Reducing Model Risk Using Bayesian Approach: Application to PD Modelling of Mortgage Loans

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Abstract: A new Bayesian informative prior selection method is proposed to reduce model risk of ignored information and improve model performances. We use logistic regression to model the probability of default of mortgage loans using both the Bayesian approach with various priors and the frequentist approach. In the Bayesian informative prior selection method we propose, we treat each of the coefficients in the frequentist PD models built on consecutive quarters as a time series variable. We build ARIMA models to forecast the coefficients' values in future time periods and use these ARIMA forecasts as Bayesian informative priors. We find that the informative Bayesian PD models using this prior selection method outperform both frequentist models and Bayesian models with other priors in terms of model predictive accuracy, regardless of the time periods at which the models are built or the economic conditions.

Keywords: Autoregressive time series; Bayesian logistic regression; Bayesian informative prior; Credit scoring