EBA: The Calibration of the IRB Supervisory Formula – A Case Study

Highlights

- About 20 years ago, the Basel Committee on Banking Supervision (BCBS) introduced into the system of prudential regulation for banks a risk-based framework (named Basel II), allowing financial institutions to use internal models to calculate minimum capital requirements for major risk types. For credit risk, the BCBS proposed a measure of regulatory capital based on risk measures internally estimated by the banks, and presented the first version of the Supervisory Formula (SF) i.e. a “closed” formula aimed at replicating the results of the portfolio models developed by major investment banks and consulting firms (mainly from the US). The BCBS opted for a structural model and, in particular for the gaussian Single Risk Factor Model derived from the Merton-Vasicek (MV) model. The banking regulation on credit risk issued by the BCBS has undergone a progressive evolution starting from the initial amendment proposal submitted for consultation in 19993, which proposed the use of systems based on internal rating models (IRB) for the purpose of calculating the capital requirement.

- The basic idea of the regulation consists in establishing the minimum amount of capital that the bank must hold to protect depositors (and the entire economic system) from the insolvency of the bank itself. The minimum capital has been quantified in different ways depending on the versions of the proposed regulation, but all share the principle of protecting the bank from adverse credit events (peak losses) that may affect the loan portfolio up to a certain confidence interval over the time horizon of one year. The worst-case credit loss of the portfolio obtainable from the MV model is based on the probability of default conditional on the realisation of an extreme event, which has a small but not zero probability of occurrence.

- The level of capital requirement generated by the IRB approach depends crucially on the asset correlation, a parameter that enters the regulatory risk weight formula and is calibrated by the Regulator. Estimating the asset correlation parameter is challenging, however, there appears to be a growing consensus in the literature on the range for asset correlations and the current regulatory correlations are larger than the empirical results reported in this literature. However, differences in the estimating approaches and in the type of data, may produce quite different results.

- In this EBA paper, it is offered a different perspective that allows to evaluate the adequacy of the asset correlation estimate for a given portfolio without the need to make comparisons with other estimates, perhaps based on data that is not representative of the portfolio in question. EBA paper shows that the IRB credit risk measure is substantially obtained by rescaling the distance between the expected probability of default (PD) and the stressed PD. The regulatory IRB SF can be seen as an algorithm whose main purpose is to provide the stressed PD given the expected PD (estimated by the banks) and the asset correlation. The stressed PD can then be compared with the observed default rates. This comparison provides a simple way to evaluate the realism (and the level of conservatism) implied by a given level of asset correlation. EBA paper then turns its attention to the minimum regulatory capital requirements. EBA paper shows that this quantity can be seen as the estimated worst-case loss (WCL) given the confidence level and how this measure is influenced by the stressed PD. This enables to make comparisons with different risk measures obtained by relaxing some of the hypothesis underlying the IRB approach and this in turn permits to quantify the role of such hypothesis.