Estimating Bank Loss Given Default (LGD) through Advanced Credibility Theory

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Abstract

The New Basel Accord allow banking organizations to calculate their credit risk capital requirements using an internal ratings based (IRB) approach, subject to supervisory review. One of the modeling components is the loss given default (LGD): it represents the credit loss for a bank when extreme events occur and these influence the obligor ability to repay their debts to bank.

Determining LGD values tailored to a bank’s portfolio could drive to capital savings and it represents a strong motivation for a bank to want to move from the foundation to the advanced IRB approach, moreover LGD plays a crucial role for risk-based decision making and risk-adjusted pricing.

Among researchers and practitioners it is quite common the use of statistical models like linear regression, Tobit, or decision trees in order to compute LGDs as a forecasting of historical losses (Schuermann, 2004). However these techniques do not seem to provide robust estimations and show low performances (Gürtler & Hibbeln, 2011). In order to improve the performance and the robustness of LGD forecasting, other authors try to estimate the time to recovery event or to charge-off event (Bonini & Caivano, 2011 - Witzany & Rychnovsky, 2010) through survival analysis techniques. The reason of these identified weaknesses on bank recoveries can be found in factors which usually drive significant differences in LGD such as the presence and quality of collateral, timing of business cycle, and the workout process management. All these factors embed judgmental elements that can be hardly captured by traditional statistical and econometrics techniques. Moreover, in the last years the European banking scenario has been marked by many M&A activity

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and the consequent portfolio aggregation could lead to some bias in analysis of historical data and recoveries.

This paper evaluates an alternative method of modeling LGD using a technique based on advanced credibility theory typically used in actuarial science (Bühlmann & Gisler, 2005). This technique provides a statistical component to the credit and workout experts opinion embedded in collateral and workout management process and improve the predictive power of forecasting. In this paper the Bühlmann-Straub model, for advanced credibility theory, has been used for the first time to identify a nonlinear estimate of LGD as a weighted average of historical losses and LGD forecasted by regression model. The average is performed through a weight factor \( z \) identified by a dynamic error minimization procedure, and computed as function of two parameters estimated on available data inside the portfolio: the expected variance of historical losses \( \sigma^2 \) and the variance of average historical losses \( \tau^2 \). Finally it can be observed a inverse relation between \( z \) and \( \sigma^2 \): the higher volatility of individual experience (historical losses) the lower its credibility.

The model has been applied on a top tier European Bank (identified by the FSB as one of the SIFIs). It has been observed that the new LGD estimation shows a high predictive power and robustness among time and sub-sample. The results have been confirmed by an out of time backtesting that has been performed to assess its overall stability and predictability.

**Keywords**: Loss Given Default Forecasts, Basel2, Basel3, Credit Risk Modeling, Quantitative Finance, Credibility Theory, Risk Management.