indifferent to others and having negative attitude toward work (Maslach and Jackson, 1984). There are three dimensions in theory of job burnout proposed by Maslach and Jackon (1996):

(1) Emotional exhaustion: feelings overextended and depleted of one's emotional and physical resources.

(2) Depersonalization: negative and uncaring attitudes toward others and various aspects of the job.

(3) Reduced accomplishment: deterioration of self-confidence, and a lack of achievement and productivity in work.

Individual characteristic can affect job burnout, but the nature of job types and job organization play a more important role (Mastach and Jackson, 1984). Therefore, improving job burnout through individual level is less effective than the one through organizational environmental level (Maslach et al., 2001).

Meaninglessness and powerlessness are dimensions of work alienation. Meaninglessness is the lack of connection between the present and the future (Manneheim, 1954, cited by Mau, 1992). It means that an individual cannot control the future or expect what behaviors he or she can control, has pessimistic expectation about the result of his or her behavior and feels meaningless about life. Such phenomena usually take place when there is a lack of job autonomy and participation and an individual's freedom in controlling work activities is taken

away (Aiken & Hage, 1966).

Powerlessness is a psychological condition that is generated when an individual feels unable to control things (Cheng, 2004). Powerlessness is a feel of helplessness that one's own destiny is not controlled by oneself but by exterior power such as people, things, or objects. Young, a scholar in Taiwan, suggests that powerlessness is a feel of incapability that one has no ability or cannot influence outside world and elaborate effectiveness. Miller (1992) suggests that in general powerlessness can be seen as helplessness, a cognition that an individual's behavior cannot influence the results, causing the reduction of motives of trying to change.

Job autonomy means that one can choose freely, be independent and decide working schedules and procedures (Hackman and Oldham, 1976, Miller, 1986). Miller (1986) proposes job autonomy as "freedom in self management", which can even be seen as "psychical income". Halaby and Weakliem (1989) state that job autonomy is job control, thus job autonomy is to give employees more freedom and reduce following on written procedures. Breaugh (1985) established scales to divide job autonomy into three dimensions: autonomy in working method, autonomy in work scheduling and autonomy in working standards. Spetor (1986) pointed out that when employees feel a high degree of task autonomy, their work satisfaction, organizational commitment, work involvement, performance and degree of motivation are also higher while some biological symptom, emotional depression, role pressure, absentee, willingness to quit and quitting rate would decrease.

Job loading is a source of job pressure. Beehr, Walsh and Taber (1976) sees job loading as when there are too much work to be done by an individual in limited time, he or she cannot take up the load because work volume too heavy or working hours too long. Job overload appear to increase the frequency of burnout (Maslach & Goldberg 1998). Lower levels of burnout are reported by employees who experience autonomy in their jobs (Savicki & Cooley, 1987).

Hypothesis Development

Bureaucratic system is a typical formalization and dependence on formally written rules and procedures to establish detailed orders of task and activities (Whitley, 1999). "Formalization" overlooks variations in individuals and situations and stick to abstract rules. The more dependence on formalized rules and procedures, the less personal judgment there is, thus, the more that special conditions cannot be taken into consideration in supervising and performance evaluation (Whitley, 1999). Powerlessness is a psychological condition that is generated when an individual feels unable to control things (Cheng, 2004). Reduced accomplishment is one dimension of burnout. Therefore individual has little flexibility to choose actions that they think is best fit the particular situation, consequently powerlessness is generated and then job burnout. The study induces hypothesis 1 and 2:

Hypothesis 1: Formalization of bureaucracy has a positive effect on powerlessness.

Hypothesis 2: Powerlessness has a positive effect on job burnout.

Autonomy can be defined as the degree of control a worker has over his or her own immediate scheduling and tasks (Liu, Spector, & Jex, 2005). Formalization is viewed as "coercive" when rules and procedures limit a worker's rights to control his/her work activities (Oldham & Hackman, 1981). Since autonomy refers to decision-making freedom, the more formalization of bureaucracy, the lower autonomy of employees is.

Formalization will reduce workers' interest on their work (Agarwal & Ramaswami, 1993). Doing everything according to rule will cause sense of tedium and monotony (Maslach, Schaufeli, & Leiter, 2001), thus people would lost interest in the job and feel working is meaningless, forming the following hypothesis:

Hypothesis 3:　Formalization of bureaucracy has negative effect on job autonomy.

Hypothesis 4:　Formalization of bureaucracy has positive effect on meaninglessness.

The heavier job loading is, the less likely workers will do their job well, thus producing emotional exhaustion. Scholars also point out that job loading is one cause of emotional exhaustion (Maslach, 1982). Job loading drives workers to lack of emotion (Jackson, Turner & Brief, 1987). Because both emotional exhaustion and workers' lack of emotion are dimensions of job burnout, the higher job loading is, the higher job burnout will be. Van Horn, Schaufeli, Greenglass and Bruke, (1997) noted that the teacher who feels restricted in their autonomy experience more burnout. Based on Weber's point of view, formalized rules and regulations can accelerate rational decision, utilizing best efficiency (cited by Jafee, 2001). It can code complex behavior or outcome to simple rules. The People who perceived clarity of the task perceived lower job loading. Therefore, the higher formalization is the lower job loading will be.　From the above forms the following hypothesis:

Hypothesis 5:　The formalization extent of bureaucracy has negative effect on job loading.

Hypothesis 6:　Job loading has positive effect on job burnout.

In centralization organizational structures, employees may not be able to recognize problems due to their limited understanding of the overall process, and even when they recognize problems, they do not have the authority to correct them without management approval (Liu, Denis, Kolodny & Stymne, 1990).The nature of bureaucracy, in addition to behaving according to rules, has another measuring dimension, "centralization", under which employees lose their control on work, thus producing job burnout. (Hage & Aliken, 1969) The reasons are:

(1)Centralization of bureaucratic system lowers employees' participation. Employees will have lower autonomy because of limited commitment to decision making processes. Low job autonomy reduces personal sense on self-ability and accomplishment. Therefore, low job autonomy can result in low sense of accomplishment. Researchers found that the employees who have the necessary job autonomy will experience less burnout (Grandey, fisk & Steiner, 2005; Griffin, Hogan, Lambert, Tucker-Gail & Baker; Miner, Maureen and Sterland, 2010), forming the following hypothesis:

Hypothesis 7:　Centralization of bureaucracy has negative effect on job autonomy.

Hypothesis 8:　Job autonomy has negative effect on job burnout.

(2)Centralization leads employees to lose ability to think independently and the ability to

control work related behaviors, resulting in employees feeling meaningless about job (Kakabadse, 1986, Mottaz, 1981, cited by Sarros, Tanewski, Winter, Santora & Densten, 2002). Feeling meaninglessness toward work can produce job burnout. Thus forms hypothesis 9 and 10.

Hypothesis 9: Centralization of bureaucracy has positive effect on meaninglessness.

Hypothesis 10: Meaninglessness has positive effect on job burnout.

(3)People feel powerless when they are controlled and manipulated by authority figures and the rules. Literatures point out that centralization will increase powerlessness, (Sarrors, et al., 2002). Thus forms hypothesis 11.

Hypothesis 11: Centralization of bureaucracy has positive effect on powerlessness.

Centralization refers to high level of authority with highly efficient decision-making competency. Decision authority means that employees have the authority to make decisions on their own. In highly centralized organizations, decision-making power is concentrated at the upper levels, thereby reducing each member's level of authority and job loading. Thus forms hypothesis 12.

Hypothesis 12: Centralization of bureaucracy will have negative effect on job loading.
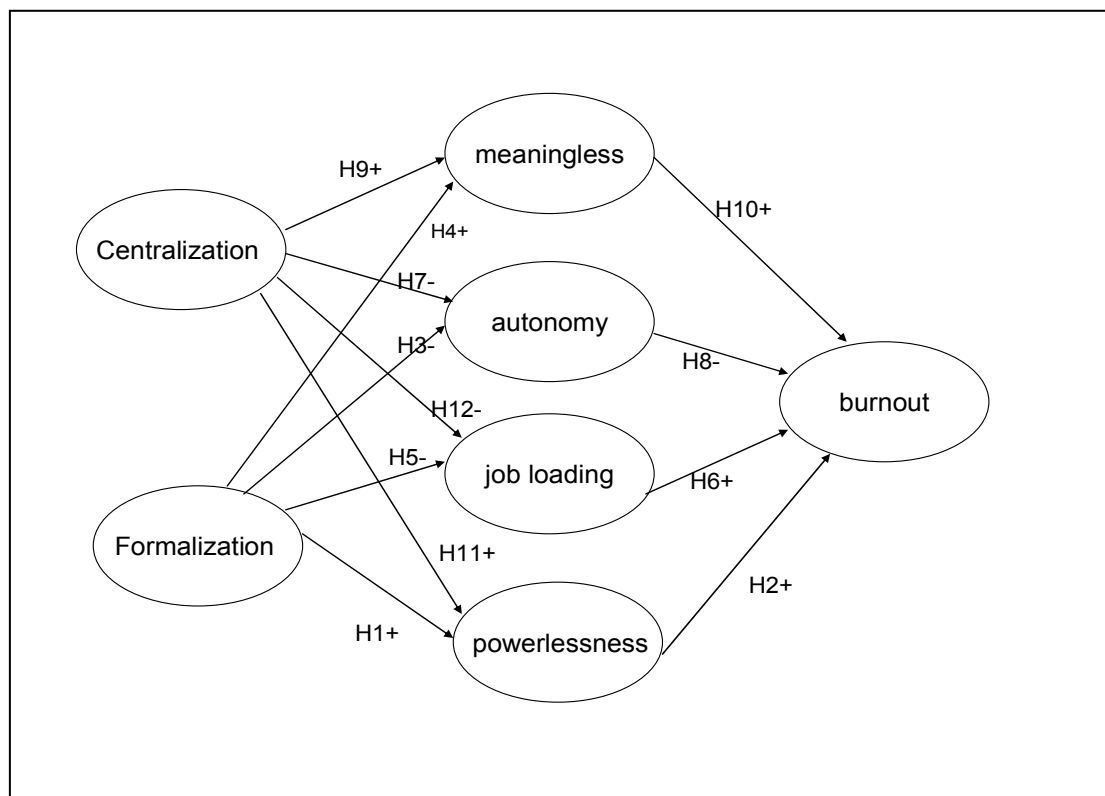
Figure 1 Cause-effect relationship of research structuring concept

Research Methods

Samples

Bureaucracy is an authority structure designed for use on large scale. It can be used either in the private or in the public sectors (Dugger, 1980). As a result, the sample covers both the public and private sectors. When 2010, the study was conducted on convenience sample two public sectors and two private sectors in Taiwan. The public sectors included a tax administration and a police department. The private sector included a bank and insurance company. One of the authors visited the HR departments and made a request for delivering questionnaires. The questionnaires were put in postage-paid return envelope and mailed back to the researchers.

A total of 600 questionnaires are issued, composing 78% of returning rate. Respondents' basic information includes gender, age, marital status, educational background and department of service.

Of the 600 questionnaires distributed, 468 were returned and 443 were found usable. Among them 203 participants served in the public sector and 240 in the private sector. 246 were female and 197 were male. There were 16 aged under 20, 63 aged 20 to 25, 148 aged 25 to 30, 92 aged 30 to 35, 54 aged 35 to 40, 36 aged 40 to 45, 24 aged 45 to 50, and 10 over 55. Participants' educational level were high school diploma (1%), junior college diploma (22%), bachelor (50%), master's degrees(23%), and doctorate (4%).

Measurement

The independent variable of this study is bureaucracy, divided to formalization and centralization dimensions. Dependent variables consist of job autonomy, job loading, powerlessness, meaninglessness and job burnout. All measurement tables are evaluated and adjusted on meanings of translation and structures by doctoral students in Graduate Institute of International Business Administration, Chinese Culture University, Taiwan. A pretest is also performed to assure reliability and validity of questions before official issuance of questionnaire surveys. All items in the measurement scale were measured on a five point scale

Job burnout uses Maslach Burnout Inventory-general survey (MBI-GS) (Leiter and Maslach, 1988) measurement table, in which there are 22 items (e.g. " I feel hopeless because of my job") and the Cranbach alpha is 0.85.

The basis of bureaucracy is formalized rules, power and decision centralization (Hetherington and Hewa, 1997). Therefore, the questionnaire uses "centralization" and "formalization" to measure degree of bureaucracy and not use public or private sectors as a basis for categorizing bureaucracy. "Centralization" means decision must be controlled by high rank supervisors and most questions must be reported through each level until reaching high rank supervisors. "Formalization" measures the degree that employees' behavior or working activities are constrained by formal regulations, rules and procedures, etc. Measurement of "centralization" and "formalization" imitate measurement tables applied by Martin and Gilsson (1989). Originally there were seven items for formalization (e.g. "How frequently do you participate in decisions on the adoption of new programs"). After the pre-testing, one item lacking reliability was eliminated, ending up with six items. There were 13 items for centralization (e.g." The same procedures are to be followed in most situations").

An item lacking reliability were eliminated and 12 items were left. Cranbach alpha for centralization and formalization are 0.73 and 0.92, respectively.

Job autonomy means an individual's ability to decide how to finish tasks, including methods and equipment used and opportunity to think and act independently. The Measurement table was established by Sims (1976) (e.g. " I have the freedom to decide what to do on my job"). There were 6 items for job autonomy and the Cranbach alpha is 0.86.

Job loading means there are too much work to be done in limited time and measured with a subscale developed by Caplan et al (1975) (e.g. " my job leaves me with very little time to get everything done"). Job loading has 5 items and the Cranbach alpha is 0.82.

Meaninglessness and powerlessness are dimensions of work alienation. Meaninglessness means that a person holds pessimistic expectation regarding whether his or her own behavior can achieve satisfactory results. Powerlessness is the sense that one's own destiny is not under his or her own control (Seeman, 1959). Measurement table is a modified version of the one established by Abdul-Gader and Krzar (1995) Cranbach alpha for powerlessness and meaninglessness are 0.64 and 0.69. Both powerlessness (e.g. "I feel that I control job rather job control me.") and meaninglessness (e.g. "My company never teach me what I want to learn.") have 5 items.

Data Analysis Method

The study explores the reason that bureaucracy causes job burnout. Data analysis method used is structural equation model. (SEM) Amos 5.0 is applied to modify and analyze relationships among variables in each hypothesized models to understand adaptation condition of models and actual data. SEM is a method that combines factor analysis and path analysis. In the past examination on cause-effect model of numerous variables usually applies path analysis, but the measurement of path analysis variables are hypothesized as no errors. SEM includes measurement errors in the model and, in addition to considering measurement errors, it can also provide fit indicators and modification indicators to models, allowing analysis of multiple indicators, cause-effect relationships (prediction) of variables and measure unobservable theoretical variables (hidden structuring concept). These advantages are much help to structure theoretical models. The study applies Maximum Likelihood Estimation (MLS) to estimate research models.

Results of Data Analysis

Table 1 provides the means, standard deviations, correlations and Cronbach's alpha of the independent and dependent variables. There are twelve hypotheses in this study. As shown in Table 2 and Figure 2, hypothesis that are rejected due to insignificant t-value are as follows:

Hypothesis 3:   Formalization of bureaucracy has negative effect on job autonomy.

Hypothesis 4:   Formalization of bureaucracy has positive effect on meaninglessness.

Hypothesis 6:   Job loading has positive effect on job burnout.

Hypothesis 11:   Centralization of bureaucracy has positive effect on powerlessness.
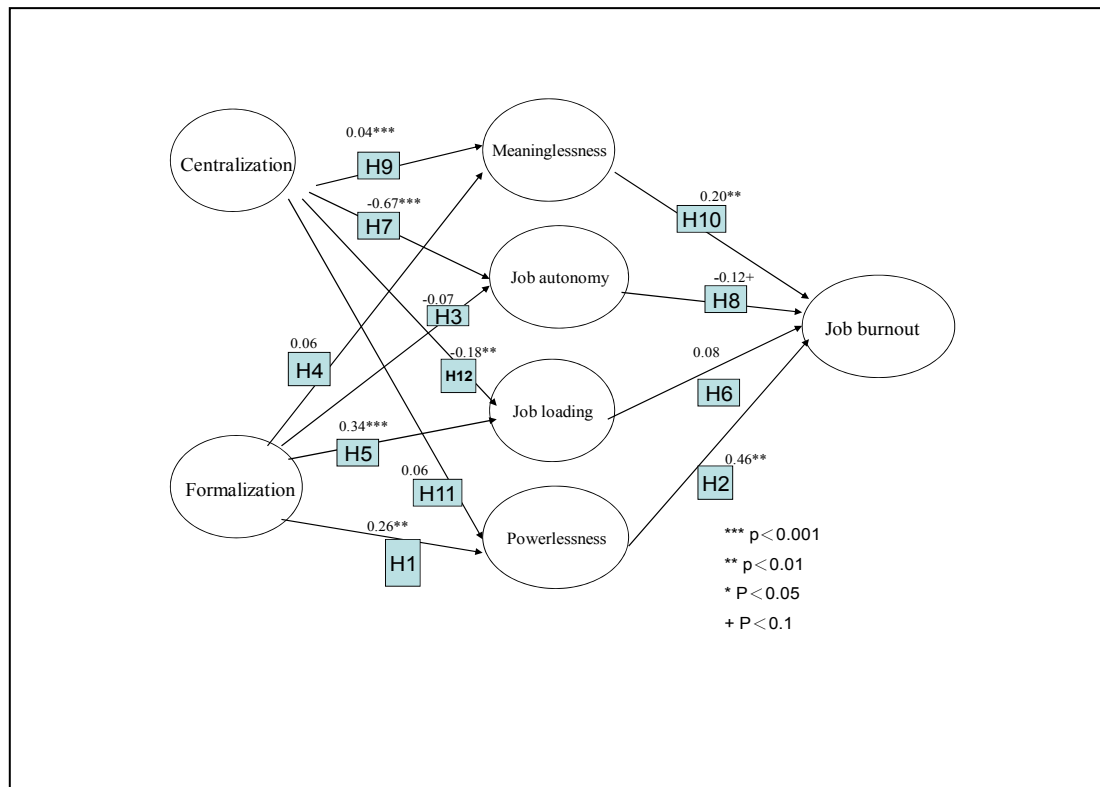
Figure 2　The effect of bureaucracy on job burnout

Table 1 Means, Standard Deviations, Correlations and Cronbach's alpha for variables

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1.formalization	3.29	0.56	*0.92*											
2.centralization	2.39	0.69	0.22***	*0.73*										
3.autonomy	2.97	0.76	-0.19***	-0.64***	*0.86*									
4.meaningless	3.08	0.60	0.14**	0.33***	-.31***	*0.64*								
5.job loading	3.42	0.77	0.20***	0.10**	-.04	0.03	*0.82*							
6.powerlessness	3.14	0.67	0.09	-0.19***	-.19***	-0.19***	-0.29***	*0.69*						
7.burnout	3.18	0.71	0.10*	0.24***	-.38***	0.36*	0.14***	0.42**	*0.85*					
8.sex	0.38	0.48	0.06	-0.02	-0.07	0.06	-0.02	-0.07	-0.03					
9.age	31	1.65	0.02	-0.07	0.07	0.02	-0.07	0.07	-0.14**	-0.15**				
10.job tenture	8.5	2.24	0.01	-0.12*	0.10*	-0.10*	-0.12*	0.10*	-0.10*	-0.19***	0.80***			
11.education	2.45	0.78	0.01	-0.02	0.08	0.01	-0.02	0.08	-0.25***	-0.08	0.20***	0.15**		
12.position level	2.88	1.52	0.04	0.04	0.12**	0.04	0.04	0.12**	-0.07	0.11*	0.16**	0.20***	0.09	
13.salary	81.1	1.29	0.03	-0.17***	0.09	-0.01	0.11*	-0.11	-0.14***	0.28***	0.38***	0.39***	0.24***	0.25***

N=443；diagonal value is Cronbach's alpha
the three dummy variables representing the experimental conditions are incorporated in the table for sake of comprehensiveness.
For the sex dummy, female was 0 and male was 1. For the education dummy, under high school was 1, junior college education was 2, bachelor was 3, master was 4 and doctor was 5. For the position level dummy, contractors was 1, first-line employee was 2, elementary supervisor was 3, higher supervisor was 4, and the other conditions was 5.
*p<.05　**p<.01　***P<.001

Table 2 Model confirmation (H1-H12)

Hypothesis	Model Path	Relationship	Standardized Coefficient Estimation	P Value
H1	Formalization→Powerlessness	+	0.26	＊＊
H2	Powerlessness→Job burnout	+	0.46	＊＊＊
H3	Formalization→Job autonomy	none	-0.07	0.22
H4	Formalization→Meaninglessnes	none	0.06	0.35
H5	Formalization→Job loading	+	0.34	＊＊＊
H6	Job loading→Job burnout	none	0.08	0.17
H7	Centralization→Job autonomy	－	-0.67	＊＊＊
H8	Job autonomy→Job burnout	－	-0.12	0.07
H9	Centralization→Meaninglessness	+	0.34	＊＊＊
H10	Meaninglessness→Job burnout	+	0.20	＊＊
H11	Centralization→Powerlessness	none	0.06	0.34
H12	Centralization→Job loading	－	-0.18	＊＊

The study modifies relationships among variables in each hypothesized models based on Amos 5.0. The fitness evaluation index of entire model is shown on Table 3. Whether the model is appraised on exterior or interior quality, the study is within the acceptable range.

AVE is the instrument for the discriminant validity test. The analysis is shown on Table 4. Each construct are to meet the criterion.

Table 3 Model fitness evaluation index

Items of evaluation	Ideal evaluation result	Result of this study	Compliance condition of evaluation result
GFI (Goodness of Fit Index)	>0.9	0.84	Close
AGFI(Adjusted GFI)	>0.8	0.81	Yes
χ^2 Value ratio, Degree of freedom =1200	<3	1.88	Yes
RMSEA (Root Mean Square Error of Approximation)	the smaller the better	0.05	Acceptable
RMR (Root Mean Square Residual	the smaller the better	0.06	Acceptable
IFI (Incremental Fit Index)	> 0.9	0.90	Very close
Reliability of each item	> 0.5	All > 0.5	Yes
Estimated coefficient	T value >1.96	All > 1.96	Yes
Standard residual value	< 2.58	Unqualified ratio 3%	Yes

Table　4　Discriminant Validity

Variables	1	2	3	4	5	6	7	8
1.formalization	*0.71*							
2.centralization	0.05	*0.66*						
3.autonomy	-0.04	-0.41	*0.74*					
4.meaningless	0.02	0.11	0.10	*0.49*				
5.job loading	0.04	0.01	0.00	0.00	*0.39*			
6.powerlessness	0.01	0.04	0.04	0.04	0.08	*0.48*		
7.burnout	0.01	0.06	0.14	0.13	0.02	0.18	*0.58*	
8.bureaucracy	0.61	0.62	0.28	0.12	0.11	0.05	0.07	**0.65**
Diagonal values are the AVE; below the values are the square of the correlation coefficient.								

Discussion

Although job burnout takes place on individuals, it can affect entire organization. (Maslach, 1982). Job burnout causes increase in quitting rate and absentee rate, reduce effectiveness, forming an actual cost to organization and individuals (Maslach, et al., 2001). Because job burnout can result in reduction of job involvement and poor working performance, an understanding on the degree of employees' job burnout can provide a timing waning to organizational management (Lin, 1997). The understanding of factors that cause job burnout can even allow managers taking appropriate management action.

Matteson and Ivancevich (1987) proposes that the natures of job and organizational play major role in the effect on job burnout, including: job overloading, too much emphasis on set procedures and paper work, poor communication and feedback. Caputo (1991) also agrees that working environment is highly related to job burnout, in which factors include: lack professional autonomy, lack opportunity of personal achievement, lack control and job loading, etc. The study found that bureaucracy would raise the degree of job burnout and the causes of bureaucracy system on job burnout are, (1) the nature of centralization results in increase meaninglessness and decrease job autonomy (2) the nature of formalization results in increase powerlessness.

Bureaucratic system praises highly on formal rules, of which organizational power is built on a set of formal rules basis that all organizational members must strictly follow and all members' activities must be constrained by the rules without exception, excluding any person emotional factors. Based on the requirement of management and efficiency, power in a bureaucratic organization is authorized layer by layer and forms a pyramid of level structures, which is often a centralized system. Bureaucratic formalization and centralization in reality is a control mechanism that pursues efficiency, but in the most typical bureaucratic organization-governmental department, employees' motivation and effort is less than the one in profit earning organizations (Romzek and Hendricks, 1995). Because of unnecessary and over-elaborate formalities, gobbledegook and stiff rules in public department, organizations often set the lowest performance level for employees (Merton, 1940). In fact bureaucratic procedures are often meaningless (Bacharach, 1979). When workers cannot control their working procedures and participate in organizational decision, powerlessness often arises. When the relationship between workers' personal activities and entire working procedures loses its meaning and everything is done as told, job burnout would be generated.

Formalized rules make employees feel cold and powerless. Employees follow rules to act, thus feel powerless about their work. Stiff structures take away employees' power in production process and result, making employees feel powerless, (Kanungo, 1982) as verified in Hypothesis 1. Powerlessness can cause job burnout is also verified in Hypothesis 2. The higher the organizational structure is, the less chances employees would participate in decision making. Finding of this study on that formalized rules would reduce workers' measurement space, which in turn reduce job autonomy (Jaffee, 2001) is not significant, (Hypothesis 3) meaning that formalization is different from centralization. Centralization can

reduce work autonomy, but as long as formalized rules are appropriate, workers' job autonomy is not interfered. Bureaucratic formalization, in which everything is processed according to rules, can reduce vagueness in action. The hypothesis 4 that formalization of bureaucracy has positive effect on meaninglessness is rejected, meaning that people do everything according to rule will not produce sense of meaninglessness.

Thus the study induces that formalization can reduce job loading (Hypothesis 5). However, empirical result of the study shows that the higher degree of formalization the higher job loading is, perhaps due to the fact that formalized rules and system leads employees to always watch closely on whether their acting procedures comply with the rules, causing mental burden. Besides, under stiff structures employees cannot take simplified procedures to cope with different circumstances, an increase in job loading is also resulted.

The relationship between job loading and job burnout is not significant, (Hypothesis 6), which is different from the findings of Maslach and Jackson (1986) and Matteson and Ivancevich (1987), of which job loading would increase frequency of job burnout.

Factors that affect job burnout consist of organizational characteristic, job characteristic and personal characteristic(Nowday, Porter & Streers, 1982). The empirical result of the study found that centralization would result an increase in meaninglessness, (Hypothesis 9) and a decrease in job autonomy, (Hypothesis 7), but the cause to job burnout is meaninglessness (Hypothesis 10) and is not related to job autonomy (Hypothesis 8). The finding is consistent with Lin (2002) in that centralization of organizational structure would result in job burnout, and the same as the study of Savicki and Cooley (1987), in which job autonomy of job characteristic can influence job burnout.

The empirical result of the study found that the relationship between centralization and powerlessness is not significant, possibly just as the same as the notion proposed by Seeman and Anderson (1983), which states that "there is no irresistible evidence concerning that lack of controlling power in work can cause powerlessness and in fact evidences supporting this relationship are quite few." The study found that though the relationship between centralization and powerlessness is unclear, it can reduce job loading (Hypothesis 12). However, the relationship between loading and job burnout is not significant. In other words, the reason that centralization causes an increase in job burnout has nothing to do with job loading.

Limitations

The findings should be tempered by two limitations. First, data were collected from only two industries and two public sectors in Taiwan; thus, the results of this study may not apply to other industries and other countries. Second, the study are based on the degree to which respondent were able to report accurately to the questionnaire.

Suggestions
Suggestion to management practice

Job burnout not only affects a person's physical and mental health, but it also affects work performance and present a negative effect on organizational performance. The study finds that the higher the bureaucratic formalization and centralization, the higher powerlessness and meaninglessness would be while job autonomy would be lower and job burnout would be higher.

The layers system of Max Weber is to make organization efficient through work authority, clear plans and responsibility system. The advantage of bureaucratic system is the dependence on standardization to control employees' behaviors, leading to predicable results. However, the use of still rules and procedures to supervise employees would make employees losing interest in work (Agarwal & Ramaswami, 1993). Sense of meaninglessness arises when one person cannot understand the relationship between him or her and the job (Shepard, 1971) because everything is performed according to rules. The loss of job autonomy would generate one's feel of meaningless toward work. Centralization makes employees feeling powerless, rousing the sense of meaninglessness. Thus, bureaucracy would result in job burnout. Based on the findings of this study, (1) higher degree of formalization would promote sense of meaninglessness, causing job burnout; (2) higher degree of centralization would increase powerlessness and decrease job autonomy, causing job burnout. Although management theory states that centralization and formalization will increase organizational performance, but job burnout caused by employees' emotional reaction cannot be ignored.

Centralization and formalization would lead people to feel no meaning of existence from their work. When the feeling of powerlessness toward work rises, job burnout would be generated. Therefore, in order to raise job involvement of employees in public agencies, one must consider how to let employees feel meaningful toward their job, have sense of duty and reduce sense of powerlessness.

Bureaucracy system implements strict controlling system to assure people's reliability, or testability, but producing pressed human nature and stiffness. Delegation employees to participate in decision making and job autonomy is an interior reward that can inspire employees' morale. Empowerment is an enabling process through the enhancement of follower self-efficacy beliefs and intrinsic task motivation (Thomas & Velthouse, 1990). Empowerment can increase employees' efficiency and decrease feelings of work alienation and powerlessness (Kanungo, 1992). Thus, authorizing employees to actually participate in decision making, such control in working atmosphere can reduce occurrence of job burnout (Almost & Laschinger, 2002).

Bureaucratic centralization and formalization would make employees feel powerless and meaningless about work and appropriate authorization and flexibility should help in solving job burnout problem in present bureaucratic system. Increasing work autonomy can reduce job burnout, (Leiter, 1990) as verified in Hypothesis 8 of this study. Therefore, what is needed under bureaucratic system is reasonable discipline, not stiff and inhumane constraint. Appropriate authorization promotes employees' work autonomy, then reducing job burnout (Singh, 2000). Besides, appropriate motivational measures can also prevent the increase of job burnout (Euwema, Kop and Bakker, 2004)

Suggestion for future study

The study induces that formalization can reduce job loading, (Hypothesis 5) but empirical results show that job loading is also high when the degree of formalization is high. Whether the formalization reducing work flexibility causes workers' mental burden, or formalized organization sticking to set rules and system and everything must be run according to rules have resulted in employees' inability to act to cope with circumstances, plus that employees must always watch whether their behavior have complied with rules, thus increasing employees' loading, is a question that needs further exploration. In addition, different cultural groups or countries have different attitudes toward obedience to authority and rules, whether the results of relative bureaucracy and job burnout may not be consistent is also worthy of exploration.

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合作教學在大學英文教學之運用：個案研究
Collaboration in Teaching General English in College: A Case Study[*]

黃美金[1]
Lillian M. Huang
實踐大學應用外語學系
教授
lhuang@mail.usc.edu.tw

莊維貞[2]
Wei-Chen Chuang
實踐大學應用外語學系
助理教授

郭壽旺[3]
Tony Kuo
實踐大學應用外語學系
助理教授

曾春鳳[4]
Chunfeng Tseng
實踐大學國際貿易學系
講師

湯河松[5]
Hersong Tang
實踐大學財務金融學系
講師

摘　　要

　　晚近「合作」的概念已廣泛被運用在許多領域中，其中也包括了英語教學。本論文為一個案研究，探討臺灣某大學之英文教師如何藉由「合作」模式教授英文，參與成員進而達到情感凝聚、教學改進、及專業成長之效。另外，本研究也驗證了「合作」模式要想成功需奠基於某些要素，如：共同目標、參與者平等關係、共同參與及決定、共同為結果負責、共享資源、自發性。不過，本研究也指出參與「合作」模式之成員，在合作教學過程中，未必全都會表現出相同的正面、自發性行為；尊重成員之個別差異自有其必要性。

關鍵詞：教師合作、情感凝聚、教學改進、專業成長、個別差異

Abstract

It is noticeable that the notion of collaboration has been actively put into practice and has become more widely utilized in different disciplines, including English teaching. This paper presents a case study of college instructors' collaboration in teaching general English in Taiwan, resulting in their emotional engagement, teaching improvement, and professional development. However, since successful collaboration is based on conditions such as mutual goals, participants' parity, responsibility for participation and decision making, responsibility for outcomes, sharing resources, and voluntary, it is not surprising that the positive self-generated behaviors taken shape in the process and their induced effects were not observed in all the participants. It would be improper to assume that self-generated positive behaviors will become prevalent among the participants in any co-teaching context. It is thus necessary for participants to recognize variance and to respect diversity in any collective and collaborative work.

Keywords: teacher collaboration, emotional engagement, teaching improvement, professional development, diversity

Introduction

Traditionally many teachers tended to work on their own, seldom consulting or cooperating with each other.[1] Such a convention is still practiced by many teachers, particularly by a number of college instructors who normally possess higher degrees, have academic as well as professional specialties, and expect themselves to actualize their ideals. They often believe that by working individually, they can enjoy more freedom to decide how they will teach, what materials they will use, and how best they will instruct their students. This approach signifies an "individualism" approach. However, Coronel et al. (2003), among many other scholars, pointed out that working alone might somehow prevent "the opening up of spaces and opportunities for dialogue and collaboration" (p. 127), and that individualism might become "a barrier to professional development, the implementation of innovations [sic] and the development of common educational objectives" (p. 128).

Over the past two decades, the concept of collaboration has been more actively put into practice and has become more popular in different disciplines, including business, economics, technology, medicine, science, mathematics, the arts, library science, and the social sciences (Schneider, 2007). This paper reports a case study on a one-semester teacher collaboration in teaching general English in a university setting. The original goal of this study was to discover the self-generated positive behaviors and their induced results of the collaboration taken shape through the interaction among three instructors. Positive behaviors refer to behaviors that may have positive impacts on teaching such as teachers' exchanging their past English teaching experiences, deciding on what topics to focus on together, sharing methodological strategies, assessment activities, teaching resources and teaching activities, and making important pedagogical decisions together such as choosing a proper grading system for the course together.

In the following sections, a literature review on teacher collaboration, a description of the named case study and the participants' comments and reflections are presented and interpreted, followed by some suggestions for practitioners who wish to engage in collaboration in the future.

LITERATURE REVIEW

Teacher collaboration has been more actively practiced in the past decades. Such a practice may be a response to social change and educational reform. For example, Welch (1998) pointed out that collaboration was one of the many bandwagons in the parade of educational reform rhetoric; Clemente (1999) remarked that the development of a sense of community, cooperation and coordination between teachers in the planning and development of the curriculum, and the collective acceptance of responsibility featured as desirable and

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[1] Hu (2006), for example, remarked that teaching in Taiwan is conventionally an isolated practice and that a teacher who is the 'king or queen' of the class normally takes charge of the classroom organization and activities, having little communication with other people.

necessary states for the success of initiatives for improvement; Hu (2006) indicated that after the introduction of the Grade 1-9 Curriculum in Taiwan, individualistic teaching pattern was no longer seen as appropriate; because of the integrated curriculum and because of schools' being directly responsible for their curriculum, team-teaching was encouraged and greater teacher collaboration was anticipated.

However, collaboration is a rather complex process and it requires skills. Hudson & Glomb (1997), for instance, considered that collaboration is based on mutual trust and respect; hence, each person's contribution to an interaction is equally valued, and each person shares power in making decisions. Muronaga & Harada (1999) also considered that with team partners coming from different backgrounds and bringing diverse classroom and personal experiences, and background knowledge, every member should learn to identify and respect other team partners' different perspectives, strengths and weaknesses. Thus it is quite understandable that Coronel et al. (2003) would consider 'conversation' a means of avoiding tensions besides providing the development of non-hierarchical relations, and that 'through conversation a consensus could be achieved from amongst differing goals, and a balance of participation in the different individual focuses, collaborating on the same topic. This is a long and costly procedure. But we must also emphasise that is an easy and simple one, too, in that it concerns 'talk' and the sharing with colleagues what we do as teachers' (p. 131). Similarly, Hu (2006) remarked that while in formal meetings, there are institutionalized ways and contents of talking, and then of writing up the minutes and most people find it difficult to be open about what they feel, informal meetings or gatherings give people a sense of security and can enhance openness.

Concerning the advantages of teaching through collaboration, many scholars (e.g. Bruskewitz, 1998; Coronel et al., 2003; Fu, 2007; Goddard, Goddard, & Tschannen-Moran, 2007; Hu, 2006; Levine & Marcus, 2007; Lin & Xie, 2009; Musanti & Pence, 2010; Piercey, 2010; Pochedley & Dorff, 2008) consider that teacher collaboration may result in teachers' personal growth and professional development, and furthermore, help facilitate change in the school to promote student success. Nevertheless, not all the teamwork would proceed smoothly and successfully. Musanti & Pence (2010), for example, observed some team participants' seeming resistance in the process of collaboration and remarked, 'Resistance has been typically characterized as a negative element of the learning process,' but he also stated that 'resistance is an almost unavoidable presence in professional development programs that foster prolonged collegiality and collaboration. Redefining it as a positive force for change instead as an obstacle for growth is essential to the success and long lasting impact of such approaches' (p. 87).

METHODOLOGY

The Setting of the Case

The general English course described in this study was "English 3" (i.e. the third-semester General English) taught to sophomore English majors in a private university

located in northern Taiwan in the fall semester of 2010. General English is a set of English courses provided to undergraduate students to meet a requirement of the higher education policy in Taiwan, namely, improving college students' proficiency in English, which is the major language for international communication.

The language center in charge of the administration of General English at this university assigns several instructors for multiple classes of a general English course at the same level. For the sophomore English majors, they are usually arranged into three classes instructed by three different instructors. The instructors are allowed to make their own decisions on textbooks to be used, approaches to be taken, and assessments of students' learning achievements; the language center grants the instructors full autonomy on conducting the course.

In the past, three instructors assigned to teach "English 3" usually worked independently and seldom collaborated; different teachers might have had very different goals, approaches, materials and assessments of students' achievements on the course. The long lasting "on-your-own" and "to-go-your-own-way" culture began to shift as one of the three teachers teaching "English 3" in the fall semester of 2010 initiated collaboration among teachers.

Participants

The major participants in this study were the three instructors teaching the forenamed course. They taught 100 sophomore students forming three groups (34, 34 and 32 students, respectively). The following seemed to contribute to the different collaborative relationships found among the three participants.

Educational background. The three instructors, one male and two females, are faculty members in a Department of Applied Foreign Languages in a university in Taiwan. They have all attained Ph.D. degrees, with specialties in education, linguistics, and intercultural education, respectively.

Professional background. The three instructors have different professional backgrounds. The first instructor ('Teacher A' hereafter) has been teaching in this private university for approximately 20 years. He has been through different transformation stages of the university, i.e. from a vocational college to a technology university and then to the present university, and he is very familiar with how the school system functions. The second instructor ('Teacher B' hereafter) joined the department about six years ago, with more than 25 years of teaching experience. She used to teach at a public teacher training institution and thus has spent some time adjusting to the new environment and trying to find a balance between public and private school administration systems and teaching environments. The third teacher ('Teacher C' hereafter) is, relatively, a junior professor. After teaching at another private university for ten years, she joined the present department four years ago and has adjusted well to the new environment.

Administrative experiences. Among the three instructors, Teacher A served as the head of the Department of Applied Foreign Languages for two terms. Teacher B served as the department head and the dean of the Office of Academic Research and Development in her

former university, and also served as the chair of the Department of Applied Foreign Languages in the present university for one year. Teacher C has not yet served in an administrative position.

Daily contact. Among the three participants, Teacher B and Teacher C often discussed how the course was proceeding, identified problems encountered and proposed solutions, through informal communication[2] made while running across each other in the hallway, dropping by each other's office, having meals together, or commuting together once a week, instead of having a formal meeting in a seminar room. Teacher A, on the other hand, only joined the team discussions twice before the semester started, and then, through Teacher B's email messages, was informed of how the other two instructors conducted their classes, without further or active interaction with the other instructors.

The Agreed Procedure of the Course

Through discussions, the three teachers agreed to have three stages of the course; namely, preparation, in-class presentations, and poster and workshop presentations.

Preparation stage. In order to teach the same course in a more coordinate pattern, the three instructors had two meetings before the semester started. In the first meeting (July 12, 2010), they exchanged their past English teaching experiences, discussed what topics to focus on (i.e. "business, legal documents, and celebrities"), and planned to collect related articles which would be included in the teaching materials. In the second meeting (September 2, 2010), after reviewing the materials the instructors had collected, they decided to change their topics to "environmental protection, human rights, and influential people." Furthermore, they talked about the assessment activities, grading policies, and methodological strategies, and decided to employ lecturing, reader's theater (RT), and oral presentations with PPTs, respectively. They also adopted the Project-Based Learning (PBL) approach, and agreed to organize a four-day (Tuesday-Friday) poster presentation, and to hold a two-day (Saturday-Sunday) workshop entitled "Earth, Rights and People" at the end of the course so that the students could present part of their acquired knowledge in English 3.

In-class presentations. At the very beginning of the semester, the three instructors asked students to find their own partners and form teams, with about 4-6 members in each team. Given such freedom, students were expected to work in a more coordinate and satisfactory way. However, students in each class had slightly different requirements, as shown below:

(1) Students in Teacher A's class were merely asked to attend classes and to listen to the instructor's lecturing for the first two-thirds of the semester. During this period, they were neither required to give any in-class presentation nor were they given assignments,

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[2] Such agenda-less, preparation-free get-togethers are similar to the "conversations" utilized by Feldman (1999, p. 14) (as cited in Coronel et al. 2003 (p. 138)), "… The conversations served the purposes: they helped to bring to light thoughts and ideas, they facilitated communication among the participants, they resulted in the groups making defensible decisions about goals and actions, they helped to make meetings pleasurable experiences for the teachers, and there were exchanges of knowledge and understanding."

quizzes or a midterm exam. Then, in the last one-third of the semester and in the process of preparing for the workshop presentation, each team presented their final project in class and was advised (but not required) to meet with their instructor, not only to discuss the content but also to improve their language skills as well as their presentation techniques. Consequently, students in this class seemed to have more opportunities and time to prepare for and to practice their final project.

(2) Students in Teacher B's class were required to give two oral presentations in class; one before the midterm and the other after. Since this class focused on the theme "celebrity", each team had to choose two famous people (from two different categories[3]) out of *the 2010 Time: The 100 Most Influential People in the World* to do their presentations. While preparing for presentations, members of each team needed to share the workload among themselves, including discussing the given materials, searching for more supporting materials from different websites, and drafting a two-page handout (containing 5 parts – the target person's biography, explanation of the main text, reasons for the target person's being chosen, conclusion/reflection, and references) and a PPT file. After the instructor's assistance in correcting the handouts and the PPT files, each team gave an oral presentation in class with an acting out, expected to demonstrate the teammates' cooperation. The other students in the class, who served as the audience, were required to listen to the presentation and then filled out (i) the Individual Evaluation Sheet (see Appendix A) with the purpose of examining if the team's presentation was comprehensive and collaborative, and of checking one's learning effectiveness; and (ii) the Group Evaluation Sheet (see Appendix B) not only to comment on the entire team's presentation and cooperation but also to investigate their (i.e. the students filling out the questionnaire) own learning motivation and learning effectiveness. Meanwhile, the presenters were also asked to fill out a Self Evaluation Sheet (see Appendix C) in order to examine their own presentation and teammates' cooperation. In this way, the critical thinking ability of the students might somehow be developed and enhanced.

(3) Students in Teacher C's class were assigned similar tasks as those in Teacher B's class except that, instead of having two oral presentations, they gave one oral report and one reader's theater (RT) presentation. This class focused on the theme of human rights, and the resource materials that were used included the novel *The Boy in the Striped Pajamas*, the movies *The Boy in the Striped Pajamas* and *The Freedom Writers Diary*, the short articles *Rosa Parks: My story*, *The freedom writers diary*, and the speech *I have a dream* (Martin Luther King). The students were also introduced to the online teaching resource The U.S. Holocaust Memorial Museum (http://www.ushmm.org/).

Poster and workshop presentations. As stated above, towards the end of the semester, the three groups of students participated in a four-day poster presentation and a two-day

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[3] The categories selected for class presentations included leaders, heroes (before midterm), artists, and thinkers (after midterm). Please refer to http://www.time.com/time/specials/packages/completelist/0,29569,1984685,00.html#ixzz0yEcKicGW for more details.

workshop entitled "Earth, Rights and People.[4]"

(1) The poster presentation lasted four days (i.e. January 4-7, 2011). Since each team was composed of four members or so, every member was allowed an opportunity to host one day and to present before an audience relevant key items pertaining to their poster session. All the students were required to speak in English when asking or answering questions. In addition, each student was expected to visit all the poster boards and to fill out a reflection sheet, giving comments on any aspect of the poster presentation.

(2) The workshop, following the poster presentation, lasted two days (i.e. January 8-9, 2011). Four sessions were held each day, with three teams presenting in one session, and twenty-five minutes for each team's presentation. All the members in a team were required to present, and the audience needed to complete the reflection sheets with four rating categories, including content, language, PPTs, and cooperation, so that the student participants could evaluate other teams' presentation with respect to the comprehensiveness of the content, the organization and completeness of the PPTs, the presenters' four language skills, and the teammates' cooperation. The workshop presentation also allowed the students to present part of their acquired knowledge within the construct of the course.

Data Collection

The case study was conducted during the course of English 3. The data were collected in the semester while the course was still going on. The whole process of data collection was an on-going multiple data collection and data analysis process; the preliminary analysis of the data available at each stage led to the data collection and analysis of the next stage.

Three sources of evidence were employed in this case study, namely documentation, participant observation, and interview.

Documentation. The document information collected in this study included the minutes of the meetings of the three teachers, and the written reflections of the two actively-involved teachers. The minutes (approximately 600 words) of the two meetings (July 12 and September 2, 2010) were collected, and roughly 2,500 words of written reflections were reviewed.

Participant observation. Such observation also provided valuable information for the case study. Teachers B and C interacted with each other actively and they served as the teacher-researchers of this case study, while the other three researchers served as the participant-observers ('Observers A, B, C' hereafter). All of the participant-observers took part in an English teacher community[5] and attended regular/monthly meetings claiming to seek for inspiration from the experience. They also went to the student poster and workshop presentations of the course, observing the interaction of the three instructors. Though the

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[4] For the students in Teachers B's and C's classes, their poster and workshop presentations were different from their weekly/in-class presentations, while Teacher A's students had their presentations on the same topic.

[5] For a more detailed discussion of this English Teacher Community and the collaboration of the participants as well as their professional development, please refer to Tang et al. (2011).

participant-observers did not tape what they observed, they kept field logs for what they observed.

  Interview. This was another technique used for data collection in the case study. Observers B and C served as the interviewers, and two actively-involved teachers (i.e. Teachers B and C) were interviewed, with one being interviewed three times (i.e. October 13, November 3, and December 28) and the other four times (i.e. October 13, November 3, December 1, and December 28). All the interviews were conducted informally and were not taped; the interviewers/participant-observers kept notes in their field logs. They always reconfirmed their interpretation of what they had heard in the previous interviews with the interviewees in their next interviews. The informal interviews started with the beginning of participant observation. The interviewers raised questions eliciting more information whenever necessary in the natural interaction contexts of participant observation.

  The preliminary findings were generated from the data collected through the three data collection techniques. These findings were then triangulated to formulate the final results.

RESULTS AND DISCUSSION

  The results were derived from the analysis of the three sources of data collection mentioned above. However, only two of the instructors engaged in frequent sharing, discussion or consultation regarding teaching strategies for the course, whereas the third instructor tended to avoid face-to-face coordination meetings, teaching experience sharing, or problem solving discussions, following the initial interaction during the preparation stage. In other words, while Teachers B and C had more consistent collaboration between themselves, they also respected the third instructor's decision to have less frequent and informal communications. Consequently, in this section, the results of the above case study are examined from the standpoints of the two instructors[6] and focus on three aspects; namely, emotional engagement (sense of partnership), teaching improvement, and professional development.

Emotional Engagement (Sense of Partnership)

  The first significant outcome of the present research is the two participants' emotional engagement with each other. That is, both Teachers B and C developed a sense of belonging and a sense of interdependence, which helped them reduce their feelings of solitude and helped them feel a sense of moral support.

  Reducing the sense of isolation. Gilles, Wilson & Elias (2010) remarked that "collaboration tended to remove the feelings of isolation that many teachers experience" (pp. 97-98). Musanti & Pence (2010) also presented a case of teacher collaboration where the participants perceived "collaboration as a means to overcome isolation, and as a way to

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[6] The results can also be examined from the viewpoints of the students taking the named course, with respect to the advancement of their four language skills and critical thinking abilities in this course and through the Cooperative Learning Approach. For a detailed discussion, please refer to Chuang et al. (2011).

collectively construct knowledge. They valued collaboration because it made it possible to exchange experiences, maintain interesting conversations, and build relationships with peers" (p. 79).

Similarly, in the course of their teaching, Teachers B and C collaborated with each other from the beginning of the semester till its end, which helped them form a sense of partnership and thus reduced their solitary and helpless feelings. That their collaboration helped reduce the sense of solitude/isolation can be exemplified by the following conversations between teacher-researchers and participant-observers:

(1) Observer B: While teaching English 3, have you ever felt helpless or isolated?

Teacher C: Yes. Since I am a junior faculty member at this university and I don't think I am good at teaching, I was always wondering whether it is ok to ask for advice on teaching from other teachers; I was not sure what other teachers would think of me if I asked "dumb" questions. Working with my partner has helped me feel safe to seek professional help and support. Now I know I am not alone, and that my partner is willing to share with me her experiences, knowledge, expertise and even her problems and feelings. There is an important personal significance for me in knowing this—that is, a sense of connection, a sense of "us", is emerging between us. We share similar experiences and are in similar situations. [OB-11032010][7]

(2) Observer C: Having taught 30 years or so, do you find it useful to collaborate with other insructors?

Teacher B: Yes. This is my first time in teaching English 3 in this university, and I was not sure how to teach this course more effectively. Also since I have two other colleagues teaching the same course, I would like to know how they were conducting their classes. Luckily I have a supportive partner to work with, and so I always feel secure, without feeling isolated. We often exchange ideas concerning how to conduct our classes, how to help our students prepare for their final presentations, how to evaluate our students' performance, and the like. Through collaborating with my partner, I feel more comfortable teaching this course. [OC-11032010]

Having moral support.　Through frequent contact and informal dialogues, Teachers B and C thus developed a stronger professional partnership and mutual trust. More importantly, they, both the junior and senior faculty members, benefited from collaboration and experienced a sense of moral support, as demonstrated by the following remarks in the teachers' self-reflection notes:

(1) Teacher B: Every Monday night, after our evening classes, my partner would offer to

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[7] The coding system in this paper is data provider followed by the recording date (month-day-year). The abbreviation follows: DOC-TB – Teacher B's reflection notes; DOC-TC – Teacher C's reflection notes; OB – Observer B; OC – Observer C; DOC-M – minutes of the meetings.

give me a ride home. During the commute, I would tell her about what I planned to cover in class the next day. Sometimes I would also tell her about the problems I had with my students and even the frustration I experienced in class. Though I didn't expect my partner to give me any suggestions, the fact that she was willing to listen to me really helped me somehow. [DOC-TB-01112011]

(2) Teacher C: What also impressed me was when my partner felt frustrated in the process, she expressed her point of view; she didn't suppress her feelings. She talked about her frustration and the source of her frustration and sought solutions. I think it is really healthy to talk about one's frustration at work with a positive goal to formulate strategies to deal with the problems. [DOC-TC-01112011]

Teaching Improvement

The second notable outcome of this case study concerns improvement in teaching. Coronel et al. (2003, p. 140) observed that collaboration among instructors teaching the same course has a positive effect on teaching, at least to the extent where the instructors find themselves more confident and comfortable in performing their teaching duties. A similar positive effect was found in the present study, and the effect could be further categorized in terms of sharing information and resources, finding solutions to problems encountered, trying new things, and pursuing constant improvement in teaching.

Sharing more information and resources. Teachers B and C, as indicated earlier, often discussed progress that had been made in their classes, difficulties confronted, and strategies used in solving problems, through frequent informal and friendly dialogues made in the hallway, in their offices, over lunch or dinner, or on their way home from work. Consequently, Teachers B and C were able to share each other's teaching experiences, information, and resources, as confirmed by the following self-reflection notes:

(1) Teacher C: My partner set a good example in sharing knowledge and skills with her co-teaching teachers. She always shared with me whatever materials she found or teaching activities she designed, and she never hesitated in informing me of her observations of her students. This really helped me a lot. Through the sharing, I had much more information and resources than working by myself. [DOC-TC-01112011]

(2) Teacher C: My partner also showed me not to hesitate in seeking professional advice when I believed it could be useful to my teaching. With this encouragement, I then went to another colleague in the department who taught the same course successfully last semester, and thus learned more information related to teaching the subject. I felt more confident in teaching the course then. [DOC-TC-01112011]

Finding solutions to problems encountered. The collaboration between Teachers B and C also seemed to enable them to avoid making mistakes or to find solutions to problems

encountered, as demonstrated below:

(1) Observer B: Has your partner ever given you any advice regarding your teaching?
Teacher C: Yes. At the very beginning of this class, informal monitoring and peer coaching was not planned in advance but somehow began to come into being during the process when my partner and I kept each other informed of what we did in our classes. Through the process, she pointed out some aspects that I might have neglected or been unable to perceive. For instance, once she reminded me to allow students to have enough time to prepare for their workshop presentations while I was too preoccupied by concentrating on the content that I had prepared and neglected the time frame that would be needed for the workshop. If I had not aborted what I had been doing to help the students prepare for their workshop presentations, they would not have been able to complete the task by themselves. My partner's advice was given just in time to avoid an undesirable result. [OB-12012010]

(2) Observer B: Please give an example to illustrate how teacher collaboration helps you solve problems.
Teacher C: For instance, before the class began, I was not sure how to make students come to class every week. Calling the roll each week seems to waste a lot of time for a class with an already tight schedule; however, the students tend to skip class if you don't take attendance. But, I was not able to think of any effective way to make them come. Knowing the obstacle I had with students' attendance, my partner shared with me what she did in her class. She asked students to sign their names on a name list she had designed. This saves time and allows the teacher to have a rough idea of the attendance rate of each student. Students will also get the message that the teacher is monitoring the attendance and this will make them avoid skipping the class. I adopted this method and it did work; the class attendance was never a problem for me again. [OB-12012010]

Trying new things.　Teachers B and C's collaboration also helped create a setting that allowed them to try something they believed to be good for but might not be welcomed by their students. The following excerpt given by Teacher C clearly designates such a point:

Nowadays, many college teachers may hesitate in assigning students to do tasks that require hard work and high level of cognition because once a teacher is viewed by his/her students to be "demanding", he/she may receive a poor evaluation score from the students and cause himself/herself some problems. Few teachers would ask for trouble for themselves. Thus, students' opinions sometimes outweigh teachers' professional judgment. Through teacher collaboration, I found that the teachers are gaining more power in course design than before; the power-relation between the teacher and the students in a class is shifting toward a new balance which allows teachers' professional

judgment not to be "vetoed" in the process of course development simply because many students complain some tasks are too demanding. Teachers can work together to implement what has been planned as an alliance to resist the pressure from the students. I found in this experience that this can eventually create a win-win situation for both teachers and students. What I saw in this experience is: the teachers gain more power back in course design while the students are pushed to maximize the realization of their potential. In this case, the students eventually admitted that without being forced to try these demanding tasks, they would never believe that they could achieve so much. [DOC-TC-01112011]

What was recorded in a minute and a log written by the observers also support this finding. Although the possibility that students may complain was brought up in a regular meeting, the teachers came to an agreement to do it together considering the benefits that the students may receive. [DOC-09022010] And, the teachers were observed to respond to the students in a same way facing complaints and challenges from the students regarding the poster sharing and the workshop firmly reassuring them these demanding tasks were for their own good. [OC-01052011]

Pursuing constant improvement in teaching. Teachers B and C also tried to analyze all the weaknesses, problems, ideas, observations, comments and proposals associated with the course, and attempted to design more palatable teaching materials, more stimulating teaching activities and more appropriate teaching strategies for the future. The following responses given by Teachers B and C to Observers C and B respectively illustrate the two instructors' constant and conscientious concern towards improving their teaching:

(1) Teacher B: I think two oral presentations in class are really too many for my students to do in one semester, especially since they still have a four-day poster presentation and a two-day workshop to attend near the end of the course, not to mention the fact that they have weekly quizzes or reflections (individual and team's), and the midterm examination. As expected, my students have been under a lot of pressure. In addition, having two teams presenting in each meeting (i.e. two 50-minute periods) doesn't leave me any time for a more detailed explanation of the text or further discussion. I definitely don't want to repeat the same mistake next time. [OC-12282010]

(2) Teacher C: I realized that the task that I originally set was too difficult for my students. "Do you think you're teaching graduate students?" one of my colleagues said. This comment reminded me that my requirements were way beyond the students' current competence, even though my goal was to help the students develop the ability to capture the whole picture of the issue they were working on. Next time I will be more careful when setting up the requirements for this course. [OB-12282010]

Professional Development

The third significant outcome derived from the named case study is the participants' professional development. As is well-known to everyone, learning is not exclusive to students; it also includes teachers. Teachers B and C expressed that they benefited greatly from collaborating with each other regarding their professional development, in addition to their emotional engagement and teaching improvement. The professional development will be further discussed in terms of teaching materials, teaching strategies, and teaching activities.

Getting familiar with more teaching materials and resources. In many universities, textbooks are mainly decided by instructors, seldom taking into account students' needs or interests. In the present study, through sharing and discussion, the instructors were able to familiarize themselves with more current and diversified forms of teaching materials suitable for students of different English levels and/or for millennial generation. The following remarks made by Teacher B during her conversations with Teacher C illustrate the above point:

(1) Teacher B: My students impressed me greatly today. I didn't expect that they would have spent so much time looking for additional materials and resources for their presentations. In addition to explaining the assigned article, they used a couple of pictures, film clips to demonstrate how Bill Clinton established the 'Clinton Foundation' and explained what he did to help Haiti. They even introduced to their classmates some quotes from Clinton's book *Giving: How Each of Us Can Change the World*. Through their work, I've also learned quite a few useful resources/web-sites and teaching materials that may interest students. I would like to share with you the list of these resources/web-sites and teaching materials. [DOC-TB-10192010]

(2) Teacher B: When I went to Boston to attend the conference on language teaching, one TV station happened to present 'Witness to the Jonestown Massacre', which got me interested in learning more about this issue. Your class is focusing on 'human rights', so this topic may be relevant and interesting to your students. Also perhaps you could share with me some more related resources concerning 'human rights' as well. [DOC-TB-11292010]

Learning diversified and innovative teaching strategies. Conventionally most teachers are accustomed to lecturing in class, with vocabulary and structural explanations followed by some Q&A's on the content under discussion. As stated earlier, Teacher B asked her class to give two in-class oral presentations with PPTs, film clips, along with optional acting-outs; and Teacher C adopted the Reader's Theater (RT) Approach, encouraging students to develop what they read into scripts and to perform in class. Moreover, both instructors utilized the strategies of Project-Based Learning (PBL) Approach and Learning by

Doing. They asked students to work collaboratively on the topic they chose, and to present it at the poster and workshop presentations. Through sharing and collaboration, Teachers B and C got the opportunities to learn more from each other about various and innovative teaching methods, and to ascertain if some teaching strategies were appropriate or applicable to the named course. For instance, the following self-reflections confirm that collaboration may help participants learn more teaching strategies:

(1) Teacher B: Reader's Theater is like storytelling. Since my partner is using RT in her class, I have learned from her that in practicing RT, everyone needs to write and to rewrite, to phrase and to rephrase, and to read aloud; everyone needs to talk, to hear and to play with language, and furthermore, to exercise the mind and emotions and tongue together. Learning what RT is and how it functions would help me make teaching more vivid and effective. [DOC-TB-10212010]

(2) Teacher C: My partner and I both adopted the Project-Based Learning (PBL) Approach and required our students to work on the chosen topic collectively. They needed to go through several stages, including collecting related materials, classifying them, organizing them, having a team discussion, revising the work, and turning in for the instructor's editing, instead of simply memorizing materials in textbooks. [DOC-TC-09292010]

It is apparent that utilizing the above-mentioned teaching strategies, instructors may face more challenges; that is, instructors adopting either RT or PBL in class may lead to students' asking all kinds of questions which may then require instructors to do more research themselves, but which may, as admitted by the two instructors, make teaching as well as learning more enlightening and inspiring.

Creating interesting and challenging teaching activities. As indicated above, traditional teaching activities usually comprise teachers' lecturing, grammatical explanations, and students' mechanical drills. However, such activities seem monotonous and less challenging. Teachers B and C thus utilized oral presentations with acting-outs and RT, which not only presented enlightening learning scenarios but also helped students improve the four language skills and enhanced their critical thinking abilities. Furthermore, through collaboration, the two instructors together designed a one-week/four-day poster presentation and a two-day workshop which inspired students greatly and required them to work collaboratively, as confirmed by the following reflection fieldnotes made by Teacher C:

(1) In this case, students experienced the pressure to present their posters in front of all three classes. Out of a sense of honor, most of the students tried hard for the poster sharing and oral presentations. Many of the students repeated practicing until the last minute. Instead of pushing them, in the last few weeks, I told them to relax,

especially seeing them trying so hard to perform well for their oral presentation. I found that they would put in much more effort for a poster sharing and a workshop than preparing for a written test. The poster sharing and oral presentations may have imposed an even greater pressure on them than a written test. I became aware of this when I talked to the students about preparing for the workshop. According to the students, compared with written tests, not being able to perform well in front of all of their peers and teachers seem to be more embarrassing for them. This suggests that workshop presentations may be a good way to force students to work hard, or a better choice for evaluation than written tests. [DOC-TC-01112011]

(2) The students didn't show the same kind of enthusiasm in the classroom. It seemed that the workshop created a lieu stimulating the students to develop the kind of learning attitudes approved by educators. Also, I expected few students would really enjoy the theme I chose for them--human rights. However, they proved that I underestimated their potential. In an informal conversation with me, more than a few students mentioned that they enjoyed reading the articles on the issues they were working on and that they will continue to pay attention to the future developments of these human rights issues. They proved that they can be inspired to become serious thinkers given enough time and a nourishing environment. [DOC-TC-01202011]

Observing the poster sharing and the workshop, observer B also noticed the magic power of the activities to mobilize students.　She pointed out in her field notes that in the poster sharing students interacted with each other fervently exchanging ideas with laughter heard everywhere.[OB-01042011] She also recorded in her notes of the efforts that the students had put into their works:

"Students seemed to care a lot about their performance on the stage; many of them arrived early to rehearse for one more time before the beginning of the workshop."[OB-01082011]

CONCLUDING REMARKS

As illustrated in the preceding section, through collaboration, the participants built up a sense of partnership (i.e. feeling less isolated, and having moral support from each other), were able to improve their teaching (including sharing information and resources, finding solutions to problems encountered, trying new things, and pursuing constant improvement in teaching), and obtained professional improvement (including getting familiar with more teaching materials and resources, learning diversified and innovative teaching strategies, and creating interesting and challenging teaching activities).

Before concluding the present paper, let us consider what Friend & Cook (1992), as cited in Piercey (2010), presented to be the necessary conditions for collaboration:

(1) Collaboration is based on mutual goals.

(2) Collaboration requires parity among participants.

(3) Collaboration depends on shared responsibility for participation and decision making.

(4) Collaboration requires shared responsibility for outcomes.

(5) Collaboration requires that participants share their resources.

(6) Collaboration is a voluntary relationship.

As expected, it was rather difficult to satisfy all six conditions. When considering if this practice of collaboration would be successful with other teachers, it was our opinion that this would be unlikely, especially among teachers teaching at colleges. In the present study, though the above six conditions were partially if not fully observed, yet, as noted in the preceding section, only two of the instructors seemed to seek out opportunities for more successful collaboration, whereas the third instructor tended to work more independently. He once indicated at the 2nd meeting that he was not accustomed to teaching small-size classes or having more close interaction with students in class. This might account for his failure in carrying out the teaching and assessment activities, grading policies, and methodological strategies as previously agreed upon[8]. Nevertheless, his class did participate in the course's final projects, that is, students' poster presentation and the workshop.

That collaboration is based on mutual goals has also been recorded by Schneider (2007), "Collaboration is the process of communication between individuals with common or similar goals" (p. 10). However, Schneider (2007) was accurate in stating that "not all teachers are prepared to be full participants in a collaborative environment" (p. 7), and that "not all teachers come to the collaboration process with the prerequisite skills" (p. 17). Furthermore, as pointed out by Musanti & Pence (2010), "collaboration is not always 'comfortable and complacent' … Moments of conflict, tension, and resistance should be expected and also welcomed" (p. 86). Consequently, it should not be a surprise or a source of discomfort to see that while two participants of the three in the present study seemed to have more successful collaboration between themselves, the third instructor conducted his class in his own and perhaps preferable way. Furthermore, it is legitimate for the two collaborative instructors to respect the third instructor's decision without forcing him to take part in their frequent and informal communications, since collaboration is a voluntary relationship[9].

Very often it is observed that while collaborating with others, some teachers may be afraid of losing their individualism and self-identity. Sometimes collaboration may bring them

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[8] Although it may be interesting or even significant to understand the potential reasons for the third participant's choice not to participate, the present paper does not attempt to further explore this aspect, which may require future analysis. For a detailed discussion on unpacking teacher resistance, please refer to Musanti & Pence 2010.

[9] DuFour (2011, p.61), however, had a different view saying that 'More than a quarter century has passed since Goodlad warned that overcoming the tradition of teacher isolation will require more than an invitation. We must do more than exhort people to work together. In order to establish schools in which interdependence and collaboration are the new norm, we must create the structures and cultures that embed collaboration in the routine practice of our schools, ensure that the collaborative efforts focus on the right work, and support educators as they build their capacity to work together rather than alone.' For details, please refer to DuFour (2011).

a certain degree of anxiety, resulting in a resistant and uncooperative attitude. Musanti & Pence (2010) pointed out that "research on teacher resistance has shown that instances of opposition, confrontation, or conflict might involve teachers' attempts to claim or recover a sense of agency and capability …" (pp. 75-76). However, in dealing with teacher resistance and trying to understand each incident, Musanti & Pence (2010) advised:

> … considering resistance as a creative source through which teachers explore possibilities and become agents of their own development, allows researchers to more fully appreciate the intricacies of the professional development. … we contend that resistance is an almost unavoidable presence in professional development programs that foster prolonged collegiality and collaboration. Redefining it as a positive force for change instead as an obstacle for growth is essential to the success and long lasting impact of such approaches. (p. 87)

To conclude, our study affirms that collaboration is beneficial to participants with respect to their emotional engagement, and personal and professional development. It also points out that in collective and collaborative work, a recognition of variance and respect for diversity are still necessary to bear in mind.

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APPENDIX A

Individual Evaluation Sheet
English (3) Fall 2010
Reflection on Classmates' Weekly Presentations

No._____　Name _____　Date _____

(**A**--Excellent: above 22.5/**90**　　**B**--Good: 20-22/**80**
　C--Fair: 17.5-19.5/**70**　　　　　**D**--Unsatisfactory: below 17/below **70**)

Individual evaluation sheet	Presenter	Brief comments		A	B	C	D
1. His/her biography	#1						
2. Explanation of the main text	#2		25%				
3. Reasons of his/her being chosen	#3						
4. Conclusion & reflection	#4						
5. PPT (content, comprehensive)			25%				
6. Act out (content, language ability)			25%				
7. Comprehension & teammates' cooperation			25%				

Final Score: Presenter #1 _____ Presenter #2 _____ Presenter #3 _____ Presenter #4 _____

Name of the target person: _____ Nationality: _____

Overall comments (e.g. What have you learned from this target person and/or from this group's presentation? Was the presentation effective? Did the group's explanations help you understand the target person more?)

APPENDIX B
Group Evaluation Sheet
English (3) Fall 2010　　　　　　　Date_____

Presenters: _____ Observers: _____

1. Presentation
(1) The content of the presentation was ___ 　　well-organized ☐—☐—☐—☐—☐ not well-organized 　　very clear　　☐—☐—☐—☐—☐ not clear
(2) The flow of the presentation was ___. 　　very smooth ☐—☐—☐—☐—☐ not smooth
(3) The presenters showed ___. 　　full cooperation ☐—☐—☐—☐—☐ no cooperation
(4) The presenters had ___ with participants. 　　great interaction ☐—☐—☐—☐—☐ no interaction
2. Learning
(1) Through listening to this group's presentation, we found ourselves learning ___. 　　very effectively ☐—☐—☐—☐—☐ ineffectively
(2) After listening to this group's presentation, we felt ___ to learn more about the content. 　　highly motivated ☐—☐—☐—☐—☐ not motivated
3. Other remarks 　⇨

APPENDIX C
Self Evaluation Sheet
English (3) Fall 2010　　　　　　　Date_____

Presenters: _____

1. Presentation
(1) The content of our presentation was ___ 　　well-organized ☐—☐—☐—☐—☐ not well-organized 　　very clear　　☐—☐—☐—☐—☐ not clear
(2) The flow of our presentation was ___. 　　very smooth ☐—☐—☐—☐—☐ not smooth
(3) We showed ___. 　　full cooperation ☐—☐—☐—☐—☐ no cooperation
(4) We had ___ with participants. 　　great interaction ☐—☐—☐—☐—☐ no interaction
2. Learning
(1) Through our presentation, we found ourselves learning ___. 　　very effectively ☐—☐—☐—☐—☐ ineffectively
(2) After our presentation, we felt ___ to learn more about the content. 　　highly motivated ☐—☐—☐—☐—☐ not motivated
3. Comparison between the 1st and 2nd presentations
(1) Preparation stage: 　⇨
(2) Presentation stage: 　⇨
(3) Learning effectiveness: 　⇨

太魯閣族原始信仰與基督教教義之嫁接
The Tribe Religion of *Truku V.S. the* Substitution or re-interpretation of Christian doctrines

陳淑芬[1]
Shu-Fen Chen
黎明技術學院通識中心
講師
fion43@kimo.com

吳茂昌[2]
Mao-Chang Wu
黎明技術學院通識中心
教授兼通識中心主任

蕭人姝[3]
Jen-Shu Hsiao
黎明技術學院通識中心
講師

摘　　要

　　筆者撰寫本文的動機有二：一、每當筆者到原住民部落旅遊，總是不解在相同的基督教傳教方式，何以原住民基督教信仰普及率遠高於漢族。二、觀看《賽德克.巴萊》下集，賽德克族的彩虹橋傳說竟與基督教最後的審判如此之相似，故大膽推論太魯閣族原始信仰與基督教義應有某些程度雷同，於是引發筆者於專業之外做個小小的研究以滿足個人的好奇心。筆者發現：宣教士將編織之神的概念除了擴大詮釋祖靈外，現今也有人將其擴大詮釋為是創造天地萬物之神靈。而編織之神雖然無上帝之名，卻有上帝之實，而如其所言，上帝叫什麼名字並不重要，重要的是這個名字的背後義涵代表的正是真神上帝。故其意被昇華後，上帝也搖身一變成為祖靈祭中凌駕於祖靈之上的主角，由此，祖靈祭中祭祖靈的信仰意義已成功被嫁接。再度說明不論古今，宣教士為積極傳教最後還是會依循原有文化脈絡或重新詮釋或移花接木基督教義，讓接受傳教的信徒在原有的基礎上很熟悉地進入上帝的牧園。

關鍵詞：太魯閣、祖靈信仰、彩虹橋、編織之神、賽德克

Abstract

The observations of two phenomena inspired me to do this search. First, whenever I travel to the aboriginal tribes, I always wonder why the conversion of Aboriginal tribe to Christian faith is much higher than the Hans. Second, from the sequel of " Saejiq Bale " I see lots of similarity between the Legend of utux rudan of Saejiq Bale and that of Christian Last Judgement. My conclusion is : In the past and today, missionaries usually proselytize People by either substitution or re-interpretation of Christian doctrines based on their original cultural context. In addition to the concept of Utux tminun , people expand the interpretation to the scope of God The Creator. Although the Utux tminun carries no name of God, it is equipped with all the might God has. So the truth is : It is the meaning behind it's name that counts. God is now transformed to Ancestral Spirits , and the aboriginal tribes enter God's garden with some of their cultural traits.

*Keywords***:** Truku**,** utux rudan, Hakaw utux, Utux tminun, Saejiq

壹、基督宗教在台灣發展的過程

在今日爲數將近四十五萬的台灣原住民中，約有八成的原住民人口以基督信仰爲其宗教，如此高比例的信仰基督宗教[1]自有其一定的發展歷程。一般而言，基督宗教在台灣發展的過程，大致上可依序分爲荷西時期、明清時期、日治時期及光復後四階段加以探討。

早在十七世紀基督宗教於荷西時期即已傳入台灣，並在原住民社會（主要以平埔族爲主）萌芽。但隨著荷蘭、西班牙相繼離台後，明鄭時期始，因爲引進了更多的民間信仰，使得其與滿清此一前後長達三百年的時間，被視爲是西方宗教在台灣宣教史上的黑暗斷層期。其後，日人據台初期，傳教工作才又重新於原住民社會發展開來。[2]然而民國二十六年中日戰爭爆發後，日人唯恐台人逆謀而起，因而進一步施行高壓統治，除了推行皇民化運動，更在思想文化上予以嚴格箝制，尤其是一向被日人視同野獸一般桀驁難馴的台灣原住民族。雖然原住民族群起反抗者不在少數，但終因武力相差懸殊而告失敗。而在當時的宗教信仰上，日人除了強迫原住民信奉其神道教外，更嚴禁外國宣教士進入山地部落傳教，當時原住民宣教士只能以秘密聚會的方式傳播福音，然而一旦爲日人發現，輕則遭致嚴厲酷刑，重則以身殉道。尤有甚者，日人若干影響族群文化之殖民政策如集團移住[3]等，都一而再再而三強烈的衝擊其傳統文化體系。直到台灣光復後，國民政府接收台灣，因憲法明文規定：「人民有信仰宗教之自由」，西方宗教之宣教工作才得以如火如荼的展開。而就在此一時期，原住民教會不論是基督教或天主教等無不以驚人的速度迅速拓展，在極短的時間內建立許多教會，如當時在花蓮地區傳教的天主教費聲遠主教以「山洪傾洩，又速又廣，是真正的歸主運動」來形容，並認爲這種集體皈依現象在中國天主教歷史上是絕無僅有的奇蹟。[4]此時，整個原住民社會儼然已成爲一個基督教社會，教會活動也成爲社區活動之重心，這整個快速發展的過程被喻爲是廿世紀宣教史上的一大神蹟。

承前所言，基督宗教之所以如此受到台灣原住民族的青睞，一般認爲與當時的社會環境與時代背景有很大的關係。即因爲日治時期之理蕃政策改變了整個原住民族的生態環境與生產形態，其部落組織亦遭到嚴重破壞，因而削弱了傳統宗教勢力。光復後，國民政府的山地平地化政策對其傳統文化之衝擊無疑更是雪上加霜。此外，由於原住民族

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[1] 基督宗教爲泛基督教之通稱，其代表基督教在歷史上發展過程中的三個傳統，即羅馬天主教、東正教及新教，今台灣原住民所信仰的教派以台灣基督長老教會爲多，天主教及真耶穌教次之。根據 1991 年台灣省民政廳調查顯示，台灣原住民中有宗教信仰者佔原住民人口的 87%以上；其中信仰基督宗教者高達 77%。台灣省政府民政廳《中華民國八十年台灣省偏遠地區居民經濟及生活素質調查報告》，第一輯山地、平地、都市山胞部分（南投：台灣省政府民政廳，1993 年），頁 39~42。

[2] 當時日本憲法採取世界潮流，對於宗教高懸信教自由主義，因此初在台灣仍與其本國相同採宗教公認政策，認爲不害公共秩序及良風美俗之宗教，即可自由傳佈。劉寧顏主編：《重修台灣省通志》，卷三・住民志・宗教篇・第一冊（南投市：台灣省文獻會，1992 年），頁 7。

[3] 以泰雅族系爲例，其部落多係「血族團體」所構成的部落，較易採行血族狩獵、祭祀、勞役、犧牲等的社會團體，但自民國三年以後，日人鑑於泰雅族深居山地，民性強悍，難於控制，因而在泰雅族地區實施大遷徙，其遷徙的方式是，將同血族團體分散遷建或若干血族集中於一社，形成一個不同血族團體雜居一社，或同一血族團體分散於不同部落的情形。加之，日本統治期間，自始至終採行「強制、壓制」手段，令泰雅人放棄以往的習俗 gaga；禁止一年一度的豐年儀禮，無形中部落組織或 gaga 組織被迫停頓，亦直間接影響了泰雅族各種社會活動的功能。廖守臣：《泰雅族的社會組織》（花蓮市：慈濟醫學暨人文社會學院，1998 年），頁 63。

[4] 同註 2，頁 421。

傳統宗教較爲簡單、不夠嚴謹，缺乏深厚的基礎，因而當西方宗教挾其積極的傳教精神、嚴謹的組織及具有深厚神學基礎的教義經典進入山地部落後，即適時地取代了原住民族的傳統宗教信仰。[5]雖然今日台灣原住民族如此廣泛且大規模的信仰基督宗教，但細觀其接受基督宗教的歷程，其實並非如表面上造成信仰間的衝突而必須全然地揚棄、背離其原始信仰；相反地，在宣教的過程中，基督宗教與原始信仰之間竟然因爲共同存在著某些足供相互連結的元素，進而產生了對應與共鳴。因此，宣教士或者有意無意的借此連結達到傳教之目的，而原住民信徒亦有意無意的借此連結轉化或深化其信仰。筆者大膽用「嫁接」，比喻在原住民原有的信仰上結成豐碩的基督教果實。以下即分別從太魯閣族之靈魂橋傳說、編織之神與祖靈信仰探討之。

貳、靈魂橋傳說

　　對整個泰雅族系[6]而言，靈魂橋傳說無疑是一則非常重要的傳說故事，因爲 此傳說內容與其原始信仰相涉，成爲此系族群重要的信仰淵源，因而深深影響其在日常生活中之若干行事準則。在太魯閣語中的「Hakaw utux」，Hakaw 是橋的意思，Utux 在此指人死後的靈魂，而 Hakaw utux 即今人所見之彩虹。今或有譯成「彩虹橋」或「鬼之橋」者，但深究其義，應以「靈魂橋」稱之較爲適當。今泰雅族系之靈魂橋傳說，雖眾說紛紜，但大致仍有一清楚之輪廓，其故事內容如下：

> 人死之後，他的靈魂一定都要通過 Hakaw utux。所以 Hakaw utux，就是靈魂走的橋。當人的靈魂要經過 Hakaw utux 時，橋頭會有祖靈守護著，準備要檢查人的手。男人如果是一個擅於狩獵或曾經砍過很多人頭的英雄，則他的雙手會留有紅色的血痕；而女人如果精於織布的話，雙手也會長滿厚厚的繭。因此，只有擅獵能織的文面男女才能通過檢查，順利走過 Hakaw utux 與歷代祖靈在一起。至於沒有通過的人則會掉至橋下，進而被橋下的一隻大螃蟹所吞噬。[7]

　　此一傳說，使早期的太魯閣人皆相信人死後，必須要經過靈魂橋才能到達祖先之地，而爲了能順利通過祖靈「擅獵精織」的考驗，男生於成年後必須勇於出草，女生則

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[5] 同註 2，頁 422~423。

[6] 今人所稱之「泰雅族」一詞，多認爲只是單純一個族群的名稱，然而在此一名稱之下，卻包含若干在語言、生活方式、風俗信仰、口傳歷史上有著不等程度異同的族群，其族群系統之繁雜堪稱台灣原住民族之最，今日對泰雅族的分類以花蓮太魯閣人廖守臣所提出的分類法普遍爲學界所認同採用。其在考諸文化結構、體質及體形特徵，認爲泰雅族群尚屬一源，但因部族之擴散移居造成語言上的差異而區分爲兩大亞族（泰雅亞族、賽德克亞族），再依血親宗族與地域關係區分爲七大系統，共計二十五群。若照廖守臣的分法，今之太魯閣人當屬泰雅族賽德克亞群中的托魯閣（太魯閣）群。然而，雖然諸如語言學、民族學、人類學等各領域學者皆表示泰雅與賽德克當同屬一源，但是花蓮地區的太魯閣人卻始終堅持以族稱的不適及今之語言文化等確實有異於泰雅族爲由，而在長老教會太魯閣中會部分牧師的倡導下，推動一連串的正名運動，並於民國九十三年一月十四號，由行政院通過太魯閣族正名案並宣佈太魯閣族成爲台灣原住民族的第十二族。雖然太魯閣族已經成立，實仍問題重重，其中尤以其祖源地南投地區太魯閣人堅決反對以「太魯閣族」爲名，而欲另以「賽德克族」之名作爲涵蓋太魯閣、道澤、德奇塔雅之同系三族群的共同族名。由此觀之，花蓮地區的「太魯閣人」與南投祖源地的「賽德克人」，正因爲複雜的正名問題使得其同族情感瀕臨破裂的邊緣。本文所用之「泰雅族系」意即包含泰雅亞族、賽德克亞族及太魯閣族。

[7] 今泰雅族系所流傳之靈魂橋傳說有許多不同的說法，唯此一傳說與其他故事相較下故事性並不強，講述者在敘述時往往解說爲重，因而內容頗爲零碎，筆者所舉之例爲今太魯閣族流傳最盛、最廣的一種說法，經比較相關文獻及實地調查後之資料整理而得。

須在家勤於織布，待其臉上被刻畫上象徵勇武與美麗的文面圖騰後，便可在死後安然走過靈魂橋至祖先地，而不會掉到橋下為螃蟹所噬。可見此一傳說，反映出幾個今太魯閣人重要的習俗源流：第一，文面來源。由於文面習俗，是泰雅族系人至為重要且鮮明的文化表徵，[8]而文面的由來歷來也有許多說法，其中基督宗教在台灣發展的過程進入靈界說即是其中一種。[9]第二，獵首來源。關於其獵首來源，根據何廷瑞的研究可歸納為八項，而死後進入靈界亦是其一。[10]第三，泛靈信仰。初聞靈魂橋傳說，多會對其中諸多情節如驗証方式、祖靈之地的美好、橋下的苦痛與基督教的死後審判、天堂地獄等觀念竟是如此相近而覺得訝異。首先，太魯閣人對於橋上之「守護者」分別有神、祖靈及螃蟹等不同的說法，此外直稱此守護者為「上帝」者亦所在多有。其次，關於「驗証」情節僅管有許多異說，但符合男獵女織的基本原則是不變的，故不論由觀手或驗刀以見紅察繭，都只是為了檢查其生前有無馘首行為或勤於織布而已。這一段在人死後欲進入祖靈地前接受守護者驗証的過程似乎與基督宗教中提及人死後必須經過神的審判才能進入天國的說法不謀而合。[11]至於「祖靈之地」，今太魯閣人一般對此部分敘述較為含糊，較具體之敘述如：「那邊每一個人都長得像月亮一樣臉圓圓的，很漂亮！」[12]或說：「過橋的人聽說臉都圓圓的，在那邊天天都很高興。」[13]也有言：「通往彩虹橋的時候，等於通往一個永遠有吃不完的地瓜跟小米的園地。」[14]由此觀之，除圓臉代表何意實難理解外，總之祖靈之地對其族人而言是一個什麼都好的地方。反之，靈魂橋下據說除了有巨蟹會咬斷人的手腳外，還有青蛙也會將人咬碎，人在底下都是一直被折磨著。因此，此與基督宗教所言天堂之美好與地獄之苦難亦頗為相近。

綜上所述，靈魂橋傳說與基督宗教間竟有諸多情節如此相近，連講述故事者不免都心生疑竇。然而，由於西方宗教傳入原住民社會不過是近百年之事，以太魯閣族為例，頗多老一輩的人在剛接觸西方宗教時，也同樣對《聖經》中諸多的信仰觀念與其靈魂傳說極為酷似而感到不解，但由於講述者多言之鑿鑿的表示早在其接觸基督宗教前已有靈魂橋傳說故事流傳，因此今太魯閣人泰半不認為此傳說有受到基督宗教的影響。然而，太魯閣人陳清秀曾說：「為什麼今天長老教跟天主教傳到我們原住民社會時，它會很快

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[8] 今史籍對其文面表徵有諸多記載。如清郁方河《番境補遺》言：「斗尾龍岸番，皆偉岸多力，既盡文身，復盡文面，窮奇極怪，狀同魔鬼。」《臺海使槎錄》卷六及南投縣轄境內之泰雅女子時說：「水沙連北港女將嫁時，兩頤用鍼刺如網巾紋，名刺嘴箍，不刺則男不娶。」另陳叔均編纂《噶瑪爾廳志》亦載有宜蘭縣境內泰雅族之文面習俗：「叭里沙喃，額刺王字者尤逼近尤兇惡。」

[9] 泰雅族系對文面由來大致有幾種說法，即近親婚配說、人狗婚配說、敵我識別說、神靈托夢說、追求美觀說、進入靈界說。劉育玲：《台灣賽德克族口傳故事研究》，（花蓮：花師民間文學研究所碩士論文，2001 年），頁 146~147。

[10] 何廷瑞歸納出泰雅族之獵頭原因有如下八項，即復仇、死後進靈界、獲得保護靈、祭祖、成年、判決爭議、爭取社會地位、禳祓不祥。何廷瑞：〈泰雅族獵頭風俗之研究〉，《文史哲學報》7 期，（1956 年）頁 160~161。

[11] 《聖經》中有諸多觀於審判的記載。如「按著定命，人人都有一死，死後且有審判」（來 9：27）、「弟兄們，你們不要彼此埋怨，免得受審判。看哪，審判的主站在門前了」（雅 59）、「我又看見死了的人，無論大小，都站在寶座前。案卷展開了，並且另有一卷展開，就是生命冊。死了的人都憑著這些案卷所記載的，照他們所行的受審判」。（啟 20：12）在筆者實地調查過程中，也曾採錄到一則關於人死後經過靈魂橋後到達祖靈之地隨即死而復活的說法，但因在整個靈魂橋傳說中實為特例，故不列入探討範圍。

[12] 同註 9，頁 139。

[13] 同註 9，頁 139。

[14] 同前註。

被我們接受，此與人死後要通往祖靈處的信仰是有關的。」[15]可見靈魂橋傳說在太魯閣人之原始信仰中本佔有極為重要的地位，雖然今部分族人在講述此傳說時，若干用詞如稱橋上的守護之神為上帝、稱驗証過程為審判、稱祖靈之地為天堂（天國）、稱橋下有螃蟹之處為地獄等，確實在使用的語言上明顯受到西方宗教的影響，但平心而論，觀其故事結構與其中所蘊含的文化意涵還是有著濃厚的族群色彩。因此，或許靈魂橋傳說與基督宗教兩者之間原本就不約而同在概念上具有相當程度的雷同性，也因為此一連結點，而使太魯閣人的原始信仰與原本陌生的外來宗教產生了對話與互動。

　　雖然如此，在今日基督宗教已普遍成為原住民族主流宗教的情況下，靈魂橋傳說早已失去其原有的信仰意義，亦即現今多數之太魯閣人已不再相信人死後必須要通過靈魂橋到達祖靈之地，其表示：

> 你一到那邊，男的話手會出血，就表示你有殺過人頭。我一直很懷疑，那我們沒有殺過人頭的怎麼辦？女的話要很會織布，很會的話就通過，不會的話就下去。那我就很懷疑，我們不會殺頭也不會織布的有沒有其他的捷徑、方法？它不像聖經裡面說，你只要認真悔改，信靠祂。很簡單嘛！[16]

或許基督宗教在宣教初期，對於靈魂橋的信仰或多或少拉近了此族群與基督宗教之間的關係，但是當形成此靈魂橋信仰之時空環境已不復存在，而基督宗教又以嚴明的組織與經典教義強勢的闖入此族群的生活時空時，其靈魂橋傳說中原本蘊含的原始信仰意義亦隨之被基督宗教所取代而走進歷史。

參、編織之神

　　太魯閣人的神靈信仰基本上是屬於祖靈崇拜之泛靈信仰，其認為祖靈（utux rudan）是主宰一切的力量，具有無上的權力，人類社會一切禍福皆受其控制。然而今之太魯閣人常將神、靈魂與鬼等概念混稱作 utux，亦即 utux 是泛指一切無形的超自然力量。換句話說，utux 在太魯閣人心中除了是超自然的神，同時也是靈魂與鬼的化身。因此，太魯閣人的宇宙中可分為神靈與人兩大部份，而神靈中又以祖先之靈為首要。據《續修台灣省通志》中所載：「泰雅人（含太魯閣族）稱所有的超自然存在為 rutux（utux），而沒有生靈、鬼魂、神祇或祖靈之分。更沒有個別或特有之神名。Rutux 既是超自然的全體，也是其個別的存在。」[17]由此段敘述觀之，似乎在泰雅族系人的神靈觀中除了眾所皆知的祖靈信仰外，並無其他它神祇的存在。然而，根據少部分文獻所載及筆者之實地調查，不論泰雅或賽德克皆隱約提到一位編織之神的存在，只是其對於編織之神的概念與定位似乎並不明確。

一、編織之神的概念

　　編織之神（非織布之神），太魯閣語稱 Utux tminun，utux 一樣是超自然力量之泛稱，至於 tminun 則是「編織」之意。根據族人的說法，編織之神是有別於祖靈的神，因為族人的生命就是由祂編織出來的。此一說法明顯有別於賽德克系人始祖起源之樹石生人

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[15] 同前註。

[16] 同前註。

[17] 劉寧顏主編：《重修台灣省通志資料》，卷三‧住民志‧同冑篇‧第一冊（南投市：台灣省文獻會，1995年），頁 337。

說。[18]而祂不只創造族人的生命，之後更持續編織人的命運直到死亡爲止。[19]據說以前老人家都會加以告誡，如果看見殘疾之人千萬不可以嘲笑他，因爲他也是編織之神所創造出來的。[20]在早期日人對泰雅族宗教信仰的調查中述及關於神的概念時也有類似的說法，其言：

> 番語所稱之「otox」「utux」「rutux」及「lutuk」主要是指死者之靈魂，但有時似也指稱無形之神。例如人出生爲「tminun utux」（「utux」織），稱人之死亡爲「masoq tminun utux」（「utux」織完了），稱人之好運爲「blaq cinunan utux」（「utux」織得好的結果），稱惡運爲「yaqih cinunan utux」（「utux」織壞了的結果）……等等，諸如此類，與其將它視爲死者之靈魂，不如將它視做造人且支配人的命運之神。……太㧚崁番中雖然同樣稱「utux」，卻認爲「utux mhuqil」（死靈）與「utux tminun」（生魂）應做區別。[21]

以上所呈現出編織之神的概念雖然頗爲含糊，但大致有一清晰的脈絡，即編織之神不僅掌控人的生死，也掌控著人的命運。由於泰雅人與賽德克人乃至於太魯閣人本係同源，故其對於編織之神的概念亦大同小異。因此，泰雅族系對 utux 的混稱，使得與 utux 相關之詞語概念也容易相互混淆，但從上文觀之，所謂的「無形之神」或「生魂」都是指稱這位掌控著人生死命運的編織之神，其所代表的神性更是表露無疑。由此可見，泰雅系族人除了祖靈之外，確實尚有一編織之神的神靈存在，只是今日約莫年紀較長者與教會牧師才知曉此一概念。

二、編織之神概念的擴大

對於編織之神編織人生死命運的說法，今似乎有被擴大詮釋的跡象。如南投高德明牧師即對編織之神有如下的闡釋：

> 在傳統信仰裡，所謂祖靈是指那編織族人生命的神靈，這個神靈賽德克族稱"Utux tmninun"（編織的神靈）。現今有許多錯誤的了解，認爲"Bgihul"（靈）也是神靈。事實上，只有此編織人生命的神靈被稱爲"神靈"，其餘才是"靈"。人擁有的靈是編織的神靈所賜的，當人死亡時就是編織的神靈來取走人靈的時

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[18] 太魯閣神話中之始祖起源說：「太古之時，有巨樹，其高入天，枝葉鬱鬱蒼蒼，遮蔽天地，因爲太陽被樹葉所遮蔽，所以宇宙永遠是一片黑暗。其後樹下生出四腳而全身長毛的動物，又生出頂上有瘤而體如樹幹，底下有兩樹枝如根的動物，其後樹上也生了二種動物，一種形狀細長，不能直立，祇能匍匐而行，一種體輕手長，能在地上行走又能在空中飛，此即獸、人、鳥之始祖……其樹幹所化成的最初的男體中，又生出男女二人，此即我族的始祖。」或言：「昔日，中央山脈博諾彭地方有一棵大樹，其半面爲木質，半面爲岩石，頗爲奇怪。一日，木精化爲神，內出現男女二神。此二神生多數子女，數代後人口便增多了。」佐山融吉、大吉西壽《生蕃傳說集》（台北市：杉田重藏書店，1923 年）頁 27、28。今賽德克人（太魯閣、道澤、德奇達亞）多相信其始祖乃是自 Pusuquhuni（樹根）迸生而來此樹根位於中央山脈的白石山上，於霧社東南方，標高 3108 公尺，爲濁水溪支流萬大溪與花蓮溪支流萬榮溪之發源地。雖說是樹根，實際上卻是一顆有樹附生其上之巨石。此神石海拔 2750 公尺，高約 80 公尺，基底直徑約 20 公尺，因岩頂有樹附生，故遠眺像一拔地而起的大竹筍，當地人稱「石筍」；有人認爲它像觀音立像，而有「觀音石」之稱；今台灣山岳界則稱其爲「牡丹岩」。

[19] 同註 9，頁 139。

[20] 同前註。

[21] 小島由道：《番族慣習調查報告書・第一卷・泰雅族》，（台北市：中央研究院民族學研究所，1996 年），頁 40。

候。今一般賽德克人確實多以 Utux 混稱祖靈、神、靈及鬼，實是受西方宗教的影響。[22]

在此，其將一般賽德克人所稱之祖靈（utux rudan）等同於創造人生命的編織之神（utux tmninun），這與一般族人所認知之祖靈有所不同。由於祖靈在賽德克人信仰中係指歷代祖先死後的靈魂，而祖靈雖然具有主宰的力量，但並不具有創生的功能，而編織之神卻是創造人生死命運的神。因此嚴格來說，祖靈為過去死去祖先之靈的一種統稱，而祖先曾經在人世間的生命（人靈）理當也是由編織之神所賜，因此編織之神似乎更加超然獨立於祖靈之上，兩者明顯在神格的層次上有別。但由於以上之論述者為牧師，因此其將祖靈等同於編織之神，若非筆誤，則似乎有意識或無意識地將祖靈信仰的層次向上提升。

編織之神的概念除了擴大詮釋祖靈外，現今也有人將其擴大詮釋為是創造天地萬物之神靈。其表示：「我們世界上的東西都是 utux tminun 織出來的，所有我們看到的和我們的身體都是一樣。」[23]它是「創造一切的神」[24]。由此可見，老人口述中的編織之神原本只有編織人生死命運的功能，在此搖身一變而成為創造世界萬物的大神。顯而易見，將編織之神擴大解釋為創造天地萬物之神乃是受到基督宗教的影響。如一位太魯閣老人所言：

像我們的話，「utux tminun」不是織布的神，是像創造天地萬物的神一樣。以前沒有上帝的觀念，可是一定有像上帝一樣創造山啊、天啊、太陽啊，一定有那樣的神。（utux tminun）跟後來上帝的觀念很像。[25]

由此可知，將編織之神與上帝相提並論，使得原本其職能僅為掌控人生死命運，但在基督宗教傳進其社會後，也有被擴大解釋為與上帝等同之創世大神。

三、編織之神與未識之神

承前所言，倘若編織之神等同於上帝，則與基督信仰的一神論就明顯有了形式上的衝突，但事實上卻非如此。因為對部分太魯閣人及其族群之宣教士而言，其所認知的編織之神其實就是上帝本身，只是在福音還未傳至太魯閣社會之前，它還是屬於「未識之神」。而何謂未識之神？〈使徒行傳〉中提到保羅在雅典街道上的一段講演：

保羅站立在亞略巴古議會上，說：「眾雅典人啊！我看你們凡事都很敬畏鬼神。我走在城裡，觀看你們崇拜的場所，發現一座祭壇，上面竟然刻著「未識之神」。我現在要告訴你們的就是這位你們不認識卻在敬拜著的神。這位創造天、地、萬物的上帝乃是天地的主。他不住人所建之殿宇，也不需要人的任何供奉；因為他把自己把生命、氣息，和萬物賜給人類。他從一人造出萬族，使他們散居在各地，而且預先為他們訂下年限和疆界。他這樣做是要他們尋求上帝，或者能夠在摸索中找到他。其實，上帝跟我們每一個人相距不遠。……」[26]

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[22] 高德明：〈非人的境遇—霧社事件的 Sediq 觀點〉，《霧社事件七十周年國際學術研討會論文集》（台北市：台灣基督長老教會總會，2000 年），頁 13。
[23] 簡鴻模：〈台灣原住民對基督宗教的皈依—以南投仁愛鄉眉溪部落為例〉，（台北縣：輔仁大學宗教系，2002 年），頁 3。（未刊稿）
[24] 同註 9，頁 139。
[25] 同前註。
[26] 《聖經·使徒行傳》第 17 章，22~27 節。

上文提及雅典人事事敬鬼拜神，甚至怕所祭拜之鬼神有所遺漏而建立一座「未識之神」的祭壇。雖然如此，保羅不但沒有批評、譏笑，反而以「未識之神」做橋樑，從「未識之神」導引到「天地的主」進而傳播福音。他告訴雅典人他們所不認識的神，正是那位創造宇宙萬物的全能者—上帝。根據 Peelman 的發現，美國第一民族（The first nations of America）相信基督在基督教宣教士未來到他們之前就已經臨在並活躍在他們當中。因此，在他們的宗教宇宙觀裡，早已有「未知者的基督」，就好像保羅在雅典的經驗，即「未識之神」[27]。同樣地，今賽德克族群內也有類似的說法，其言：「在 Saejiq（賽德克）的傳統信仰裡也非常相信及尊敬上帝、祖靈和鬼神，他們始終相信世上有一位超自然及大能力的獨一大神，也許這位大神就是保羅所說的未識之神、是創造宇宙及所有受造物的上帝。」[28]這裡雖未提及編織之神，但其傳統信仰中如上的超自然獨立大神，似乎只有編織之神符合。因此，若以此說法重新檢視編織之神與上帝之間的關係，從宣教士的觀點觀之，因為二者本係一體，因而根本無所謂信仰上的衝突，正如一位賽德克老人所說：「utux tminun 跟上帝是一樣的，只是一開始我們還不知道原來就是祂。」[29]

　　平心而論，原先雅典人所敬拜的「未識之神」自然不會是保羅所說的「天地的主」，那只是一種宣教的手段，巧妙的將未識之神與上帝相連結。因此，過去有許多外國宣教士進到異文化民族宣教時，首要之務就是先瞭解其文化習俗，然後再將其基督信仰與原始信仰予以融合或轉化。然而，以太魯閣族早期之宣教士為例，從有「台灣原住民信仰之母」美譽的芝苑[30]開始，之後其門下之宣教士也都是同族人，故其對自身族群文化熟稔的程度絕對是外國宣教士所望塵莫及，因此他們在宣教之時便更容易像保羅一般找到更多的連結點，並透過此一連結點，直接將基督宗教嫁接於於原始信仰間之上，開出燦爛的花朵。

肆、祖靈信仰

一、祖靈信仰與 gaya

　　太魯閣族之祖靈信仰是以祖靈（utux rudan）[31]為中心之超自然信仰，「utux」是無

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[27] Peelman,Christ is a Native American, 150~151。轉引哈尤・尤道：〈禮拜更新：本土化禮拜〉，《玉山神學院學報》，第 11 期（2004 年 6 月），頁 228。

[28] 哈尤・尤道：〈禮拜更新：本土化禮拜〉，《玉山神學院學報》，第 11 期（2004 年 6 月），頁 228。

[29] 同註 9。

[30] 芝苑在太魯閣族的宣教史上佔有舉足輕重的地位，其傳奇性的一生更為族人所津津樂道。她一生共嫁了三個漢人丈夫，第一任丈夫為族人所殺；第二任丈夫因病而故；第三任丈夫是因為她擁有許多金錢、財產而入贅於她，成天吃、喝、嫖、賭直到其錢財散盡。在她傷心欲絕，重要的生命決定性時刻，遇到了李水車傳道夫婦向她傳福音因而改變了她的生命。她認真參與各種聚會，學習羅馬字及研究聖經，在受洗為基督徒後更在孫雅各牧師的鼓勵下以 58 歲高齡到淡水婦女聖經學校讀書，八個月後學成後隨即回花蓮開啟了她的傳道生涯。酋卡爾：《台灣基督長老教會原住民族宣教史》（台北：永望文化，1998 年），頁 64~66。

[31] 太魯閣族對於 utux 的觀念，除了前所言之 utux tminun 外，尚有以下多層的含意。(1) utux rudan（祖靈）還有所謂的善靈（utux malu）與惡靈（utux nagah）之分。善靈者即善死之人，如在家有子女隨伺在側而逝者，死後即為善靈；相反地，惡靈者即凶死之人，如在外發生意外死亡、自殺死亡、被人殺害或無人陪伴而逝者，死後即為惡靈。此外，基督教傳進之後，也以 utux nagai 指稱邪靈 ’魔鬼。(2) begihul（風、氣、靈）。除了 utux，也有人以「begihul」來指稱祖靈。begihul 在太魯閣語是風、氣之意，因為與靈同為無形之體，所以可互通之。(3) utux baraw（上帝），太魯閣人田信德表示：「utux baraw 是後來才表示上帝，baraw 是上的意思，所以意思是上面的 utux。第一個用這個話的是一個外國的傳教士，原本是用 utux rudan。」可見，utux baraw 是基督教傳進來後結合其族群原有的語意所創造出來的一個

形的超自然力量,「rudan」則是祖先或老人之意。今日一般太魯閣人除非要特別強調祖靈之意才會完整地說出 utux rudan,否則大部分的人都直接省略 rudan 而直稱祖靈為 utux。太魯閣人崇拜祖靈,其認為祖靈具有無上的權力與力量,人類社會一切活動皆受其控制。祖靈監護子孫,但並不一味保祐而毫無責罰,更不會無條件的賜與恩惠。如果子孫遵守祖先訂下之法則制度,包括道德準則和祭祀禁忌,則祖靈就會使族人身體安康,農作、狩獵豐收;如果行為不檢,違逆祖訓,祖靈便會降下疾病與災難,使農作歉收。而一旦部落中有人破壞祖訓或相關禁忌,不僅對個人生產不利,也將危及團體安全。除此之外,族人亦透過巫師作法來影響祖靈,即使不慎觸犯禁律,也可用贖罪的方式去改變祖靈的責罰。而所謂 gaya(道澤稱 waya、泰雅族稱 gaga),是此系族群在日常生活中一種習慣法之通稱,也可說是祖先所流傳下來的各種訓示。「它真正的內涵除了一般的習俗之外,尚包括法律、道德、禁忌、儀式、禮俗、規範等等;實際上,這個詞彙以『文化』解釋更為貼切。」[32]

今日太魯閣族的祖靈信仰已日漸式微,如前所言,在若干外在及內在因素交互影響下,其整個部落組織與原始信仰因而崩潰瓦解。此外,一般認為基督宗教的涵化也是重要的原因。對此,太魯閣人廖守臣曾表示:

> 自基督教在泰雅族地區盛行後,使泰雅族中原有的 gaga 組織與活動漸形解體。最顯著的改變,是在宗教信仰的觀念方面,基督教信奉的「神」或「上帝」代替泰雅族原崇奉的「祖靈」,以「祖靈」為中心的超自然信仰,實踐於祭祀團體的各種儀式行為,及各種禁忌及實踐於血族犧牲、狩獵團體的同負罪責,同享安樂等儀禮亦漸改為在教堂、或家內外舉行「禱告」,向「神」贖罪,也同樣地可拔除其污穢,不必殺牲賠祭、同食祭肉了。[33]

因此基督宗教傳入太魯閣社會,在「一神論」的教義下,對太魯閣人而言,最明顯的影響莫過於是與其祖靈信仰和 gaya(習俗規範)系統的衝突。因為太魯閣人崇拜祖靈,而上帝卻是創造世界萬物的唯一真神,因此祖靈也理當為上帝所打造,換言之,接受基督宗教就不能再崇拜祖靈,這對傳統生活中幾乎事事與祖靈相涉的太魯閣人而言,是必須嚴肅以對的問題。但是,所謂傳統生活已悄然遠逝,在各種主、客觀因素的影響下,連帶使祖靈信仰與 gaya 的力量也隨之被削弱。因此,當時部分宣教士即在此一原始信仰較為軟弱的時期,將基督宗教與原始信仰結合成宗教性的對話說服其族人轉換信仰。如早期太魯閣人宣教士 Kumu Losin[34]到南投眉溪傳時,曾以傳統 gaya 已隨已逝老人而去,而請信徒改採「外國人的 gaya」。據當地老人說:「我們做 gaya 的老人都過逝了,也沒人來教我們怎麼做了,好像我們失去了方向一樣。所以 Kumu Losin 他們來部落傳教時,我們想乾脆我們就學美國的 gaya 好了,也是一樣都是 gaya」[35]這裡所謂美國的 gaya 自然就是指聖經教義,然而美國的 gaya 與傳統的 gaya 內容一樣嗎?對此,老人家說:「Kumu Losin 到眉溪時,她說:不要偷東西,不要搶別人的東西,不要打人……。

新的後起詞,而且顯然有意與 utux rudan(祖靈)做出區隔。

[32] 余光弘:〈泰雅族東賽德克群的部落組織〉,《中央研究院民族學研究所集刊》,第 50 期(1981 年),頁 101。

[33] 廖守臣:《泰雅族的社會組織》(花蓮市:慈濟醫學暨人文社會學院,1998 年),頁 64。

[34] Kumu Losin(周玉葉),早期從芝苑處聽得福音後,便開始其傳道生涯,其足跡遍佈南投仁愛鄉—清流、眉溪、中原、力行;台中和平鄉;宜蘭大同,四季和南澳鄉等。太魯閣中會為紀念她一生奉獻給主的生命見證,特於 1986 年封予名譽宣導師。詹卡爾:《台灣基督長老教會原住民族宣教史》(台北:永望文化,1998 年),頁 69、70。

[35] 同註 24,頁 6。

這樣的道理在我們老人教導我們的 gaya 中就有了。」[36]雖然不見得所有的傳統 gaya 都與聖經教義相吻合，但宣教士（特別是瞭解其習俗文化的宣教士）為達宣教目的，有意識的選擇兩者間的共同性作為初步溝通的橋樑亦屬必然。

二、祖靈信仰的轉化

一般而言，太魯閣人的祖靈信仰展現於其日常生活與祭典活動中，雖然今日基督宗教的力量已遍布太魯閣社區，但這並不代表祖靈信仰已自其日常生活中消失，在其初期之祭典活動中，祖靈仍然是祭祀的主要對象。

今觀太魯閣族的祭典活動，從 1991 年於布洛灣台地的獵頭儀式始，一直到今日各村落廣場的祖靈祭典，祖靈信仰與宗教信仰的衝突似乎從未間斷過。以太魯閣社區內的三大教派為例，其面對祖靈祭所表現出來的態度，頗值得探討。根據旮日羿‧吉宏對太魯閣人祖靈祭的研究中指出：

> 在祖靈祭典的復振議題上，村落內的三個教派各自在神學的詮釋上，抱持著不同的祭儀態度。天主教方面，始終是以寬鬆的一貫態度面對社區的活動，也不過問參與村落文化活動的信徒們；真耶穌教會則是否定族群社會中的傳統祭儀，包括分食豬肉、禁食豬隻和動物的血等，真耶穌教會傳道者對於祭儀復振的態度，是否定而且是質疑的；至於基督教會在祭典復振初期，因為不認同儀式過程中的祭祀形態，一直是積極的反對態度，甚至也禁止村落內的教會信徒，參與首次辦理的萬榮鄉萬榮村落祭典活動。[37]

花蓮太魯閣族早期舉辦祭典乃是為了傳承其傳統文化，然而幾次的祖靈祭舉辦後似乎毀譽參半。其中讚揚者，認為藉由今日祭典的展演，可使傳統文化再現，對年輕一輩者是很好的機會教育；持反對意見者則認為，今所辦之祖靈祭已明顯有觀光化的傾象，更與傳統祖靈祭有所不同，進而成為一種僵化的「標本」。然而，反對最烈者，多是教會的牧師和傳道，主要是因為祖靈祭的若干內容與儀式違背了基督信仰與聖經教義。

雖然如此，近年來的祖靈祭活動漸漸有不少牧師參與其中，甚至還有牧師在祭典中扮演重要的祭司的色。姑且不論牧師與祭司角色職能上的衝突，由於整個祖靈祭活動中，祭司的角色無庸置疑是非常重要的，其不但必須在祭典中與祖靈對話，活動中也有獻祭的儀式，而這都是明顯違反基督教義。然而，在 1999 年於萬榮鄉萬榮村所舉辦東賽德克群的復振祖靈祭典中，台灣基督教長老教會的哈尤‧尤道牧師負責籌備祭典音樂的部分，並且扮演祭典中祭司角色，格外引人囑目。而哈尤‧尤道對其扮演祭司有如下的詮釋：

> 我認為祭典裡最重要的核心，就是我把祂昇華了。有人認為不太像了，當然是不會像，因為我們不是對著祂。他們認為牧師怎麼可以對著鬼神講話呢？我當然是對著我的上帝講話了，我把這個部分做了轉移。
> 我的祭詞內容大致上是這樣：utux, utux rudan, utux nami rudan.（祖靈，我們的祖靈）我的意思不是主的靈。Utux rudan nami sbiyaw（我們古昔的祖先），utux kana rudan nami（我們所有的祖先）這裡是不一樣的，utux rudan 是我們

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[36] 同前註。
[37] 旮日羿‧吉宏：《即興與超越：Seejiq Truku 村落祭典與祖靈形象》（花蓮：慈濟大學人類學研究所碩士論文，2004 年 7 月），頁 109。

祖先的神，不是祖先的靈，靈是人死後的靈，我把這個部分加以昇華了。

　　再一句是 kana utux tminun，…utux tminun 指的是編織的神，也就是說造物的神。我認為這個觀點涵蓋層面很大，這個觀點很重要，就像印地安人的造物者觀念。他們也認為是 utux tminun，也就是具有造物者觀念。雖然他們是當地傳統信仰，他們一樣具有造物者的信仰觀念。…他們沒有這個神學概念，他們擁有一個概念，就是造物者。也就是不管造物者用哪一種名稱，這都是一樣了。所以，他們的想法和聖經是相通的，只是名稱不相同。我是用這樣的概念，去跟上帝說話。[38]

由此可見，其在所唸之祭詞中將「utux rudan」祖先的靈，轉化爲祖先的神（上帝），如前所言，utux 在太魯閣語泛指一切超自然力量，一般 utux 若和 rudan 合用，utux 在此指死亡祖先之靈。但是由於神也是一種超自然力量，自然也可以用 utux 來指稱，進而轉變成祖先的神—上帝。因此這一句話在完全不需要改動任一語詞的情況下而直接將其意從「靈」昇華爲「神」。至於後一段提到「utux tminun」編織之神，此編織之神原爲編織人生死命運之神，後來被擴大解釋爲造物者，更進而將其與上帝等同。因此，其在祭典中刻意提到編織之神，雖然無上帝之名，卻有上帝之實，而如其所言，上帝叫什麼名字並不重要，重要的是這個名字的背後義涵代表的正是真神上帝。故其意被昇華後，上帝也搖身一變成爲祖靈祭中凌駕於祖靈之上的主角，由此，祖靈祭中祭祖靈的信仰意義已明顯被轉化。

伍、結語

　　綜上所述，太魯閣族之神靈信仰與基督信仰之間確實存在著許多相似的因子可做爲相互連結或轉化的橋樑。如靈魂橋傳說，不僅只是傳說故事，更是早期太魯閣人重要的信仰根源，其故事中隱然有類似基督宗教之上帝（祖靈）、審判（驗証）、天堂（祖靈之地）與地獄（螃蟹）之說。又如掌控著人生死命運的編織之神，其概念更被擴大解釋爲含蓋祖靈甚至等同於創造天地萬物之造物者。此外，太魯閣人也有類似聖經教義的gaya。而唯一較有爭議的祖靈崇拜，也在祖靈祭由基督教牧師以其神靈信仰中原本即有的編織之神的概念巧妙的加以轉化。今太魯閣人楊盛涂說：「基督教跟我們的原始信仰很接近，所以很快就被接受，而且很簡單，就像我們的宗教信仰一樣簡單。隨時隨地敬拜我們的神（祖靈），就像是禱告一樣，用講的就解決了，這跟基督教的信仰完全一樣，隨時禱告，隨時感謝。我們以前是採集生活，你現在要出去就先跟祖靈禱告，拿到東西後要先感謝，拿一點點，有酒是最好，拿一點點。……所以 utux 就很像上帝，感謝就很像禱告，gaya 就像聖經的教義一樣，很簡單。……像佛教等一般的民間宗教儀式很長，要唸經啊！我們不能接受，因爲我們比較喜歡自由。」[39]對此，鄒族學者浦忠成在〈文化詮釋的弔詭〉一文中，提及神職人員對於原住民口傳資料的運用與詮釋有如下的看法，其表示：

　　筆者在一九九〇年前後在阿里山地區採集鄒族神話傳說資料，曾在山美村六鄰記錄一耆老 minolu 講述鄒族古老神話 nivnu（此爲敘述鄒族神話創造女神之故事），老人講述故事內容做補充說明，認爲此女神就是教會常提到的馬利亞。筆

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[38] 同前註，頁 133~134。
[39] 同註 17。

者刻意採錄數回，他的補充都不會漏掉，問是誰說的，老人說是一位神父彌撒的時候說的。這種對原住民口傳資料（又稱口碑）的運用與詮釋，在部落的教堂中是很容易發現的。對於族群神話傳說的詮釋與運用是部落神職人員為說服其信眾而採取的迂迴方式，因此許多神職人員十分熱衷於部落口傳故事的蒐集與整理。如果能以嚴肅客觀的態度與方法面對這些族群文化資產，將是一件極有意義的事，但若僅是為宣傳教義而從事文化意涵的比附與串聯，甚或扭曲原意，則其價值就因其用心而有折扣。[40]

承其所言，多數這些可供基督宗教與其原始信仰相互連結的雷同元素，自是本即存在，而非憑空所捏造，其後則透過宣教士及其族人有意識或無意識的將其加以連結、比附。對宣教士而言，做如此的連結或許確為宣教之便，也為兩種信仰面臨衝突時適時提供了轉化的契機，這站在宣教的立場，本即無可厚非；而對信徒而言，也因為此一連結得以同時與兩種信仰產生更多的對話與交流。平心而論，文化的詮釋本即是主觀且多元的，不同的時代、不同的環境、不同的角色、不同的立場就會解讀出不同的文化現象[41]。因此，今太魯閣人廣泛信仰基督宗教或許與這些連結與比附沒有必然的因果關係，然而也確實因為這些可供連結的元素使兩種不同的信仰在接觸之初不至於悍然對立，而其透過與這些雷同元素的對話後而產生共鳴，進而轉化或深化其信仰。

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[40] 浦忠成：〈文的詮釋的弔詭〉，《山海文化雙月刊》第 23、24 期（2000 年 8 月），頁 119。

[41] 陳淑芬《中國文化史》（台北:五南書局，2009），頁146。十六世紀中葉以降，西洋耶穌會教士抵華，如利瑪竇（ Matteo Ricci）、湯若望（J.Adam Schall von Bell）、南懷仁（ Ferdinandus Verbiest ）等 ，不但努力學習中文、了解中國傳統禮俗，迎合我國祭祖祀孔拜天儀式，更以學術為傳教手段，取信於中國人，藉以接近居領導地位的中國士大夫，於是西學與西教幾成一體，結下不解之緣。

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[6] 廖守臣（1998）。泰雅族的社會組織。花蓮市：慈濟醫學暨人文社會學院。

二、期刊雜誌

[1] 何廷瑞（1956）。泰雅族獵頭風俗之研究。文史哲學報，（7），160－161。
[2] 小島由道（1996）。番族慣習調查報告書‧第一卷‧泰雅族。中央研究院民族學研究所，（1），40。
[3] 哈尤‧尤道（2004）禮拜更新：本土化禮拜。玉山神學院學報，（11）。
[4] 余光弘（1981）。泰雅族東賽德克群的部落組織。中央研究院民族學研究所集刊（50），101。
[5] 浦忠成（2000）。文的詮釋的弔詭。山海文化雙月刊（23、24）119。

三、報告

[1] 高德明（2000）。非人的境遇—霧社事件的 Sediq 觀點。載於台灣基督長老教會總會舉辦之霧社事件七十周年國際學術研討會論文集（13），台北市。

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E-mail: aaoffice.j@uch.edu.tw。

十二、本辦法經行政會議通過後，報請校長核定實施，修正時亦同。