Financial crises and bank failures: A review of prediction methods

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Paper Review Presentation
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Agenda

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Abstract

• This paper provides a summary of empirical results obtained in several economics and operations research papers to explain, predict or suggest remedies for financial crisis.

• Analyze financial and economic circumstances associated with the US subprime mortgage crisis and the global financial turmoil of 2008.
Introduction

• This paper is divided into 2 primary sections
  • **Section 1** summarizes empirical methodologies and findings of studies that apply econometric techniques and several analyses of the US subprime market and its collapse.
  • **Section 2** summarizes empirical methodologies used in Operations Research studies analyzing and predicting failures.

• **Operations research** is a complex and interdisciplinary tool that combines mathematical modeling, statistics, and algorithms to determine either optimal or near optimal solutions to complex problems and situations.
Review of econometric analyses of the subprime crisis

In this section the paper analyzes the collapse of the subprime mortgage market in the United States and outline factors associated with it.

- The quality of subprime mortgages had been deteriorating monotonically every year since at least 2001
- The paper shows that the subprime mortgages can be split into sub samples
  - fixed-rate,
  - adjustable-rate (hybrid),
  - purchase-money,
  - cash-out refinancing,
  - mortgages with full documentation, and
  - mortgages with low or no documentation.
Review of econometric analyses of the subprime crisis (contd.)

• The subprime credit market in the United States largely consists of subprime mortgages.

• Subprime loan is riskier because the expected probability of default for these loans is higher.

• A subprime loan can be
  • originated to a borrower with a low credit score and/or history of delinquency or bankruptcy, and/or poor employment history;
  • originated by lenders specializing in high-cost loans and selling fewer loans to government-sponsored enterprises
  • part of subprime securities
  • certain mortgages are not available to the prime market
Review of econometric analyses of the subprime crisis (contd.)

Remedies for financial crisis

• Regulation and supervision should be strengthened to prevent such crises in the future.

• The Fed could encourage more borrowing through the Discount Window.

• The government should also ensure the stability of the financial system by recapitalizing those banks that have a realistic possibility of survival, and merging or closing those that do not.

.... and more
Operations Research models

• Describes selected operations research models that are frequently used in the empirical literature to predict defaults or failures of banks and that could be used to predict defaults of loans or nonfinancial institutions.

• Several studies have shown that intelligence modeling techniques used in operations research can be applied for predicting the bank failures and financial crises.

• According to the Federal Deposit Insurance Corporation Improvement Act of 1991, regulators in the United States must conduct on-site examinations of bank risk every 12–18 months. Regulators use a rating system (the CAMELS rating) to indicate the safety and soundness of banks.

• The CAMELS ratings include six parts: capital adequacy, asset quality, management expertise, earnings strength, liquidity and sensitivity to market risk.
Operations Research models (contd.)

- Studies compared Signal Extraction EWS methods and Logistic Regression (Logit) shows Logit performs better. However Logit compares poorly when compared to other prediction techniques especially the intelligent techniques.

- Studies compared NN, SVM, multivariate statistical methods proved NN (MLP, LVQ) provided better results.

- BPNN provided better results than other NN techniques. Better in complex decision making.

- Trait Recognition vs Logit– Trait recognition performs better.
Conclusion

This paper provides an analysis of financial and economic circumstances associated with the subprime mortgage crisis in the United States along with an extensive review of intelligence techniques used in the operations research literature to predict bank failures.