

Predicting Credit Rating Distributions and Transition Probabilities: A Logistic Regression Technique That Allows Imbalanced and Rare Events Data

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The cumulative link model is a popular method to predict the credit rating distribution. Its important parameters are usually estimated using maximum likelihood. However, if some rating categories have small sizes, the resulting parameter estimates tend to be biased towards majority categories. Using these parameter estimates, the cumulative link model may suffer from a decline in model fit or a loss of predictive power. To avoid this potential drawback, we apply a two-stage estimation procedure (TEP) based on the logistic regression to separately estimate the regression and threshold parameters of the cumulative link model. We illustrate TEP with S&P long-term issuer credit rating (LTR) examples. Using an expanding rolling window approach, our empirical results confirm that TEP compares favorably to the alternatives because the cumulative link model with its parameter estimates produced by TEP yields more accurate predictions of the S&P LTR distribution and transition probability.

Key Words: Adjacent categories model, Cumulative link model, Imbalanced and rare events data, Sequential model, Transition probability.

「政策與管理意涵」

本文使用公司面與總經面解釋變數來預測公司信用評等分佈與轉移機率，具有簡單的計算與解釋之優點。研究結果可穩健與正確預測這些標的，金融機構可應用本文的研究結果來發展進階內部評等法，提列足夠資本需求，以符合監管單位與巴塞爾協議 III 的要求。另一方面，從業人員可以使用本文的預測標的來建立信貸衍生產品的定價模型。

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預測信用評等分佈與轉移機率： 允許不平衡與稀有事件資料的 邏輯斯回歸方法

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累計聯結模型(cumulative link model)是預測信用評等分佈的常用方法。為了應用累計聯結模型，我們經常使用最大似法同時估計累計聯結模型中的所有重要參數。但是，如果某些評等類別的分佈次數較少，則結果參數估計值往往會偏向分佈次數較多的評等類別。使用這些參數估計值，累計聯結模型可能會降低模型的適合度或預測能力。為避免此潛在問題，我們使用邏輯斯回歸與應用了兩階段估計方法來分別估計累計聯結模型的回歸與門檻參數。使用標準普爾長期發行者信用評等資料與擴展滾動視窗方法，實證結果顯示結合兩階段估計方法與累計聯結模型比其他模型可產生更正確的信用評等分佈與轉移機率預測值。

關鍵詞：相鄰類別模型、累計聯結模型、不平衡與稀有事件資料、長期發行者信用評等、順序模型、轉移機率。

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