

measurement of credit risk that many banking organizations have been developing. These approaches being developed by banking organizations generally rely on a statistical or probability-based assessment of credit risk and use inputs broadly similar to those required under the A-IRB approach. Like the value-at-risk (VaR) model that forms the basis for the market risk capital rules, the output of these statistical approaches to credit risk is typically an estimate of loss threshold on a credit exposure or pool of credit exposures that is highly unlikely to be exceeded by actual credit-related losses on the exposure or pool.

Many banking organizations now use such a credit VaR amount as the basis for an internal assessment of the economic capital necessary to cover credit risk. In this context, it is common for banking organizations' internal credit risk models to consider a one-year loss horizon, and to focus on a high loss threshold confidence level (that is, a loss threshold that has a small probability of being exceeded), such as the 99.95th percentile. This is because banking organizations typically seek to hold an amount of economic capital for credit risk whose probability of being exceeded is broadly consistent with the institution's external credit rating and its associated default probability. For example, the one-year historical probability of default for AA-rated firms is less than 5 basis points (0.05 percent).

There is a great deal of variation across banking organizations in the specifics of their credit risk measurement approaches. It is important to recognize that the A-IRB approach is not intended to allow banking organizations to use all aspects of their own models to estimate regulatory capital for credit risk. The A-IRB approach has been developed as a single, common methodology that all advanced approach banking organizations would use, and consists of a set of formulas (or functions) and a single set of assumptions regarding critical parameters for the formulas. The A-IRB approach draws on the same conceptual underpinnings as the credit VaR approaches that banking organizations have developed individually, but likely differs in many specifics from the approach used by any individual institution.

The specific A-IRB formulas require the banking organization first to estimate certain risk inputs, which the organization may do using a variety of techniques. The formulas themselves, into which the estimated risk inputs are inserted, are broadly consistent with the most common statistical approaches for

measuring credit risk, but also are more straightforward to calculate than those typically employed by banking organizations (which often require computer simulations). In particular, an important property of the A-IRB formulas is portfolio invariance. That is, the A-IRB capital requirement for a particular exposure generally does not depend on the other exposures held by the banking organization; as with the general risk-based capital rules, the total credit risk capital requirement for a banking organization is simply the sum of the credit risk capital requirements on individual exposures or pools of exposures.¹³

As with the existing credit VaR models, the output of the A-IRB formulas is an estimate of the amount of credit losses over a one-year period that would only be exceeded a small percentage of the time. In the case of the A-IRB formulas, this nominal confidence level is set to 99.9 percent. This means that within the context of the A-IRB modeling assumptions a banking organization's overall credit portfolio capital requirement can be thought of as an estimate of the 99.9th percentile of potential losses on that portfolio over a one-year period. In practice, however, this 99.9 percent nominal target likely overstates the actual level of confidence because the A-IRB framework does not explicitly address portfolio concentration issues or the possibility of errors in estimating PDs, LGDs, or EADs. The choice of the 99.9th percentile reflects a desire on the part of the Agencies to align the regulatory capital standard with the default probabilities typically associated with maintaining low investment grade ratings (that is, BBB) even in periods of economic adversity and to ensure neither a substantial increase or decrease in overall required capital levels among A-IRB banking organizations compared with the capital levels that would be required under the general risk-based capital rules. It also recognizes that the risk-based capital rules count a broader range of instruments as eligible capital (for example, certain subordinated debt)

than do internal economic capital methodologies.

Expected Losses Versus Unexpected Losses

The diagram below shows a hypothetical loss distribution for a portfolio of credit exposures over a one-year horizon. The loss distribution is represented by the curve, and is drawn in such a way that it depicts a higher proportion of losses falling below the mean value than falling above the mean. The average value of credit losses is referred to as expected loss (EL). The losses that exceed the expected level are labeled unexpected loss (UL). An overarching policy question concerns whether the proposed design of the A-IRB capital requirements should reflect an expectation that institutions would allocate capital to cover both EL and a substantial portion of the range of possible UL outcomes, or only the UL portion of the range of possible losses (that is, from the EL point out to the 99.9th percentile).

The Agencies recognize that some institutions, in their comment letters on earlier BSC proposals and in discussion with supervisory staffs, have highlighted the view that regulatory capital should not be allocated for EL. They emphasize that EL is normally incorporated into the interest rate and spreads charged on specific products, such that EL is covered by net interest margin and provisioning. The implication is that supervisors would review provisioning policies and the adequacy of reserves as part of a supervisory review, much as they do today, and would require additional reserves and/or regulatory capital for EL in cases where reserves were deemed insufficient. However, the Agencies are concerned that the accounting definition of general reserves differs significantly across countries, and that banking practices with respect to the recognition of impairment also are very different. Thus, the Agencies are proposing to include EL in the calibration of the risk weight functions.

The Agencies also note that the current regulatory definition of capital includes a portion of general reserves. That is, general reserves up to 1.25 percent of risk-weighted assets are included in the Tier 2 portion of total capital. If the risk weight functions were calibrated solely to UL, it could be argued that the definition of capital would also need to be revisited. In the United States, such a discussion would require a review of the provisioning practices of institutions under GAAP and of the distinctions drawn between specific and general provisions.

¹³ The theoretical underpinnings for obtaining portfolio-invariant capital charges within credit VaR models are provided in the paper "A Risk-Factor Model Foundation for Ratings-Based Bank Capital Rules," by Michael Gordy, forthcoming in the *Journal of Financial Intermediation*. The A-IRB formulas are derived as an application of these results to a single-factor CreditMetrics-style mode. For mathematical details of this model, see M. Gordy, "A comparative Anatomy of Credit Risk Models," *Journal of Banking and Finance*, January 2000, or H.R. Koyluoglu and A. Hickman, "Reconcilable Differences," *Risk*, October 1998.