

Supervisory Risk Assessment and Early Warning Systems – Ordered Multinomial Response Models

Econometrics to Banking Supervision

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Supervisory bank rating systems - CAMELS

CAMELS rating system used by U.S. supervisory authorities is a uniform system of rating,

- Evaluation on the basis of six critical dimensions relating to operations and performance,
- Each of the component factors is rated on a scale of 1 (best) to 5 (worst), and a composite rating of the component ratings is assigned as an indicator of a bank's current financial condition
- More frequent on-site examination for banks with rating 4 or 5, and after an interval of 18 months for sound banks with rating 1 or 2,
- On-site CAMELS ratings form the basis for determining causal relationships with financial ratios calculated through off-site analysis,
- This forms the basis for some of the U.S. supervisors' statistical early warning models.

Statistical Models - Range of practices

- The Federal Reserve and the FDIC make use of one or more statistical models as part of their extensive off-site monitoring process,
- The broad classification is as follows: (a) models estimating ratings or rating downgrades, (b) failure or survival prediction models,
- (B) Models estimating ratings or rating downgrades:
 - The models make use of the quarterly call report data and are run every quarter,
 - Federal Reserve developed SEER rating model that employs a multinomial logistic regression to estimate a bank's probable CAMELS composite rating (1-5),
 - The SEER rating is the sum of the five rating levels multiplied by their respective probabilities,

Statistical Models - Range of practices (Cont'd)

- Models estimating ratings or rating downgrades:
 - The model first determines the historical relationship between call report data and examination ratings by using call report data from two previous quarters and the corresponding latest examination data,
 - The relationship between the dependent (examination rating) and explanatory variables (from call reports) as estimated during this period is then used to estimate events during a subsequent period,
 - Since the estimation period is not fixed, the variables in the model as well as their coefficients change from quarter to quarter,

Statistical Models - Range of practices (Cont'd)

- Models estimating ratings or rating downgrades:
 - The model then combines the weights of the selected variables with the current value of those variables from call reports for each bank to estimate the probable composite CAMELS ratings for the respective institution.
 - If the estimate is significantly different from the most recent onsite examination rating, the bank is singled out for further review,
 - The SEER rating model is now being tested to work as a rating downgrade model to identify only those banks that are at a risk of downgrade,

Statistical Models - Range of practices (Cont'd)

- Early Warning System model for predicting financial crises:
 - EWS approaches based on binomial discrete-dependent variable models can be subject to post-crisis bias,
 - Bias that arises when no distinction is made between tranquil periods and crisis/post-crisis periods,
 - Multinomial model that allows distinguishing between more than two states solves this bias and improves the ability to forecast financial crises,
 - Constructing financial (banking) sector fragility index as a dependent variable of ordered model predicting the banking crisis using macroeconomic indicators; no *distress*, *medium* and *high* financial *fragility*.

Thank You