

omissions by using different mappings for different business lines or types of obligors. Supervisors expect this practice to be transitional; banks will eventually be required to incorporate the omitted effects into the rating system and the estimation process as they are uncovered and documented, rather than adjusting the mapping.

Example 1. The bank maps its internal grades carefully to one rating agency, and then assumes a correspondence to another agency's scale despite known differences in the rating methods of the two agencies. The bank then applies a mean of the grade default rates from these two public debt-rating agencies to its internal grades. This practice is not consistent with the standard, because the bank should map to each agency's scale separately.

Example 2. A bank uses internal historical data as its reference data. The bank computes a mean default rate for each grade as the grade PD for capital purposes, and asserts that mapping is unnecessary because "its strong credit culture ensures that a 4 is always a 4." This practice is not consistent with the standard, because no mapping has been done; there is no assurance that a representative obligor in a grade today is comparable to an obligor in that same grade in the past.

S. The mapping must be updated and independently validated regularly.

The appropriate mapping between a bank's portfolio and the reference data may change over time. For example, relationships between internal grades and external agency grades may change during the economic cycle because of differences in rating philosophy. Similarly, distance-to-default measures for obligors in a given grade may not be constant over time. These likely changes make it imperative that the bank update all mappings regularly.

Sound validation practices may include tests for internal consistency such as "reverse mapping." Using this technique, a bank evaluates obligors from the reference data set as if they were subject to the bank's rating system (that is, part of the bank's current portfolio). The bank's mapping is then applied to these reverse-mapped obligors to see whether the mapped characterization of the reference obligor is consistent with that of the initial evaluation.⁵ Another valuable technique is to apply different mapping methods and compare the results. For example, mappings based on financial ratio comparisons can be rechecked using

mappings based on available external ratings.

Example. A bank mapped its internal grades to the rating scale of one public debt-rating agency in 1992. Since then, the bank has completed a major acquisition of another large bank and significantly changed its business mix in other ways. The bank continues to use the same mapping, without reassessing its validity. This practice is not consistent with the standard.

Application

In the application stage, the bank applies the PD estimation method to the current portfolio of obligors using the mapping process. It obtains final PD estimates for each rating grade, which will be used to calculate minimum regulatory capital. To arrive at those estimates, a bank may adjust the raw results derived from the estimation stage. For example, it might aggregate individual obligor default probabilities to the rating grade level, or smooth results because a rating grade's PD estimate was higher than a lower quality grade. The bank must explain and support all adjustments when documenting its quantification process.

Example. A bank uses external data to estimate long-run average PDs for each grade. The resulting PD estimate for Grade 2 is slightly higher than the estimate for Grade 3, even though Grade 2 is supposedly of higher credit quality. The bank uses statistics to demonstrate that this anomaly occurred because defaults are rare in the highest quality rating grades. The bank judgmentally adjusts the PD estimates for grades 2 and 3 to preserve the expected relationship between obligor grade and PD, but requires that total risk-weighted assets across both grades using the adjusted PD estimates be no less than total risk-weighted assets based on the unadjusted estimates, using a typical distribution of obligors across the two grades. Such an adjustment during the application stage is consistent with this guidance.

S. IRB institutions that aggregate the default probabilities of individual portfolio obligors when calculating PD estimates for internal grades must have a clear policy governing the aggregation process.

As noted above, mapping may be grade-based or obligor-based. Grade-based mappings naturally provide a single PD per grade, because the estimated default model is applied to the representative obligor for each grade. In contrast, obligor-based mappings must aggregate in some manner the individual PD estimates to the grade level. The expectation is that the grade PD estimate will be calculated as the mean. The bank will be allowed to calculate this estimate differently only if it can demonstrate that the alternative method provides a better

estimate of the long-run average PD. To obtain this evidence, the bank must at least compare the results of both methods.

S. IRB institutions that combine estimates from multiple sets of reference data must have a clear policy governing the combination process, and must examine the sensitivity of the results to alternative combinations.

Because a bank should make use of as much information as possible when mapping, it will usually use multiple data sets. The manner in which the data or the estimates from those multiple data sets are combined is extremely important. A bank must document its justification for the particular combination methods selected. Those methods must be subject to appropriate approval and oversight.

The data may come from the same basic data source but from different time periods or from different data sources altogether. For example, banks often combine internal data with external data, use external data from different sample periods, or combine results from corporate-bond default databases with results from equity-based models of obligor default. Different combinations will produce different PD estimates. The bank should investigate alternative combinations and document the impact on the estimates. When ultimate results are highly sensitive to how estimates from different data sources are combined, the bank must choose among the alternatives conservatively.

C. Loss Given Default (LGD)

The LGD estimation process is similar to the PD estimation process. The bank identifies a reference data set of defaulted credits and relevant descriptive characteristics. Once the bank obtains these data sets (with the facility characteristics), it must select a technique to estimate the economic loss per dollar of exposure at default, for a defaulted exposure with a given array of characteristics. The bank's portfolio must then be mapped, so that the model can be applied to generate an estimate of LGD for each portfolio transaction or severity grade.

Data

Unlike reference data sets used for PD estimation, data sets for severity estimation contain only exposures to defaulting obligors. At least two broad categories of data are necessary to produce LGD estimates.

First, data must be available to calculate the actual economic loss experienced for each defaulted facility. Such data may include the market value of the facility at default, which can be

⁵ For example, suppose a bank asserts that its Grade 3 corresponds to an S&P rating of A. Applying reverse mapping, the bank would take a sample of A-rated obligors from the reference data, run them through the bank's rating process (perhaps a simplified version), and check to see that those obligors usually receive a grade of 3 on the bank's internal scale.