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Senior Thesis

MACROECONOMICS AND LOAN DEFAULT RATES

Default Loans

- All lending institutions experience losses from default loans
- They must take steps to minimize their losses
  - Only lend to low risk individuals

Low Risk Lending

- Application factors
  - Income
  - Job History
  - Home status
  - Purpose of Loan
  - FICO Scores
    - Likely the most significant factor in deciding credit worthiness

FICO Scores

- Produced by Fair Isaac Company for use by the three credit Bureaus Equifax, Experian, Transunion.
- Calculated based on past credit management
- Indicates how well an applicant has managed their debts in the past

Low Risk Lending

- Interest rates are calculated based on risk factors largely determined by credit scores
- Low risk individuals pay low interest rates
- High risk individuals pay high interest rates
- High risk lending generates more revenue
  - Dealing with high risks loans ultimately leads to high default rates

Default Loans

- All lending institutions experience losses from default loans
- They must take steps to minimize their losses
  - Only lend to low risk individuals
  - Utilize collection departments and collection agencies
  - Use legal action to recover losses

Allowance for Loan Loss

- Creditors must be prepared for their losses
- Loan loss accounts minimize the effects of charge-offs
- How then are the allowances for loan-loss made?

Allocation Methods

- Allocations are made using historic charge-off rates
  - Based on loan types
  - Based on credit scores
  - Expected risk amount
- All have one underlying assumption
  - Default rates tends to remain constant
  - Stated Differently
    - Little variability exists in charge-off rates

Hypothesis

This paper proposes that there does exist variability in charge-off rates and that the variability can be explained be macroeconomic indicators

Variability

- Observed portfolio default rates vary from $0.00 to $200,000.00
  - Rate 0% - 0.27%
- 95% confidence intervals $36,225.89 to $57,961.42
  - 0.05% <μ<0 .08%
- The same analysis can be performed for various categories of loans

Analysis

- Demonstrates loan types with low risk and those with high risk
- Those categories that have the highest mean charge-off rate tend to experience a greater degree of variability
- If there were no exogenous factors then the charge-off rate would be constant
  - There must be other variables that create the risk of default

Exogenous Variables

- What causes loans to go default?
- Characteristics of people who fit in high risk categories
  - Young, little job history, they don't own property, hold unsecured debt
- These individuals tend to be less responsible money managers
- They are therefore more susceptible to economic conditions

Economic Indicators

- Unemployment and inflation
  - Taken together form the Misery index
- Retail Sales as a measure of regional product
  - Food Sales as a measure of spending on consumer staples
  - Apparel Sales as a measure of discretionary spending
- Home Prices as a measure of consumer wealth
- Leading vs. Lagging indicators

Regression Analysis

- Average R^2 value is about .2
- The largest R^2 value is .4463
- The R^2 tends to be higher in loan categories with higher average charge-off rates
  - This demonstrates that economic conditions do tend to explain a significant amount of variation in high risk loans

Factor Analysis

- Examine the underlying structure of the variables and identifies salient factors
- Aids in building a model by limiting covariance
- Simplifies model by reducing the number of variables
- The factors we select will have eigenvalues greater than one and explain at least 70% of the original variability

Factor Analysis

- Analysis categories using economic variables
  - Analysis is performed at with four different lead times for indicators
- Yields 12 factors
- The first and fourth factors are relatively constant
  - It is interesting that underlying structure changes, however, it is beyond this research to explain this.

Factor One

- Loan categories with high default rates tend to load onto factor one
- There default ratios are correlated and vary together
  - This means that they tend to exhibit similar default patterns
  - This supports the idea that economic indicators impact default rates

Factor Four

- Economic indicators load onto factor four almost exclusively
  - They are general measures of economic performance
- A model would then include a single variable that represented economic conditions
  - Likely even if other indicators were considered they would be included in factor four

Constructing the Factors

- Considered using two different methods
  - Use loading scores for each variable as a coefficient for that variable
  - Add the variables together
- Found that very little difference existed between the two methods for ease of use the additive model was utilized

Hypothesis

This paper proposes that there does exist variability in charge-off rates and that the variability can be explained be macroeconomic indicators

Constructing the Model

- It has been established that there does exist variability in charge-off rates
- It has been established that the variability can be partially explained by economic conditions
- It is therefore appropriate to construct a model that utilizes the economic indicators to predict charge-off rates

Constructing the Model

- In order to construct the model a multivariate regression is performed comparing the twelve factors and the portfolio charge-offs by month
- The following R^2 values where returned
  - No lead .4676
  - One Quarter lead .4935
  - Two Quarters lead .4935
  - One Year lead .4622

Testing the Model

- Using the regression line the expected charge-off rates were computed
- Also a model that utilized historic charge-offs was used to computed expected charge-offs
- The average over/under for the models was compared

Testing the Model

- Average over/under for historical method was $25,872.95
- The over/under at each time interval was
  - No Lead $17,398.74
  - One Quarter $16,295.20
  - Two Quarters $17,132.74
  - One Year $16,254.59
- The model with one year lead reduced average over/under by 60%

Conclusions

- There is significant variation in charge-off rates
- Economic conditions do explain a portion of this variation
- A model that utilizes economic variables serves as a better predictor of charge-offs

Further Research

- Examining the loan category of DTI and unsecured debt
- Examining other economic indicators
- Examining the indicators with different intervals for each indicator