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DIVISION OF BANKING
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BASEL COORDINATION COMMITTEE
(BCC) BULLETIN

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SUBJECT: Guidance on Selection of Reference Data Periods and Approaches to Data Deficiencies When Quantifying Retail and Wholesale Risk Parameters

This guidance relates to the selection of reference data periods when quantifying retail and wholesale credit risk-weighted assets under the advanced approaches risk-based capital rule (rule).¹ Staff members at the Office of the Comptroller of the Currency (OCC) and the Board of Governors of the Federal Reserve System (Board) worked closely to develop this guidance.²

Background

Under the rule, the estimated risk parameters produced by a banking organization's quantification process must be "accurate, timely, and reliable."³ When the firm has limited reference data, risk parameter estimates must be "appropriately conservative."⁴

Apart from these overarching standards, the rule contains few requirements specific to the selection of reference data periods used in quantification. Reference data must be "relevant to the [banking organization's] actual wholesale and retail exposures, and of sufficient quality to support the determination of the risk-based capital requirements for the exposures."⁵ For the quantification of probability of default (PD), the rule requires five years or more of historical data⁶ "over a mix of economic conditions (including economic downturn conditions) sufficient

¹ See 12 CFR 3, subpart E, for the OCC and 12 CFR 217, subpart E, for the Board.

² For substantively identical guidance issued by the OCC, refer to the [OCC's Guidance on Advanced Approaches Series website](#).

³ See 12 CFR 3.122(c)(1) (OCC) and 12 CFR 217.122(c)(1) (Board). "Banking organization" refers to any national bank, federal savings association, bank holding company, savings and loan holding company, or state member bank, described in 12 CFR 3.100(b) (OCC) and 12 CFR 217.100(b) (Board), that uses the advanced approaches rule to calculate its risk-based capital requirements.

⁴ See 12 CFR 3.122(c)(3) (OCC) and 12 CFR 217.122(c)(3) (Board). [BCC Bulletin 13-5](#), "Applying the Requirement for Conservatism to the Parameters in the Advanced Approaches," provides guidance on applying the rule's requirement of conservatism to account for data limitations.

⁵ See 12 CFR 3.122(c)(2) (OCC) and 12 CFR 217.122(c)(2) (Board).

⁶ See 12 CFR 3.122(c)(6) (OCC) and 12 CFR 217.122(c)(6) (Board).

to provide a reasonable estimate of the average one-year default rate over the economic cycle.”⁷ When quantifying loss given default (LGD) and exposure at default (EAD), the rule requires reference data spanning at least seven years for wholesale exposures (five years for retail exposures)⁸ sufficient to calculate both long-run averages and expected values during economic downturn conditions.⁹

The rule does not elaborate further on how a banking organization should select reference data periods, including what constitutes a reasonable mix of economic conditions. Similarly, the rule defines economic downturn conditions with respect to an exposure held by a banking organization to mean “conditions in which the aggregate default rates for that exposure’s wholesale or retail exposure subcategory (or subdivision of such subcategory selected by the banking organization) in the exposure’s national jurisdiction (or subdivision of such jurisdiction selected by the banking organization) are significantly higher than average.”¹⁰ The rule, however, does not define what is meant by “significantly higher than average.”

The remainder of this guidance summarizes supervisory expectations for how these issues should be addressed by banking organizations.

General Implementation Guidance

Assessing the Mix of Economic Conditions and Economic Downturn Conditions

When assessing whether a banking organization’s reference data cover a reasonable “mix of economic conditions ... over the economic cycle” the following criteria should be applied:

1. The reference data should include at least one period when aggregate default rates within an exposure subcategory (or subdivision selected by the banking organization) were significantly higher than average.
2. Significantly higher-than-average default rates in the reference data should coincide with a period of adverse economic conditions (such as high unemployment or falling home prices) that affect borrowers’ ability and willingness to repay debts within an exposure subcategory (or subdivision selected by the banking organization).
3. The reference data used for calculating long-run averages should not place undue weight on periods of favorable or benign economic conditions relative to periods of economic downturn conditions.

A banking organization’s processes for determining economic downturn periods for LGD and EAD quantification are expected to incorporate the first two criteria. In contrast to LGD and

⁷ See “Probability of default” 12 CFR 3.101(b) (OCC) and 12 CFR 217.101(b) (Board).

⁸ See 12 CFR 3.122(c)(6) (OCC) and 12 CFR 217.122(c)(6) (Board).

⁹ Under the rule, LGD means the greatest of zero, the best estimate of the long-run default-weighted average economic loss per dollar of EAD, or the best estimate of the economic loss per dollar of EAD during economic downturn conditions. See “Loss given default” 12 CFR 3.101(b) (OCC) and 12 CFR 217.101(b) (Board). EAD should be estimated in a likewise manner.

¹⁰ See “Economic downturn conditions” 12 CFR 3.101(b) (OCC) and 12 CFR 217.101(b) (Board).

EAD, where separate calculations are conducted for long-run average and downturn, PD is measured only as a long-run average over a mix of economic conditions; therefore, the third criterion applies to PD as well as to long-run average EAD and LGD.

The first criterion aligns directly with the rule requirement concerning a period of economic downturn conditions. To illustrate its implications, consider the U.S. recession from 2000 to 2002 (the bursting of the so-called tech bubble). Although this recession was associated with elevated default rates for corporate exposures, the recession typically had little impact on default rates for residential mortgage portfolios. Thus, when quantifying risk parameters for residential mortgages, the period 2000–2002 typically would not be considered an economic downturn period.

The second criterion provides greater assurance that observed above-average default rates during economic downturn periods are driven by adverse economic conditions and are not simply a reflection of random or extraneous factors. For example, a spike occurred in U.S. credit card default rates before October 2005 amid a period of benign, or expansionary, macroeconomic conditions. The spike was primarily caused by an impending change in the federal personal bankruptcy law, not by adverse economic conditions. As this spike does not reflect responsiveness of card default rates to changing, or adverse, economic conditions, it should not be treated as a downturn period under the rule.

As illustrated in the examples on this and the previous page of this guidance, the timing of adverse economic conditions and elevated historical default rates typically are not the same across different types of exposures. For this reason, the time periods characterized by a “mix” and by “economic downturn conditions” may be different for each exposure subcategory (or subdivision thereof, if the banking organization chooses to use a more granular breakdown).

For purposes of LGD and EAD quantification, the downturn period should consist of consecutive quarters encompassing the peak default-rate quarter of the cycle. Downturn identification should begin with a one-year period encompassing the peak, extending outward beyond one year subject to criteria 1 and 2. In recognition of the uncertainty regarding the precise beginning and ending dates of the downturn period, a banking organization is expected to carry out a rigorous sensitivity analysis of the LGD and EAD impact of alternative downturn specifications to ensure the risk parameter estimates are appropriately conservative. Typically, downturn periods are one to two years in length. A downturn period exceeding two years is subject to close supervisory scrutiny, especially if it captures on the back end a period of clearly improving economic conditions in the relevant markets.

Because every economic cycle is unique in some way, a banking organization is expected to justify and document its decisions in identifying downturn periods.¹¹ Supervisors review these decisions for reasonableness, consistency, and conservatism.¹² Relevant considerations include the magnitude of the increase in default frequency relative to the historical variation in default rates within the particular subcategory. These considerations also include the severity of the

¹¹ See 12 CFR 3.122(j) (OCC) and 12 CFR 217.122(j) (Board).

¹² See [BCC Bulletin 13-5](#), “Applying the Requirement for Conservatism to the Parameters in the Advanced Approaches.”

adverse economic conditions and the extent to which variation in default rates is tied to changes in economic conditions and not to other sources such as changes in business strategy, underwriting practices, or the legal environment.

As an initial filter, a standard deviation test for identifying downturn quarters (when PD exceeds a threshold standard deviation above the long-run average PD) is a reasonable approach. Banking organizations, however, would be expected to supplement any such criterion with analysis of the historical economic environment and with sensitivity tests.

The third criterion requires that reference data be sufficient to produce reasonable estimates of long-run average risk parameters. This criterion implies that reference data should cover a reasonable mix of favorable or benign conditions and downturn conditions. Stated differently, the reference data should be cyclically balanced between periods covering favorable or benign conditions and periods covering downturn conditions (or at least the data should not be overweighted toward the former). For this reason, a downturn bounded by two lengthy periods of economic expansion would not be consistent with the third criterion nor would a recovery phase of a downturn combined with an expansionary period.

Addressing Data Deficiencies

Although the period covered by reference data ideally should be sufficiently long and cyclically balanced, in some cases the required data may be lacking. In such situations, the rule permits the temporary use of mapping from roughly comparable internal or external sources, or from projections based on econometric models or expert judgment, while developing a more complete reference data set. The use of such data and projections poses severe validation and model risk challenges, which have proven difficult to overcome in practice. Supervisors closely review the relevance and appropriateness of such data, including with respect to default definition, underwriting policies, business strategies, and population characteristics. The banking organization should appropriately justify, document, and validate its use of such methodologies, especially those based on projections using econometric models or expert judgment. It should also apply conservative adjustments appropriate to the degree of uncertainty around the extrapolation, as required by the rule.¹³

The use of model-based approaches to artificially extend historical data forward or backward in time, as opposed to filling in missing or deficient data within the established reference data period, is particularly discouraged.¹⁴ Banking organizations should avoid using estimation procedures or expert judgment to extend the reference data period, if the existing

¹³ A banking organization's quantification process must produce appropriately conservative risk parameter estimates when the bank has limited relevant data, and any adjustments must not result in a pattern of bias toward lower PD, LGD, or EAD estimates. See 12 CFR 3.122(c)(3) (OCC) and 12 CFR 217.122(c)(3) (Board). A banking organization must adjust its risk parameter estimates to compensate for lack of data from periods of economic downturn conditions, that is, cases when the reference data do not include economic downturn conditions or include only an incomplete downturn. See 12 CFR 3.122(c)(7) (OCC) and 12 CFR 217.122(c)(7) (Board).

¹⁴ Validation of such extrapolation approaches would need to address the adequacy of the development data; conceptual soundness of the approach; robustness of model assumptions; and appropriate application of conservative adjustments to reflect uncertainty, benchmarking, and sensitivity analysis.

reference data period is long enough, or to capture additional economic cycles when existing reference data are cyclically balanced.

Selection of Reference Data Periods

Banking organizations are expected to develop risk parameter quantification processes that incorporate the full set of important predictive variables and provide accurate, or appropriately conservative, risk parameter estimates over a range of product designs, underwriting standards, origination channels, and market environments. Generally, longer data series that include multiple, distinct economic cycles can be expected to yield more accurate and robust parameter estimates. Additionally, a banking organization's own historical experience is likely to have greater relevance than other potential sources of data.¹⁵ Thus, a banking organization should employ all readily available internal data in its quantification of risk parameters unless certain data are deemed (a) not relevant to the firm's current exposures,¹⁶ (b) inconsistent with the rule requirement to employ data from a mix of economic conditions,¹⁷ or (c) not usable because of high frequency of missing values, inconsistent definitions for important variables, or other critical flaws.

In general, all available data should be used, and data should be excluded only in exceptional, well-justified, and documented circumstances as listed earlier in this guidance. The impact of any exclusion on risk parameter estimates should be evaluated. The rule requires banking organizations to conduct comprehensive review and analysis at least annually to determine the relevance of reference data to the organization's exposures.¹⁸ Banking organizations should weigh the potential for statistically more robust parameter estimates when using a longer sample period against the possibility that data pertaining to earlier periods may be less relevant to the firm's current portfolio. Regardless of the decision to include or exclude data when quantifying risk parameters, a banking organization should retain all the data, including data that the banking organization believes is not relevant to its current portfolio. Even if data are excluded from the quantification of risk parameters, the data may still be useful in the annual review and analysis of data adequacy and relevance.

¹⁵ Such a blanket preference for internal reference data is somewhat attenuated for wholesale portfolios, when industry "master scales" are often used for risk-rating purposes. Furthermore, the well-known problem of "low-default portfolios" in cases of large corporate, bank, and sovereign exposures often makes the use of available external data necessary.

¹⁶ See 12 CFR 3.122(c)(2) (OCC) and 12 CFR 217.122(c)(2) (Board).

¹⁷ See "Probability of default" 12 CFR 3.101(b) (OCC) and 12 CFR 217.101(b) (Board).

¹⁸ See 12 CFR 3.122(c)(10) (OCC) and 12 CFR 217.122(c)(10) (Board).