

Title: Interest rate is associated with amount requested and debt to income ratio

Introduction:

Usually banks and other institutions use FICO score (because it is inexpensive) to help make lending decisions, but do has failings [1]. Because to increase the score is to increase the credit limits on one's credit card accounts [7]. For this reason it is best to consider more other factors like amount requested and debt to income ratio [2]. As if the amount is big than the risk will be more and also debt to income ratio can increase the probability of return. Therefore we try to establish a relationship between interest rate and amount requested and debt to income ratio.

Methods:

Data Collection

For our analysis we used the data consist of a sample of 2,500 peer-to-peer loans issued through the Lending Club (<https://www.lendingclub.com/home.action>). The data were downloaded from <https://spark-public.s3.amazonaws.com/dataanalysis/loansData.csv> on February 12, 2013 using the R programming language [3].

Exploratory Analysis

Exploratory analysis was performed by examining tables and plots of the observed data. We identified transformations to perform on the raw data on the basis of plots and knowledge of the scale of measured variables. Exploratory analysis was used to (1) identify missing values, (2) verify the quality of the data, and (3) determine the terms used in the database such as debt to income ratio, FICO score, etc.

Statistical Modeling

To relate interest rate with amount requested and debt to income ratio we performed a standard multivariate linear regression model [4]. Model selection was performed on the basis of our exploratory analysis. Coefficients were estimated with ordinary least squares and standard errors were calculated using standard asymptotic approximations [5].

Results:

The loan data used in this analysis contains information on the source network that have the interest rate (Interest.Rate), the amount requested (Amount.Requested), the debt to income ratio (Debt to Income Ratio [6]. We identified no missing values in the data set we collected and all measured variables were observed to be inside the standard ranges.

We first fit a regression model relating interest rate to amount requested. The residuals showed patterns of non-random variation. We attempted to explain those patterns by fitting models including potential confounders. Our final regression model was:

$$\text{Interest.Rate} = b_0 + b_1 (\text{Amount.Requested}) + b_2 (\text{Debt.To.Income.Ratio}) + b_3 (\text{Amount.Requested}) * (\text{Debt.To.Income.Ratio}) + e$$

where b_0 is an intercept term and b_1 , b_2 , b_3 represents the change in interest rate associated with a change of 1 unit in amount requested, debt to income ratio, and both. The error term e represents all sources of unmeasured and unmodeled random variation in loan data.

We observed a highly statistically significant ($P < 2.2e-16$) association between interest rate and amount requested and debt to income ratio.

Conclusions:

Our analysis suggests that there is a significant, positive association between interest rate and amount requested and debt to income ratio. But we don't use other confounding factors like loan length, loan purpose which has also significant impact on the relationship.

References

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