

The devil is in the details: dynamic prediction of loan portfolio profitability with macroeconomic drivers through multi-state modelling

Abstract

In typical loan portfolios such as mortgages and credit cards, many accounts often experience different stages of delinquency before eventually recovering, fully repaying their balance, or defaulting. From the lender perspective, these events, coupled with the state of the economy, can affect cash-flow and profitability significantly.

This paper presents a novel framework for dynamic monitoring future expected profit margins and cash flows of loan accounts, taking into account (i) individual risk profiles, (ii) macroeconomic trends, and (iii) transitions between different stages of delinquency.

We make three contributions. First, we show a method to predict future cash flows and profit margins over the life of a loan taking into account predicted transitions between repayments states and their effects of payments received. Second, we show a method to compute optimized cut-offs to be used with the transition probabilities to predict jumps an account is expected to make between different states of delinquency. Third, we illustrate the method using a large sample of 30 year Freddie-Mac mortgages including showing expected profit margins for segments of the portfolio. The method will be particularly useful to lenders, who must comply with IFRS9 or CECL.

Full paper available under open access at:

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