

# **Do Macroeconomic Dynamics Affect the Firm-specific Effects on Credit Ratings?**

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## **Abstract**

The dynamic ordered varying-coefficient probit model (DOVPM) is proposed as a model for studying credit ratings. The proposed model is constructed by replacing the constant coefficients of firm-specific predictors in the dynamic ordered probit model (DOPM; Blume et al., 1998) with the smooth functions of macroeconomic variables. Thus it allows the effects of firm-specific predictors on credit risk to change with macroeconomic dynamics (Pesaran et al., 2006). The unknown coefficient functions in the proposed model are estimated by a local maximum likelihood method. Real data examples for studying credit ratings are used to illustrate the proposed model. Our empirical results show that macroeconomic dynamics significantly affect the sensitivities of firm-specific predictors on credit ratings, and there are nonlinear relationships between them. To compare the out-of-sample performance of DOPM and DOVPM, using an expanding rolling window approach, our empirical results confirm that the advantages of DOVPM over DOPM are twofold. First, the out-of-sample firm-by-firm rating probabilities predicted by DOVPM are more accurate and robust. Second, the out-of-sample total error rates of the prediction rule based on DOVPM are not only of smaller magnitudes but also of lower volatility. Thus the proposed model is a useful alternative for credit risk forecasting.

JEL classification: C33; C35; G20.

Keywords: Dynamic ordered probit model; Expanding rolling window approach; Predicted number of ratings; Predictive region; Varying-coefficient model.

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