Credit risk measures and the estimation error in the ASRF model under the Basel II IRB approach

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ABSTRACT

In many standard derivation and presentations of risk measures like the Value-at-Risk or the Expected Shortfall, it is assumed that all the model's parameters are known. In practice, however, the parameters must be estimated and this introduces an additional source of uncertainty that is usually not accounted for. The Prudential Regulation have formally raised the issue of errors stemming from the internal model estimation process in the context of credit risk, calling for margins of conservatism to cover possible underestimation in capital. Notwithstanding this requirement, to date, a solution shared by banks and regulators/supervisors has not yet been found. In this paper, we investigate the effect of the estimation error in the framework of the Asymptotic Single Risk Factor (ASRF) model that represents the baseline for the derivation of the credit risk measures under the IRB approach. We exploit Monte Carlo simulations to quantify the bias induced by the estimation error and we explore an approach to correct for this bias. Our approach involves only the estimation of the long run average probability of default and not the estimation of the asset correlation given that, in practice, banks are not allowed to modify this parameter. We study the stochastic characteristics of the probability of default estimator that can be derived from the Asymptotic Single Risk Factor framework and we show how to introduce a correction to control for the estimation error. Our approach does not require introducing additional elements in the Asymptotic Single Risk Factor model like the prior distributions or other parameters which, having to be estimated, would introduce other sources of estimation error. This simple and easily implemented correction ensures that the probability of observing an exception (i.e. a default rate higher than the estimated quantile of the default rate distribution) is equal to the desired confidence level. We show a practical application of our approach relying on real data.

Keywords

Bank Capital; Regulation; Basel 2; Margin of Conservatism; Value-at-Risk

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