A flexible machine learning approach to repayment capacity estimation for affordability assessment

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In the modern credit environment, lenders make term structure, pricing and ultimately accept/reject decisions based on affordability as well as risk. Affordability assessments may be more or less sophisticated depending on the product and the range of data available to the lender, which can range from verified or unverified stated income to a full income and expenditure review backed by evidence. Where less information is available, affordability criteria often reduce to a debt-to-income calculation that does not necessarily account for the individual circumstances of each borrower.

We propose a machine learning approach to estimating monthly repayment capacity for an individual borrower, using data that may include income, expenditure and credit attributes. A borrower's maximum capacity for repayment is unobserved: we only observe the actual scheduled repayment and subsequent credit performance. We use a censored regression approach, using a custom loss function to train a model to predict repayment capacity using data on actual borrowing and subsequent performance.

We establish a framework for assessing the performance of such a model, and compare our approach to rules-based benchmarks including debt-to-income thresholds. Our approach is flexible: it can be applied to any appropriate input data and supports a range of models including neural networks and GBMs, which can be suitably constrained to ensure explainability.