# 應用存活分析於企業財務危機之預測
# －以台灣地區上市櫃公司為實證研究

學生：卓秋月　　　　　　　　　　　　指導教授：胡德中

國 立 高 雄 應 用 科 技 大 學
金 融 資 訊 研 究 所 碩 士 班

## 摘　要

　　本研究主要針對 1999 年 12 月 31 日至 2006 年 12 月 31 日被會計師出具繼續經營有疑慮查核意見之上市（櫃）公司，觀察其至 2009 年 12 月 31 日之存活情形，並以因素分析將國內外研究之重要財務指標進行變數之萃取，另鑑於目前金融機構多將台灣企業信用風險指標（簡稱 TCRI）作為授信決策評估時之重要指標，因此，將 TCRI 評等加入本文探討之影響變數中，並採用 Cox（1972）所提出之比例危險模型（PHM）進行存活分析（Survival Analysis）。

　　本研究實證結果顯示，當企業發生潛在財務危機訊息時，其存活風險最高點落於第 42 個月，且於該時點之前，風險率呈現上升現象，於訊息發生超過第 42 個月後，其風險率則呈現逐漸降低現象；另影響存活之主要因子分別為企業之財務結構、經營效能及 TCRI 信用評等。當企業負債比率、長期資金適合率、營運資金比率（即財務結構）下降時，實證結果與以往國內外文獻有所不同，差異主因應可歸咎於本文研究對象係存有潛在危機訊息之企業，因此當負債減少時，應可推估為債權人對該企業未來抱持較不樂觀之看法，進而逐漸收回資金所致，因此，當企業發生潛在危機訊息時，評估其財務結構變化與一般正常公司應有所不同。

　　而總資產週轉率、固定資產週轉率（經營效能）上升時，風險率呈現下降情況，反之則反，此結果可透過國內外研究實證支持；而本研究另一特色為加入 TCRI 信用評等作為研究變數，實證發現，當信用評等等級愈高時，風險率則愈大，此可支持目前金融機構評析觀點。

關鍵字：繼續經營有疑慮、存活期間、風險率、台灣企業信用風險指標

# The Application of Survival Analysis to Forecasting Financial Distress - An Empirical Study for TSEC and OTC Listed Company

Student：Chiu-Yueh Cho                    Advisors：Dr. Te-Chung Hu

Institute of Finance and Information
National Kaohsiung University of Applied Sciences

## ABSTRACT

This study is targeted at the listed or cover-the-counter companies with respect to which negative auditing reports have been issued by CPAs concerning their continuing operations during the period from December 31, 1999 to December 31, 2006. Factoring Taiwan Corporate Credit Risk Index ("TCRI") in the influencing variables studied herein and using Cox's proportional hazard model ("PHM") proposed in 1972, a suvival analysis is carried out by observing the survival status of such companies through December 31, 2009, conducting variable extraction with respect to the important financial indicies adopted in local and international researches by means of factor analysis, and taking into account the current practice of financial institutions which use TCRI as an significant index in making decisions as to extending credit lines.

Based on this study, it is found that the peak point of an enterprise's survival risk would fall in the 42nd month after said enterprise experienced a potential financial hazard, and that the risk was rising prior to such peak poin but began to decrease gradually afterwards. Furthermore, the key factors affecting the sruvival of an enterprise are its financial structire, operational efficiency and TCRI. When the debt ratio, long-term capital adequacy rate or operational capital ratio (i.e., financial structure) is decreasing, the outcome of tis study is nevertheless different from the findings of previous international and local literatures. The primary reason responsible for such difference should be owing to the fact that the targeted enterprises under this study are those with potential hazards. Therefore, when such an enterprise's debt decreased, a creditor was presumed to have held less optimistic views on the prospects of the enterprise's future and hence have withdrawn its capital step by step. Therefore, if and when an enterprise experiences any potential hazard, a different perspective should be taken in evaluating the change of its financial structure than does a normal company.

Moreover, as the turnover rate for total assets, turnover rate for fixed assets (i.e., operational efficiency) rises, the risk will be lowered, and vice versa. Support for the findings can be found from both local and international literatures. Another feature of this study is the addition of TCRI to the variables contemplated by this study. A positive diagnosis suggests that the risk becomes higher as the level of TCRI gets higher, which corroborates the current views held by financial insitutions.

Keywords：concern over continuing operation; survival time; risk ratio; TCRI

# 目　錄

# 參考文獻

## 一、國內部分

1. 丁婉淳，2008，企業信用評等授信放款之研究，高雄第一科技大學財務管理所，碩士論文。

2. 王俊傑，2000，財務危機預警模式─以現金流量觀點，臺北大學企業管理研究所，碩士論文。

3. 花敬霖，1993，台灣股票上市公司預警系統：PHM 與 Logit 模型應用之比較，輔仁大學金融研究所碩士論文。

4. 李紀珠，1993，金融機構失敗預測模型－加速失敗時間模型之應用，經濟論文叢刊，第 21 卷，第 4 期，頁 355-379。

5. 李家豪，2002，依時共變數存活分析模型在企業信用風險之應用，逢甲大學財務金融研究所碩士論文。

6. 李姿嫻，2006，運用存活分析於企業財務預警模式之建立-以台灣上市電子業為例，義守大學財務金融學系碩士班碩士論文。

7. 何文榮、彭俊豪，2001，以不同類神經網路建構上市公司財務預警模型，臺灣土地金融季刊，第 38 卷，第 3 期，頁 1-22。

8. 何思親，2005，廠商存活與退出之動態分析-以多層次傳銷產業為例，淡江大學產業經濟學系碩士班，碩士論文。

9. 邱碧芳，2002，公司財務危機預警資訊之研究─考慮現金流量因素，朝陽科技大學財務金融所，碩士論文。

10. 林祖嘉、方世調，1992，台北市紡織業與食品業廠商存活時間之分析，經濟論文叢刊，第 20 卷，第 1 期，頁 59-91。

11. 林金賜，1997，財務危機之時間序列預測模式，台灣大學財務金融學系，碩士論文。

12. 周欣怡，2008，房屋貸款違約預測-存活分析模型之應用，真理大學財經研究所，碩士論文。

13. 陳肇榮，1983，運用財務比率預測企業財務危機之實證研究，政治大學企業管理研究所博士論文。

14. 陳晉䔉，1997，保留意見對上市公司發生財務危機之增額解釋能力，政治大學會計研究所，碩士論文。

15. 陳家豪，2003，存活分析方法應用於汽車貸款客戶信用風險管理之研究，成功大學統計學研究所，碩士論文。

16. 陳俊佑，2006，公司治理對信用評等的影響，東吳大學國際貿易學系，碩士論文。

17. 郭志安，1997，以 Cox 模型建立財務危機預警模式，逢甲大學統計與精算研究所碩士論文。

18. 郭姿伶，1999，住宅貸款之提前清償與逾期還款，碩士論文，國立中正大學財務金融研究所。

19. 張大成、薛人瑞、黃建隆，2003，財務危機模型之變數選取研究，貨幣觀測與信用評等，39 期，頁 96-105。

20. 曾素娟，1999，考慮經濟景氣變動之企業失敗預警模式-台灣上市公司之研究，成功大學企業管理研究所碩士論文。

21. 楊佳寧、陳漢沖，2003，存活分析模型於信用風險管理之應用－以台灣上市櫃公司為例，貨幣觀測與信用評等，39 期，頁 106-118。

22. 黃建隆，2003，以市場模式衡量信用風險，文化大學會計研究所，碩士論文碩士論文。

23. 溫健志，2001，存活分析方法應用於台灣金融機構信用風險管理之研究」，朝陽科技大學財務金融研究所碩士論文。

24. 劉佳振，2005，新上市上櫃公司信用評等之研究，東吳大學國際貿易學系碩士班，碩士論文。

25. 劉完淳、許振明，2008，我國銀行的併購與存活研究，第 9 屆全國實證經濟學論文研討會。

26. 賴麗月，1994，企業失敗的預測－比例危機模型應用，東吳大學會計研究所碩士論文。

27. 蔡淑惠，2004，台灣地區國際合資公司存續之研究－存活模型應用，銘傳大學國際企業學系研究所，碩士論文。

28. 鄭歆蕊，2007，兩階段預警模型之研究-以台南市房貸為例，成功大學統計學系，碩士論文。

29. 鄭桂蕙，1992，財務簽證意見對銀行授信決策影響之實證研究，政治大學會計研究所，碩士論文。

30. 簡秀瑜，1993，金融機構的財務預警模式─區別分析、Logit、Cox 比例風險模式之實證研究，中央大學財務管理研究所，碩士論文。

31. 謝明憲，2005，信用評等對銀行業效率之影響分析，高雄第一科技大學金融營運所，碩士論文。

32. 鍾岳昌，2004，以比例危險模型估計房貸借款人提前清償及違約風險，國立政治大學財務管理研究所碩士論文。

## 二、國外部分

1. Altman, E. I., 1968, Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy, Journal of Finance 23, pp.589-609.

2. Beaver William H., 1966, "Financial Rations as Predictors of Failure,"Journal of Accounting Research, 4, pp.71-111.

3. Bruderl Josef and Schussler Rudolf, 1990, "Organizational Mortality: The Liabilities of Newness and Adolescence," Administrative Science Quarterly, 35, pp.530-547.

4. Cox, D. R., 1972, "Regression Models and Life-Tables, "Journal ofthe Royal Statistical Society,Series B, Vol.34, No.2, pp.187-220.

5. Cole, R. and J. Gunther., 1995, "Separating the Likelihood and Timing of Bank Failure," Journal of the Banking and Finance : 1073-1089.

6. Eforn, B., 1977, "The Efficiency of Cox's Likelihood Function for Censored Data," Journal of the American Statistical Association,Vol.72, pp.557-565.

7. Flagg, J. C., Giroux, G. A., & Wiggins, C. E. , 1991,. Predicting corporate bankruptcy using failing Firms, Review of Financial Economics, 1, pp.67-78.

8. Gentry James A., Newbold Paul and Whitford David T., 1985, "Classifying Bankrupt Firms with Funds Flow Components," Journal of Accounting Research, 23(1), pp.146-160.

9. Gentry James A., Newbold Paul and Whitford David T., 1987, "Funds Flow Components, Financial Ratios, and Bankruptcy," Journal of Business Finance and Accounting, 14(4), pp.595-606.

10.Hopwood, W., McKeown, J. C. & Mutchler, J.F. (1994). A reexamination of auditor versus model accuracy within the context of the going-concern opinion decision, Contemporary Accounting Research, 10, pp.409-431.

11. Huyghebaert Nancy, Gaeremynck Ann, Roodhooft Filip and Gucht Linda M Vande, 2000," New Firm Survival: The Eeffects of Start-up Characteristics," Journal of Business Finance and Accounting, 27, pp.627-652

12.Lane William R., Looney Stephen W. and Wansley James W., 1986, "An Application of the Cox Proportional Hazards Model to Bank Failure," Journal of Banking and Finance, 10, pp.511-531.

13.Lau Amy Hing-Ling, 1987, "A Five-State Financial Distress Prediction Model," Journal of Accounting Research, 25(1), pp.127-138.

14.Lee, S. H. and J. L. Urrutia, 1996, "Analysis and Prediction ofInsolvency in the Property-Liability Insurance Industry : A comparisonof Logit and Hazard Model," The Journal of Risk and Insurance,Vol.63, pp.121-130.

15.Lee, E. T. and J. W. Wang, 2003, Statistical Methods for Survival Data Analysis, New York, John Wiley & Sons.

16.Merwin, C., 1942, "Financial small corporation in five manufacturing industries: 1926-1936," National Bureau of Economic Research

17.Noh, P.J. Rohb, T. H. and Hana,I., 2005, "Prognostic personal credit risk model considering censored information."Expert Systems with Applications , 28, 753–762.

18.Ohlson, J. A. (1980). Financial ratios and the probabilistic prediction of bankruptcy, Journal of Accounting Research, 18, pp.109-131.

19.Platt Harlan D. and Platt Marjorie B., 1990, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction," Journal of Business Finance and Accounting, 17(1), pp.31-51.

20.Platt Harlan D., Platt Marjorie B. and Pedersen Jon Gunnar, 1994,"Bankruptcy Discrimination with Real Variables," Journal of Business Finance and Accounting, 21(4), pp.491-510.

21. Richardson Frederick M., Kane Gregory D., and Lobingier Patricia, 1998,"The Impact of Recession on The Prediction of Corporate Failure," Journal of Business Finance and Accounting, 25(1) and (2), pp.167-186.

22. Sheppard Jerry Paul, 1995, "A Resource Dependence Approach to Organizational Failure," Social Science Research, 24, pp.28-6

23. Smith, C. W. and J. Warner, 1979,On the Financial Contracting: An Analysis of Bond Covenants., Journal of Financial Economics, 7, No.2, 117-161.

24. Vandell, K. D., Barnes, W., Hartzell, D., Kraft, D. And Wendt W., 1993, "Commercial Mortgage Default : Proportional Hazards Estimation Using Individual Loan Histories," Journal of American Real Estimate and Urban Economics Association, Vol.4, pp.451-480.

25. Whalen, G., 1991, "A Proportional Hazard Model of Bank Failure : An Examination of Its Usefulness as an Early Warning Tool," FederalReserve Bank of Cleveland, Economic Review, Vol.27, No.1, pp.21-31.

26. Winkor, H. and Smith, R., 1935, "Change in financial structure of unsuccessful industrial corporations," University of Illinois, Bureau of Business Research