Wholesale Credit Risk Work Program for the Advanced Approaches Rule

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Date last updated:	

Wholesale Credit Risk Work Program for the Advanced Approaches Rule

The wholesale credit risk work program is based on the common text of subpart E of the regulatory capital rules adopted by the Office of the Comptroller of the Currency (OCC), the Federal Reserve Board (Federal Reserve), and the Federal Deposit Insurance Corporation (FDIC) (collectively, federal banking agencies) for calculating risk-based capital requirements for retail credit risk exposures.[1] The work program is consistent with the advanced approaches risk-based capital rule (advanced approaches rule)[2] and no review question or procedure is intended to go beyond the scope of the advanced approaches rule. The work program may be updated as appropriate to further clarify the requirements of the advanced approaches rule and related interpretations and guidance documents issued by the federal banking agencies.

The wholesale credit risk work program is primarily designed as a tool to help supervisors gather information on wholesale credit risk management and measurement practices at banks, thrifts, and holding companies that are subject to the advanced approaches rule related to the use of an internal ratings-based (IRB) approach to determine risk-based capital requirements for wholesale exposures. The information collected through this work program may be used to catalogue supervisory understanding of the regulatory capital practices for wholesale credit risk employed at reviewed organizations, to facilitate cross-firm perspectives on sound practices, and for other supervisory purposes. The work program is designed to be sufficiently flexible to be used by supervisors either as an ongoing comprehensive compilation of supervisory knowledge and assessments or as a reference guide supporting individualized scope memos of targeted wholesale IRB reviews to help determine whether an organization meets the qualification requirements to use the advanced approaches rule.

The work program consists of three sections: (I) overview of wholesale portfolios, (II) summary of supervisory views and knowledge gaps, and (III) a detailed supervisory assessment. Section III includes major components of wholesale advanced systems,[3] consistent with the advanced approaches rule. The work program includes a number of specific questions, numbered 1.01 through 13.06, and review questions and procedures to help assess compliance with the overall qualification requirements of the advanced approaches rule for using wholesale advanced systems.

While the information collected through this work program is intended to help assess each organization’s overall compliance with the advanced approaches rule, the specific questions and procedures, as well as the suggested review items, are not intended to be all-inclusive. In addition, answers to each question may not be required to reach a conclusion on a particular issue. Upon consideration of materiality and other case-specific factors, if the supervisor believes that additional or alternative review steps should be taken to fully reach a conclusion on the organization’s compliance with the advanced approaches rule, the supervisor may adjust the review scope and document the findings, as appropriate.

Supervisors should treat the work program documentation with the same care that they treat any other supervisory work papers and label the work program documentation accordingly.

[1] For purposes of this work program, section numbers refer to the common text of the agencies’ advanced approaches rules, unless noted otherwise. As an example, section 122 refers to 12 CFR 3.122 for OCC-supervised organizations, 12 CFR 217.122 for Federal Reserve-supervised organizations, and 12 CFR 324.122 for FDIC-supervised organizations.

[2] The advanced approaches rules are set forth at 12 CFR 3, subpart E (OCC); 12 CFR 217, subpart E (Federal Reserve); and 12 CFR 324, subpart E (FDIC). The advanced approaches rule applies to an organization described in 12 CFR 3.100(b)(1) (OCC), 12 CFR 217.100(b)(1) (Federal Reserve), and 12 CFR 324.100(b)(1) (FDIC).

[3] The term “wholesale advanced systems” and “wholesale IRB systems” are used interchangeably throughout this document.

I. Overview of Wholesale Portfolios

This section may be used to capture quantitative and qualitative information supervisors can use to understand the composition of the wholesale portfolio and the relative importance of the subportfolios that comprise the wholesale portfolio.

As of date: ________________

Subcategory/portfolio	Value of drawn exposure ($)	Value of undrawn exposure ($)	Advanced approaches risk-weighted assets ($)	General risk-based[4] risk-weighted assets ($)	Risk rating process	Number of facilities	Number of facilities
Total wholesale exposure							
Total assets							

[4] The term "general risk-based capital rules" refers to the risk-based capital rules set forth at 12 CFR 3, subparts A, B, C, and D (OCC); 12 CFR 217, subparts A, B, C, and D (Federal Reserve); and 12 CFR 324, subparts A, B, C, and D (FDIC).

II. Summary of Supervisory Views and Knowledge Gaps

This section provides supervisors with tables for consolidating key supervisory views and knowledge gaps identified during wholesale advanced systems reviews (subsections A and B). For previously identified supervisory views or gaps that have been addressed upon subsequent review, subsection C provides a place to record such gaps to easily track views and gaps that have been satisfactorily resolved (along with information supporting resolution). Subsection D provides an area for supervisors to document notable/best practices at the organization to further peer analysis on emerging best practices with respect to wholesale advanced systems.

A. Supervisory Views

View	Initial assessment date	Work program question	Update (e.g., date view was communicated to organization and manner in which communicated; update noting item remains pending as of a review date)
1.			
2.			
3.			

B. Supervisory Knowledge Gaps

Knowledge gap	Initial assessment date	Work program question	Update (e.g., remains a gap and as-of date; date and summary of additional gaps identified while closing initial gap)
1.			
2.			
3.			

C. Resolved Gaps/Addressed Views

Previous gap/view	Initial assessment date	Work program question	Update (e.g., support and date for resolution of supervisory views; knowledge gap addressed and date)
1.			
2.			
3.			

D. Notable or Best Practices

Practice	Initial assessment date	Work program question	Update
1.			
2.			
3.			

III. Detailed Supervisory Assessment

A. Governance, Control, Documentation, and Use

Section 122(i)[5]	**Control, oversight, and validation mechanisms.** (1) The organization's senior management must ensure that all components of the organization's advanced systems function effectively and comply with the qualification requirements in section 122. (2) The organization's board of directors (or a designated committee of the board) must at least annually review the effectiveness of, and approve, the organization's advanced systems. (3) An organization must have an effective system of controls and oversight that: (i) Ensures ongoing compliance with the qualification requirements in section 122; (ii) Maintains the integrity, reliability, and accuracy of the organization's advanced systems; and (iii) Includes adequate governance and project management processes. … (5) The organization must have an internal audit function or equivalent function that is independent of business-line management that at least annually: (i) Reviews the organization's advanced systems and associated operations, including the operations of its credit function and estimations of probability of default (PD), loss given default (LGD), and exposure at default (EAD); (ii) Assesses the effectiveness of the controls supporting the organization's advanced systems; and (iii) Documents and reports its findings to the organization's board of directors (or a committee thereof).
Section 122(j)	**Documentation.** The organization must adequately document all material aspects of its advanced systems.
Section 122(a)(2)	**Systems and processes requirements.** The systems and processes used by an organization for risk-based capital purposes under this subpart must be consistent with the organization's internal risk management processes and management information reporting systems.

Suggested review items

Governance
- Board-approved implementation plans, gap analysis, and project plans.
- Wholesale IRB-related committee charters and reporting structures.
- Functional organizational charts delineating responsibility for IRB activities (risk rating, data management and maintenance, quantification, and validation), including users, day-to-day operations, and the internal control environment of the system.
- Flow charts describing IRB processes and approval points.
- Minutes and packages from board, relevant board committee, and senior management meetings where IRB issues are discussed, including board approval of the components of the IRB system and the framework of controls.
- Minutes and packages from board, relevant board committee, and senior management meetings where audit and validation results are discussed.
- Board and senior management reports summarizing the performance of the IRB system.

Policies and Procedures
- Policies and procedures governing wholesale credit activities, including underwriting, credit administration, the risk rating assignment process, risk controls, and risk limits.
- Policies and procedures governing documentation requirements for the internal risk rating system, quantification, data management and maintenance, and validation.
- Policies and procedures for the change control process.
- Policies and procedures for internal risk management of IRB systems.

[5] Unless noted otherwise, all section references are to the advanced approaches rule.

Management Reporting • Reports used by senior management to implement and oversee the IRB process. • Reports to senior management and the board concerning the organization's compliance with wholesale IRB requirements. **Audit and Independent Review** • Results of the organization's internal IRB monitoring activities. • Internal summary reports of the independent review process for the IRB system. • Management responses to audit findings and criticisms, along with corrective actions to address audit findings. • Internal audit policies, work programs, and work papers related to the assessment of the effectiveness of the controls and oversight of the IRB system. **Supervisory Review** • Examination findings related to – validation of the risk rating and quantification processes. – independent reviews of data maintenance. – other internal controls related to the IRB system, including the internal audit and independence of control processes conducted by the line of business. – qualifications of independent review staff. • Board-related supervisory findings from other IRB review areas.

1. Governance, Control, Documentation, and Use

Update log		
Subcategory/portfolio	Date	Prepared by

1.01	**Work program question**	**Overall assessment**	**Reference**
Does the organization's senior management ensure that all components of the organization's advanced systems function effectively and comply with the qualification requirements in section 122?			122(i)(1)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What process does senior management use to ensure that all components of the organization's advanced systems function effectively and comply with the qualification requirements of section 122? • What are the criteria for determining "effectiveness"? • How are the various owners of the advanced IRB systems components held accountable for each component's effectiveness? 2. To the extent that aspects of the wholesale advanced IRB systems have been outsourced to external parties, how does senior management ensure effectiveness and compliance? 3. Is senior management notified of audit and validation results with respect to wholesale advanced systems? Does senior management take corrective action where appropriate? • Who is responsible for reporting audit and validation results to senior management, and how are results communicated?		1. 2. 3. 4.	

4. How does senior management monitor and ensure that audit and compliance issues relative to advanced IRB systems are addressed? • What interim measures are required until the corrective actions are taken? • How is the progress to correct deficiencies monitored? • Test a sample of audit, validation, or compliance issues from initiation to resolution. Describe the process and document any concerns.	

1.02	Work program question	Overall assessment	Reference
Does the organization's board of directors, or a designated committee of the board, at least annually review the effectiveness of, and approve, the organization's advanced systems?			122(i)(2)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. When did the board review and approve the current implementation plan? 2. What reports concerning the wholesale IRB system are provided to the board? How often? • Is the frequency of reporting to the board appropriate? • Do the reports provide the board with sufficient information to allow it to assess the effectiveness of the wholesale IRB system, including the control environment? • Were any problems with compliance noted in the reports? If so, what actions did the board take to address the problems? 3. Does the board annually review and approve • key components of the IRB system? • outputs of the IRB system (i.e., adequacy of minimum risk-based capital requirements)? • the framework of controls? 4. Review minutes of board meetings and evaluate the appropriateness of discussion regarding the effectiveness of the organization's advanced systems. 5. Does the board of directors delegate responsibility to a designated committee to annually review and approve the effectiveness of the organization's advanced systems? • If so, to which committee does the board delegate responsibility? • Does the board review the decisions made by the designated committee? 6. What plan ensures continuity of wholesale IRB system knowledge as board members change?		1. 2. 3. 4. 5. 6.	

1.03	Work program question	Overall assessment	Reference
Does the organization have an effective system of controls and oversight that ensures ongoing compliance with all qualification requirements?			122(i)(3)(i)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio. as appropriate**	
1. Identify group(s) responsible for overseeing the organization's ongoing compliance with wholesale IRB qualification requirements. • What are the qualifications of staff assigned responsibility for oversight? • How was the allocation of staffing and resources to ensure ongoing compliance determined?		1. 2.	

2. What internal controls, processes, and reports are in place on an ongoing basis to ensure the advanced IRB systems remain compliant with the qualification requirements in the advanced approaches rule? • What key control points has the organization identified and established? • What quality assurance processes has the organization established for the wholesale IRB systems (e.g., data integrity, model documentation, quantification, capital calculation, etc.)?	

1.04	Work program question	Overall assessment	Reference
Does the organization have an effective system of controls and oversight that maintains the integrity, reliability, and accuracy of the organization's advanced systems?			122(i)(3)(ii)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Who or what groups are responsible for control and oversight for each of the following components of a wholesale advanced system: • Risk rating systems? • Risk rating processes? • Quantification processes? • Data management and maintenance systems? 2. Are the control and oversight roles and responsibilities consistent with the management of other credit risk management activities? 3. What reports and processes are used to monitor and ensure the reliability of the organization's wholesale IRB systems? • What is the role, if any, of internal loan review and corporate compliance? 4. Does each component of the wholesale IRB system perform effectively and continue to operate as intended? 5. What are the measures used by each group in its oversight role and how were these measures chosen? Are "accuracy measures" in place? 6. What testing is conducted on an ongoing basis by the quality assurance functions the organization has established to ensure the integrity, reliability, and accuracy of its advanced systems? 7. Determine if the oversight process • ensures various systems used in determining risk-based capital requirements are operating as intended. • identifies errors and flaws. • recommends corrective action as appropriate. • reviews the effectiveness of the accuracy measures and if these measures are consistently applied.		1. 2. 3. 4. 5. 6. 7.	

1.05	Work program question	Overall assessment	Reference
Does the organization have an effective system of controls and oversight that includes adequate governance and project management processes?			122(i)(3)(iii)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Review reports that pertain to governance and project management, minutes from project management meetings, and internal audit findings and reports on the organization's framework for governance and project management.		1.	

• Are there any gaps or deficiencies still to be addressed? If so, what corrective action plans are in place? • Identify the key milestones and plans to address any issues. Determine if there are any outstanding issues that have exceeded their established due dates. • Determine if the project management reports provide good high-level information on project status, as well as detailed information on key project plans at the implementation level. • Determine whether remediation plans are reasonably aligned with the identified gaps and if timelines and staffing levels/cost outlays represent reasonable estimates given the nature of the deficiency.	

1.06	**Work program question**	**Overall assessment**	**Reference**
Does the organization adequately document all material aspects of its advanced systems?			122(j)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Has the organization developed documentation standards and requirements for its wholesale IRB systems, including, for example, implementing procedures to ensure that rating definitions are applied consistently and documenting any changes to the rating processes? 2. Review available documentation and determine if it is complete, current, and includes the following: • A risk rating system: assumptions and analysis (statistical or judgmental) of risk rating criteria and system design. • Risk parameter quantification processes, including evidence supporting a rationale for methodologies considered but not implemented. • A model design: objective, description of data, model methodology, assumptions, variable selection process, and model statistical output. • Results of risk rating and quantification processes. • Data management and maintenance. • Wholesale IRB policies and procedures. • Controls supporting the wholesale IRB systems. 3. Is the IRB documentation easily accessible and sufficiently transparent so that qualified third parties, such as internal audit or external supervisors, can follow and understand each of the policies, processes, and procedures used by the organization to support its wholesale advanced systems? • To the extent that the organization has not adequately documented all material aspects of its wholesale advanced systems, what remediation processes does the organization have in place to address gaps and how is resolution of gaps tracked? 4. Where additional work has been conducted, such as for economic downturn adjustment of the parameters, augmentation for short data, etc., is there sufficient supporting documentation? 5. How often is documentation reviewed and updated? • Are changes to policies, processes, and procedures supporting the wholesale IRB systems clearly identified and justified within the documentation?		1. 2. 3. 4. 5.	

• What are the procedures to ensure that documentation remains up-to-date with the current implementation of the wholesale IRB systems?	

1.07	Work program question	Overall assessment	Reference
Are the advanced IRB systems and processes used by the organization for wholesale credit risk-based capital purposes consistent with the organization's internal risk management processes and management information reporting systems (MIS)?			122(a)(2)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization use a risk rating approach for wholesale IRB purposes that is consistent with its approach for internal risk assessment purposes? • Are there differences in the risk drivers used for credit risk management and wholesale IRB purposes? How material are the differences? What is the rationale for any material differences? 2. Compare risk parameters used for credit risk management to the IRB risk parameters. Are they consistent? Are differences understood and justified? 3. Compare wholesale IRB system processes and results with internal credit risk management processes and MIS for wholesale exposures. Are they generally consistent? How material are the differences? Are material differences understood and justified? 4. Does the wholesale IRB information influence or affect the planning, execution, and monitoring of wholesale lending activities? • Does senior management effectively use IRB information and reports to identify, monitor, measure, and control credit risk at the organization? 5. How else are IRB risk rating and quantification results used in internal credit risk management processes (e.g., portfolio analysis, loss forecasting, economic capital calculation, etc.)? 6. Does documentation of wholesale advanced systems also support the organization's broader risk management and reporting needs?		1. 2. 3. 4. 5. 6.	

1.08	Work program question	Overall assessment	Reference
Does the organization have an internal audit function or equivalent function that is independent of business-line management?			122(i)(5)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Confirm with supervisors responsible for supervising the organization's internal audit function that internal audit is independent of business-line management.		1.	

1.09	Work program question	Overall assessment	Reference
Does internal audit or equivalent function, at least annually, assess the effectiveness of the controls supporting the organization's advanced systems?			122(i)(5)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What are internal audit or equivalent function's plans for assessing the effectiveness of the controls supporting the organization's advanced systems? • Are the plans sufficient? • Are sufficient resources available to execute those plans? • Do the organization's personnel who execute the plan have sufficient		1. 2. 3. 4. 5.	

training and experience? 2. What are the scope and findings of internal audit's assessment of the effectiveness of controls supporting the organization's wholesale IRB system? • Does the internal audit function evaluate the depth, scope, and quality of the risk management system review process and conduct appropriate testing to ensure that the conclusions of these reviews are well-founded? • What testing is conducted to ensure the organization's wholesale IRB systems are compliant with the wholesale IRB qualification requirements? – How frequently is testing conducted? – How were the depth and quality of the testing program established? • Does the internal audit function review the validation process, including procedures, responsibilities, results, timeliness, and responsiveness to findings? • Test a sample of internal audit work assessing the controls supporting the wholesale IRB systems to confirm that the quality of work is consistent with the overall supervisory evaluation of the ability to rely on internal audit work. 3. Are internal audit policies, work programs, and work papers related to the assessment of the effectiveness of the controls and oversight of the IRB system sufficient? 4. Has internal audit opined on the governance and project management framework in place? • If audit concerns were identified, determine if the process to address the concerns has been established and if this process is being followed. 5. If any work related to the annual assessment of the effectiveness of the controls supporting the organization's advanced systems is outsourced to a third party, how does internal audit ensure that the work done by the third party meets the documentation and performance standards of the organization?	

1.10	**Work program question**	**Overall assessment**	**Reference**
Does the internal audit function document and report its findings at least annually to the organization's board of directors (or a committee thereof)?			122(i)(5)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What information is provided to the board regarding internal audit's assessment of the wholesale IRB systems? 2. Review minutes of board meetings and evaluate the depth of discussion on internal audit's findings and the level of board engagement. 3. Are procedures and corrective action plans to address any deficiencies identified in testing noted and appropriately followed? • Are deficiencies relative to qualification requirements reported to the board and senior management as appropriate? • How is the progress to correct deficiencies monitored? • Who is responsible for ensuring the deficiencies are corrected? • What interim measures are required until the corrective actions are taken? 4. Test a sample of corrective action plans and reports. Assess the timeliness of remediation efforts and the board and senior management's response if remediation actions are overdue.		1. 2. 3. 4.	

B. Risk Rating Systems for Wholesale Exposures

Section 122 (b)	**Risk rating systems for wholesale exposures.** Section 122(b) (i) An organization must have an internal risk rating and segmentation system that accurately, reliably, and meaningfully differentiates among degrees of credit risk for the organization's wholesale exposures. When assigning an internal risk rating, an organization may consider a third-party assessment of credit risk, provided that the organization's internal risk rating assignment does not rely solely on the external assessment. (ii) If an organization uses multiple rating systems, the organization's rationale for assigning an obligor to a particular system must be documented and applied in a manner that best reflects the obligor or exposure's level of risk. An organization must not inappropriately allocate obligors or exposures across systems to minimize regulatory capital requirements. (iii) In assigning ratings to wholesale obligors and exposures, including loss severity rating grades to wholesale exposures, an organization must use all relevant and material information and ensure that the information is current. (iv) When assigning an obligor to a PD rating, an organization must assess the obligor or retail borrower's ability and willingness to contractually perform, taking a conservative view of projected information. (2) For wholesale exposures: (i) An organization must have an internal risk rating system that accurately and reliably assigns each obligor to a single rating grade (reflecting the obligor's likelihood of default). An organization may elect, however, not to assign a rating grade to an obligor to whom the organization extends credit based solely on the financial strength of a guarantor, provided that all of the organization's exposures to the obligor are fully covered by eligible guarantees, the organization applies the PD substitution approach in paragraph (c)(1) of section 134 to all exposures to that obligor, and the organization immediately assigns the obligor to a rating grade if a guarantee can no longer be recognized under the advanced approaches rule. The organization's wholesale obligor rating system must have at least seven discrete rating grades for non-defaulted obligors and at least one rating grade for defaulted obligors. (ii) Unless the organization has chosen to directly assign LGD estimates to each wholesale exposure, the organization must have an internal risk rating system that accurately and reliably assigns each wholesale exposure to a loss severity rating grade (reflecting the organization's estimate of the LGD of the exposure). An organization employing loss severity rating grades must have a sufficiently granular loss severity grading system to avoid grouping together exposures with widely ranging LGDs. (iii) An organization must have an effective process to obtain and update in a timely manner relevant and material information on obligor and exposure characteristics that affect PD, LGD, and EAD. … (4) The organization's internal risk rating policy for wholesale exposures must describe the organization's rating philosophy (that is, must describe how wholesale obligor rating assignments are affected by the organization's choice of the range of economic, business, and industry conditions that are considered in the obligor rating process). (5) The organization's internal risk rating system for wholesale exposures must provide for the review and update (as appropriate) of each obligor rating and (if applicable) each loss severity rating whenever the organization obtains relevant and material information on the obligor or exposure that affect PD, LGD and EAD, but no less frequently than annually.
Section 131 (c)(3)	**Eligible purchased wholesale exposures.** An organization may group its eligible purchased wholesale exposures into segments that have homogeneous risk characteristics. An organization must use the wholesale exposure formula in Table 1 to section 131 to determine the risk-based capital requirement for each segment of eligible purchased wholesale exposures.
Section 131 (e)(4)	**Non-material portfolios of exposures.** The risk-weighted asset amount of a portfolio of exposures for which the organization has demonstrated to the primary federal supervisor's satisfaction that the portfolio (when combined with all other portfolios of exposures that the organization seeks to treat under this paragraph) is not material to the organization is the sum of the carrying values of on-balance sheet exposures plus the notional amounts of off-balance sheet exposures in the portfolio. For purposes of this paragraph (e)(4), the notional amount of an OTC derivative contract that is not a credit derivative is the EAD of the derivative as calculated in section 132.
Section 101	**Eligible purchased wholesale exposure** means a purchased wholesale exposure that: (1) The organization or securitization SPE purchased from an unaffiliated seller and did not directly or indirectly originate; (2) Was generated on an arm's-length basis between the seller and the obligor (intercompany accounts receivable and receivables subject to contra-accounts between firms that buy and sell to each other do not satisfy this criterion); (3) Provides the organization or securitization SPE with a claim on all proceeds from the exposure or a pro rata interest in the proceeds from the exposure; (4) Has an effective maturity (as defined in section 101) of less than one year; and (5) When consolidated by obligor, does not represent a concentrated exposure

	relative to the portfolio of purchased wholesale exposures.
Section 101	**Obligor** means the legal entity or natural person contractually obligated on a wholesale exposure, except that an organization may treat the following exposures as having separate obligors: (1) Exposures to the same legal entity or natural person denominated in different currencies. (i) An income-producing real estate exposure for which all or substantially all of the repayment of the exposure is reliant on the cash flows of the real estate serving as collateral for the exposure; the organization, in economic substance, does not have recourse to the borrower beyond the real estate collateral; and no cross-default or cross-acceleration clauses are in place other than clauses obtained solely out of an abundance of caution; and (ii) Other credit exposures to the same legal entity or natural person; and (2) (i) A wholesale exposure authorized under section 364 of the U.S. Bankruptcy Code (11 USC 364) to a legal entity or natural person who is a debtor-in-possession for purposes of chapter 11 of the Bankruptcy Code; and (ii) Other credit exposures to the same legal entity or natural person.

Suggested Review Items

Governance
- Board approved implementation plans, gap analysis, and project plans.
- Minutes from credit risk management, project management offices, and other executive management or board meetings devoted to internal risk rating systems.
- Charters and minutes of any board or executive committees responsible for the internal risk rating system.

Policies and Procedures
- Risk rating policies, procedures, and training materials.
- Policies and practices concerning past due loans and charge-offs.
- Risk rating policies, procedures, and training materials related to ongoing monitoring, refreshing data, and migration of exposures between rating grades.
- Policies, procedures, and training materials relating to the annual review of the risk rating system.
- Policies and procedures governing the identification, capture, and recording of obligor defaults.
- Policies, procedures, and training materials related to ongoing monitoring and refreshing of data for risk ratings.
- Internal loan review policies and procedures.

Management Reports
- Latest summary wholesale risk rating report that includes applicable parameter values.
- Latest summary report detailing information regarding wholesale exposures deemed nonmaterial and thus, not subject to the wholesale IRB approach.
- Latest summary reports detailing past due, non-accrual, and charged off wholesale loans.
- Monitoring reports used for review and migration purposes, such as migration patterns with emphasis on unexpected results, changes in risk parameter estimates, and changing portfolio trends and risks.
- Internal loan review reports to senior management.

Documentation
- Internal risk rating system gap analysis and documentation, including potential interim mitigation strategies to address any gaps.
- Documentation of risk rating system design describing the factors used to develop the risk rating approach.
- Documentation of risk rating system design, including the theory underlying the system, inherent assumptions of the system, empirical analysis supporting conclusions, identification of data sources used, and validation results.
- Documentation and analyses supporting the risk drivers or loss characteristics used for risk rating, including statistical analysis demonstrating the reasonableness and reliability of risk drivers and boundary values.
- Documentation supporting the number or granularity of obligor grades and (if applicable) loss severity rating grades, and the ability of the risk rating system to separate obligors (and exposures) into grades with homogenous risk characteristics.
- Documentation and support for migration of exposures between rating grades.

- Documentation and support for changes in or modifications to the risk rating system.

Audit and Independent Review
- Internal audit plans, reports, issues, and issue resolution plans related to internal risk rating systems.
- Results of the annual review of the risk rating systems and recommendations for modification.
- Internal loan review work plans.
- Scope, findings, and supporting documentation from the validation process.

Supervisory review
- Examination findings from previous reviews of the risk rating system and the validation process.

Other
- Reconcilements of exposures from the data warehouse supporting the quantification process to the general ledger.
- Documented approvals for any system modifications.
- Results of tests of system modifications to ensure data consistency and ensure that reliable risk ratings are assigned.

2. General Wholesale Risk Rating Systems

Update log		
Subcategory/portfolio	Date	Prepared by

2.01	**Work program question**	**Overall assessment**	**Reference**
Does the internal rating system accurately, reliably, and meaningfully differentiate among degrees of credit risk for the organization's wholesale exposures?			122(b)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the internal rating system make meaningful and consistent distinctions among credit exposures along two dimensions—default risk (corresponding to PD) and loss severity in the event of default (corresponding to LGD)? • How recently has the organization implemented a two-dimensional risk rating system? If the organization has implemented a two-dimensional risk rating system recently, what types of adjustments has it made to historical ratings? • If the organization has recently moved to a two-dimensional risk rating system, verify that adjustments made to historical ratings are appropriate and consistently applied. Explain what role the historical ratings played in the development of the two-dimensional risk rating system. 2. Does the wholesale risk rating system strictly separate obligor and exposure-level characteristics? 3. Who assigns, reviews, and approves internal risk ratings? • Are wholesale risk ratings reviewed by independent credit risk management or loan review personnel? 4. How does the organization measure and monitor overrides? Does it set override		1. 2. 3. 4. 5.	

tolerances to inform management of potential issues with the internal risk rating system? • How does the organization define a ratings override? • Request a sample of recent overrides made to the rating system. Obtain evidence that each override was identified, monitored, and analyzed to evaluate its impact on the organization's rating system. Obtain evidence each override conforms to the organization's policy and that information provided in support of the override decision is sufficiently detailed. 5. Are there any groups that test and monitor assignment of internal rating grades that are independent from personnel and management functions responsible for originating exposures?	

2.02	Work program question	Overall assessment:	Reference
If an organization elects to segment its eligible purchased wholesale exposures, similar to the treatment of retail exposures, does it group its eligible purchased wholesale exposures into segments that have homogenous risk characteristics?			131(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization ensure that it limits the scope of this treatment to those exposures that meet the definition of "eligible purchased wholesale exposures" in section 101? 2. Describe the organization's method of segmentation (e.g., decision-tree modeling, exposure-level statistical models a combination of exposure-level models with historical default frequencies for PD quantification). • Does the organization's documentation of segmentation systems include descriptions of methodologies, data sources, assumptions, statistical testing, and reasonability checks? 3. Assess the appropriateness of statistical tests used during model development and validation for supporting differentiation of risk. 4. Review model documentation for portfolios of eligible purchased wholesale exposures that are segmented and determine how the risk variables are selected. • What risk characteristics are used to segment exposures within each subcategory? • Do the risk drivers (or loss characteristics) selected consider factors affecting both borrower risk and exposure-specific risks? • Does empirical evidence support the selection of risk characteristics used? • Assess the quality of analysis of developmental evidence. • To what degree was expert judgment relied on? • Are boundary values clearly specified and supported by statistical analysis? 5. For portfolios and/or segments with limited defaults (low default portfolios), does the organization use methods (such as reliance on external data, pooled data, or factors based on proxies from "related portfolios") that are justified, documented, and reasonable? 6. Did the organization consider and/or test other methods of segmentation before settling on its chosen method? 7. How does the organization support its segmentation rationale, and is there adequate evidence (supported by empirical data and validation results) that the		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.	

organization's segmentation differentiates risk? 8. Is the organization's approach to segmentation of purchased wholesale exposures similar to its treatment of retail exposures? What are the differences, if any? 9. Select a sample of purchased wholesale exposures and identify the underlying risk characteristics for each. Using the organization's segmentation definitions, categorize the exposures into the appropriate segments. Trace the exposures to the segments in which they were placed to ensure appropriate classification. 10. Select a sample of purchased wholesale exposure segments and compare the segment composition to the organization's segmentation definitions. For a sample of exposures within each segment, review the exposures' risk characteristics to ensure appropriate segmentation. 11. For any segments with high concentrations of exposures, evaluate that there is little risk differentiation among exposures, looking at key risk drivers or loss characteristics. 12. Assess the appropriateness of the granularity of the segments. • Are there any unusual divisions of the portfolios into segments or seemingly lack of division? • Within portfolios, do concentrations of exposures exist in a limited number of segments? If so, has the organization conducted sufficient sensitivity analysis to support that risk is homogeneous within those segments? 13. For portfolios with highly granular segments, has the organization provided sufficient evidence that each segment represents a distinct set of risk characteristics?	

2.03	Work program question	Overall assessment	Reference
For portfolios of wholesale exposures for which an organization is seeking approval to exclude from the advanced approaches, has the organization satisfactorily demonstrated that the portfolio (when combined with all other portfolios of exposures that the organization seeks to exclude from the advanced approaches) is not material to the organization?			131(e)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Review the organization's policy for determining non-material portfolios and support for the exclusions to advanced approaches. • What is the organization's definition of immaterial? • Who is responsible for recommending that a portfolio be considered immaterial? • Who or what group is responsible for approving the determination that a portfolio is immaterial? • How does the organization monitor whether excluded portfolios are, in aggregate, immaterial to the organization? 2. List portfolios the organization proposes to exclude and report outstanding balances and commitments as well as the reason for the proposed exclusion. • Assess the appropriateness of excluding each portfolio—consider size, growth plans, level of risk or risk profile, and whether the portfolio is stable, growing, or declining. • Assess if the organization has justified and supported the temporary or		1. 2. 3. 4.	

permanent exclusion of business lines, portfolios, or exposures from application of the advanced approaches. • Combine the total amount of exposures that the organization is seeking to exclude from the advanced approaches and determine whether the resulting amount is material to the organization. 3. Determine whether the organization assigns risk-weighted asset amounts equal to the carrying value of on-balance sheet exposures and notional amount of off-balance sheet exposures for immaterial portfolios. 4. Verify that the risk-weighted assets of excluded portfolios are included in the total risk-weighted assets of the organization when the organization determines required risk-based capital.	

2.04	Work program question	Overall assessment	Reference
Does the organization's internal risk rating system for wholesale exposures provide for the review, and update as appropriate, of each obligor rating and, if applicable, each loss severity rating whenever the organization obtains relevant and material information on the obligor or exposure that affects PD, LGD, and EAD, but no less frequently than annually?			122(b)(5)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization have a policy for ensuring that obligor ratings and (if applicable) loss severity ratings reflect current information? • How frequently are ratings updated? What new information triggers an update? Does the organization have an alternative timetable for updating ratings of exposures below a de minimis amount that the organization determines has no material impact on minimum risk-based capital requirements? • Does the frequency of updates reflect the risk characteristics of wholesale obligors and exposures and the materiality of the potential impact on minimum risk-based capital requirements? 2. How does the organization ensure that updates are sufficiently frequent to monitor changes in the underlying credit quality and the migration of exposures among grades? To maintain grade performance within specified, acceptable tolerance limits? 3. Does the organization report which ratings have not been updated in over a year? Does it have a process in place to update such ratings in a timely manner? 4. On a sample basis, test if updates to obligor ratings and (if applicable) loss severity ratings are processed in accordance with the organization's policy.		1. 2. 3. 4.	

3. Obligor Ratings

Update log		
Subcategory/portfolio	Date	Prepared by

<table>
<tr><th>3.01</th><th>Work program question</th><th>Overall assessment</th><th>Reference</th></tr>
<tr><td colspan="2">Does the internal rating system accurately and reliably assign each obligor to a single rating grade reflecting the obligor’s likelihood of default? (Note: An organization may elect not to assign a rating grade to an obligor to whom the organization extends credit based solely on the financial strength of the guarantor, provided that the organization meets the requirements of section 122(b)(2)(i).)</td><td></td><td>122(b)(2)(i)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory or portfolio, as appropriate</td></tr>
<tr><td colspan="2">1. In determining an obligor rating, does the organization consider key obligor attributes, including both quantitative and qualitative factors that could affect the obligor’s default risk?
2. For all material portfolios, what quantitative and qualitative factors does the organization consider in determining the obligor rating grade?
• How does the organization demonstrate that quantitative and qualitative criteria selected in the obligor rating system are the most predictive factors of default rates available to the organization? Does the organization discuss other criteria that were considered but ultimately not included in the obligor risk rating system and the reasons why?
• How did the organization select the criteria to determine obligor ratings?
• How have the criteria changed over time, if at all?
• If there are changes in the risk rating criteria, on what basis are changes made? What is the process for incorporating changes in the criteria used in the risk rating system?
3. Are the organization’s obligor rating criteria written, clear, and consistently applied, and do they include the specific qualitative and/or quantitative factors used in assigning obligor ratings?
• Is each obligor rating defined in writing?
• Review each obligor grade rating definition and assess whether each definition is adequately defined and unambiguous and does not overlap with definitions for other grades.
4. How does the organization demonstrate that its risk rating system rank orders default risk appropriately?
5. How does the organization ensure that similarly rated obligors within the wholesale risk rating system represent similar levels of risk across obligor types?
6. How does the organization demonstrate that wholesale obligors assigned to the same rating grade have similar default risk?
7. Request a sample of obligors and compare key risk drivers across the rating grades to determine whether the internal risk rating system separates wholesale obligors into groups of homogenous risk.
8. Request a sample of wholesale obligors. Using only the information available to the rater at the time of the original rating, determine and compare retrospective ratings with the organization’s ratings. How, if at all, do the ratings differ? Are the criteria sufficiently transparent to allow replication by a third party, such as internal audit? Are the organization’s assigned ratings appropriate and consistent with its policies?
9. Does the organization define a wholesale obligor as in default if, for any wholesale exposure of the organization to the obligor, the organization considers that the obligor is unlikely to pay its credit obligations to the organization in full without recourse by the organization to actions such as realizing collateral (if</td><td colspan="2">1.
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held), or the obligor is past due more than 90 days on any material credit obligation to the organization? • If an obligor is past due more than 90 days, under what circumstances would the obligor not be deemed to be in default? • How does the organization ensure that the 90-day past due criterion is applied only to 'material credit obligations' of the obligor? • When applying the unlikely to pay criterion or the 90-day past due criterion, how does the organization avoid capturing so-called 'technical defaults' unrelated to the obligor's underlying financial health (e.g., an exposure triggering the 90-day past due criterion owing to processing lags or errors, disputed amounts, or a deferred payment date as the organization is in the process of refinancing a loan to a financially strong borrower)? Request a sample of defaulted and non-defaulted wholesale obligors and determine if the definition of default is applied consistently across the organization to all wholesale obligors. 10. Does the organization consider each of the following as elements that may be indications of unlikeliness to pay? If not, does the organization provide a rationale? • The organization places the exposure on non-accrual status consistent with the regulatory capital requirements. • The organization takes a full or partial charge-off or write-down on the exposure due to the distressed financial condition of the obligor. • The organization incurs a material credit-related loss in connection with the sale of the exposure or the transfer of the exposure to the held-for-sale, available-for-sale, trading account, or other reporting category. For purposes of this bullet point, what is the organization's definition of materiality? • The organization consents to a distressed restructuring of the exposure that is likely to result in a diminished financial obligation caused by the material forgiveness or postponement of principal, interest, or (where relevant) fees. • The organization has filed as a creditor of the obligor for purposes of the obligor's bankruptcy under the U.S. Bankruptcy Code (or a similar proceeding in a foreign jurisdiction regarding the obligor's credit obligation to the organization). • The obligor has sought or has been placed in bankruptcy or similar protection that would avoid or delay repayment of the exposure to the organization. 11. If an organization carries a wholesale exposure at fair value for accounting purposes, are the organization's practices for determining unlikeliness to pay for purposes of the definition of default consistent with the organization's practices for determining credit-related declines in the fair value of the exposure? 12. How does the organization ensure that a wholesale exposure to a defaulted obligor remains in default until the organization has reasonable assurance of repayment and performance for all contractual principal and interest payments on all exposures of the organization to the obligor (other than exposures that have been fully written-down or charged off)? • What are the organization's standards for determining whether it has a reasonable assurance of repayment and performance? Are these similar to those for determining whether to restore a loan from non-accrual to accrual	

status? • Request a sample of defaulted wholesale obligors and determine whether the organization appropriately and consistently applies its standards for assessing whether it has a reasonable assurance of repayment and performance before removing an obligor from defaulted status. 13. Has the organization made any recent changes to its definition of default for wholesale obligors? 14. How does the organization demonstrate that it is able to link different exposures to the same obligor? 15. If the organization elects not to assign an internal risk rating to an obligor to whom it extends credit based solely on the financial strength of the guarantor, how does it ensure that all of its exposures to that obligor are fully covered by eligible guarantees and that it applies the PD substitution approach to all of those exposures? • If a guarantee can no longer be recognized under the advanced approaches rule, does the organization immediately assign an internal risk rating to the obligor? 16. How does the organization ensure that it assigns each wholesale obligor to only one rating grade? 17. How does the organization ensure that each obligor rating grade is associated with a single PD? 18. Is any reporting in place to alert management of any situations where multiple ratings may be assigned to a single obligor?	

3.02	Work program question	Overall assessment	Reference
Is the organization's definition of obligor consistent with that provided in section 101?			101
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization define an obligor? 2. Does the organization treat exposures to the same legal entity or natural person denominated in different currencies as separate obligors, as allowed (but not required) under the advanced approaches rule? 3. Does the organization treat the following exposures as having separate obligors, as allowed (but not required) under the advanced approaches rule: • An income-producing real estate exposure for which all or substantially all of the repayment of the exposure is reliant on the cash flows of the real estate serving as collateral for the exposure; the organization, in economic substance, does not have recourse to the borrower beyond the real estate collateral; and no cross-default or cross-acceleration clauses are in place other than clauses obtained solely out of an abundance of caution? • Other credit exposures to the same legal entity or natural person? 4. Does the organization treat the following exposures as having separate obligors, as allowed (but not required) under the advanced approaches rule: • A wholesale exposure authorized under section 364 of the U.S. Bankruptcy Code to a legal entity or natural person who is a debtor-in-possession for purposes of Chapter 11 of the U.S. Bankruptcy Code? • Other credit exposures to the same legal entity or natural person? 5. Request a sample of wholesale obligors and verify that the advanced		1. 2. 3. 4. 5.	

approaches rule's definition of obligor is appropriately applied.	

3.03	Work program question	Overall assessment	Reference
Does the wholesale obligor rating system have at least seven discrete rating grades for non-defaulted obligors and at least one rating grade for defaulted obligors?			122(b)(2)(i)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How many rating grades does the organization have for non-defaulted obligors? Defaulted obligors? • What analysis does the organization provide supporting the number of rating grades it uses in its risk rating system? • Does the organization's obligor risk rating system have a meaningful distribution of obligors across grades? 2. If the organization has significant concentrations within a single rating grade or grades, what analysis does it provide supporting the level of concentration? • For example, does the organization demonstrate that the grade or grades cover reasonably narrow PD bands and that the default risk posed by all the borrowers in a grade falls within that band? • Do obligors in the same grade share homogenous risk characteristics or are they materially diverse? • What analysis has the organization conducted to determine that segments with significant concentrations should not be further subdivided to enhance the accuracy and reliability of the obligor risk rating system? • How does management justify any concentrations in the obligor risk rating system? • For any obligor rating grades that have a concentration of obligors, request a sample to determine similarity of obligors within a rating grade and compare the key risk drivers within each rating grade. How does the distribution of obligors across grades change over time?		1. 2.	

3.04	Work program question	Overall assessment	Reference
Does the internal risk rating policy for wholesale exposures describe the organization's rating philosophy (that is, how wholesale obligor ratings assignments are affected by the organization's choice of the range of economic, business, and industry conditions that are considered in the obligor rating process)?			122(b)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What is the organization's rating philosophy (i.e., how does management intend for the organization's wholesale obligor rating assignments to be affected by the organization's choice of the range of economic, business, and industry conditions that are considered in the obligor rating process) and how is it documented? 2. What is the organization's expectation for the migration of obligors from one rating grade to another in response to economic cycles? 3. What is management's expectation of the speed with which ratings migrate through economic cycles? Does this expectation vary by obligor type? 4. Are the organization's actual ratings migration patterns and frequencies in line with the organization's stated philosophy?		1. 2. 3. 4. 5. 6.	

5. How do the organization's risk rating distributions over time compare with those of external sources? 6. Has the organization's risk rating philosophy changed recently? If so, what was the impact of that change?	

4. Loss Severity Ratings

Update log		
Subcategory/portfolio	Date	Prepared by

4.01	Work program question	Overall assessment	Reference
Unless the organization has chosen to directly assign severity estimates to each wholesale exposure, does the internal risk rating system accurately and reliably assign each wholesale exposure to a loss severity rating grade reflecting the organization's estimate of the LGD of the exposure?			122(b)(2)(ii)
Review questions and procedures		Supervisor comments (with references) by subcategory or portfolio, as appropriate	
1. Does the organization capture the estimated loss severity upon default for a wholesale exposure either directly by assigning an LGD estimate to the exposure or by grouping the exposure with other wholesale exposures into a loss severity rating grade? Do not answer the following questions if the organization has chosen to directly assign loss severity estimates to each wholesale exposure. 2. How does the organization demonstrate that wholesale exposures assigned to the same loss severity rating grade (or LGD estimate) evidence similar severity of loss in the event of default? 3. Which exposure characteristics has the organization identified that influence loss severity? 4. What empirical support does the organization have for its loss severity rating system? 5. Are the organization's loss severity rating criteria written, clear, and consistently applied, and do they include the specific qualitative and/or quantitative factors used in assigning ratings? • In the wholesale risk rating system, is each loss severity rating grade defined in writing? • Review the loss severity grade rating definitions and assess whether they are adequately defined and unambiguous and do not overlap with definitions for other grades. 6. How does the organization ensure that each loss severity rating grade is associated with a single LGD estimate? 7. Request a sample of wholesale exposures. Using only the information available to the rater at the time of the original rating, determine retrospective ratings and compare to the organization's ratings. How, if at all, do the ratings differ? Are the		1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	

criteria sufficiently transparent to allow replication by a third party? Are the organization's assigned ratings appropriate and consistent with its policies? 8. Obtain a representative sample of wholesale exposures and perform a reconciliation to ensure that a loss severity rating grade is assigned to all wholesale exposures. 9. Obtain a sample of wholesale exposures across different rating grades. Verify that exposures within the same grade across different portfolios have similar exposure characteristics that influence loss severity in the event of default. 10. Obtain a sample of loss severity ratings and exposures assigned to the ratings (or LGD estimates). Verify that each loss severity rating (or LGD) is reflective of the estimated loss severity in the event of default and that each rating is distinct from the obligor rating.	

4.02	Work program question	Overall assessment	Reference
If the organization employs loss severity rating grades, does it have a sufficiently granular loss severity rating system to avoid grouping together exposures with widely ranging LGDs?			122(b)(2)(ii)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
Do not answer the following questions if the organization has chosen to directly assign loss severity estimates to each wholesale exposure. 1. How many loss severity rating grades does the organization employ? 2. How does the organization empirically support the number of grades? 3. Is the loss severity rating system granular enough to avoid grouping together exposures with significantly different LGD estimates? 4. How does management determine that the organization's internal loss severity rating system is sufficiently granular to separate wholesale exposures with significantly varying estimated LGDs? 5. If there is a high concentration of exposures within a rating grade (or grades), what analysis does the organization perform supporting this concentration? 6. Select a sample of loss severity rating grades and review the characteristics of the exposures included within each grade to determine if they are classified correctly.		1. 2. 3. 4. 5. 6.	

C. Data Management and Maintenance

Section 122(h)	**Data management and maintenance.** (1) An organization must have data management and maintenance systems that adequately support all aspects of its advanced systems and the timely and accurate reporting of risk-based capital requirements. (2) An organization must retain data using an electronic format that allows timely retrieval of data for analysis, validation, reporting, and disclosure purposes. (3) An organization must retain sufficient data elements related to key risk drivers to permit adequate monitoring, validation, and refinement of its advanced systems.
Section 131(b)	The organization must determine which of its exposures are wholesale. The organization must identify which wholesale exposures are high volatility commercial real estate (HVCRE) exposures, sovereign exposures, OTC derivative contracts, repo-style transactions, eligible margin loans, eligible purchased wholesale exposures, unsettled transactions to which section 136 applies, and eligible guarantees or eligible credit derivatives that are used as credit risk mitigants.

Suggested Review Items
Governance • Management organization charts for credit risk management and information technology departments that display IRB roles and responsibilities. • The information security program and its associated risk assessments for IRB data maintenance functions. • Minutes from credit risk management meetings, information technology steering committee meetings, and other executive management meetings devoted to data maintenance. **Policies and Procedures** • Loan coding policies and procedures. • Obligor and facility risk rating policies and procedures. **Management Reporting** • Board approved implementation plans, gap analysis, and project plans. **Documentation** • Documentation pertaining to risk characteristics, monitoring characteristics, and performance data used for risk rating and quantification purposes. • Topologies of data systems and asset transaction flows. • Training materials used to teach staff responsible for data maintenance or data entry. • Data and data system gap analysis and documentation. • Data maintenance system budget and resource information. • Data acquisition and maintenance systems documentation and reporting policies and procedures. • Data dictionary or metadata documentation. • Data quality issue logs. • Interim mitigation strategies for gaps in asset data and data collection and retention systems. **Audit and Independent Review** • Internal audit plans, reports, issues, and issue resolution plans related to data maintenance and management. • Sarbanes-Oxley Section 404 documentation of the internal controls around data acquisition, maintenance, and reporting. **Supervisory Review** • Previous examination findings for risk rating, quantification, and validation that detail shortcomings in the required data elements and data systems. • Prior IT (information technology) examination findings related to the wholesale IRB system and management's responses. • Previous examination findings for categorization, quantification, and validation that detail shortcomings in the required data elements and data systems and management's responses.

5. Data Management and Maintenance

Update log		
Subcategory/portfolio	Date	Prepared by

<table>
<tr><th>5.01</th><th>Work program question</th><th>Overall assessment</th><th>Reference</th></tr>
<tr><td colspan="2">Does the organization have data management and maintenance systems that support all aspects of its advanced systems?</td><td></td><td>122(h)(1)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory or portfolio, as appropriate</td></tr>
<tr><td colspan="2">1. Do data maintenance policies, procedures, and practices address the following:
• Specify all IRB and internal credit risk data elements that will be collected at exposure origination, during ongoing exposure monitoring, and for collection and recovery purposes?
• Ensure ongoing data integrity for wholesale exposures, such as through change control procedures?
• Ensure that data elements for wholesale exposures are calculated, interpreted, and applied consistently across the organization?
• Require the data to be maintained on an individual exposure level?
• Establish appropriate data retention periods (including for charged off, paid-off, and sold exposures) that include a period of economic downturn conditions?
• Establish under what circumstances the organization will cease the collection and retention of exposure-level and segment-level data?
• Address the retention of disposition data (including collection, charge-off, and recovery information) for individual defaulted and sold exposures?
• Address the use of alternative internal data sources (such as automated valuation models or recovery cost information from “troubled asset workout” business units) and the use of external data sources (such as third-party credit bureaus and home price service providers) in the risk rating and quantification systems? Is the use of external data as a proxy for internally derived data a widespread practice within wholesale lending programs? Do the external data meet or exceed the organization’s internal data maintenance policies and practices?
• Address missing data, including the effects of missing data on risk rating and quantification systems?
• Address data errors and the reporting of data errors and data linkage breaks to source, downstream, and/or external systems?
• Address the process for implementing, documenting, and verifying system changes and data changes?
2. What is the organization’s end-to-end process for gathering data, storing data, processing data, and calculating the risk-weighted asset (RWA) amount for each wholesale exposure?
3. Has the organization documented the entire data flow process, including data flow diagrams, control points, data dictionaries, and identified control gaps?
4. How has the organization documented its process for gathering, storing, and processing data, and calculating the RWA amount for each wholesale exposure?
5. Does the organization have the ability to track obligors of wholesale exposures and to track wholesale exposures throughout their lifecycle from origination to disposition?
6. Does the organization capture all rating assignment data for its wholesale IRB system, including all significant quantitative and qualitative factors used to assign obligor and loss severity ratings at origination and whenever the rating is</td><td colspan="2">1.
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reviewed, regardless of whether the rating is changed? 7. Has a data governance function been established in support of wholesale advanced systems? • Are the roles associated with data quality management well-defined? • Has management developed a framework outlining the organization's approach to managing data? • What data architecture standards and processes have been developed and established by the organization for data capturing, processing, and retention? • Has a process been developed for granting exceptions? 8. Is there an effective governance framework and mechanism for ensuring data quality? 9. How much manual intervention is required to gather, store, or process data? 10. Do internal audit reviews include the data management framework, inspection of data, information technology controls, data metrics, and data quality plans? 11. What controls have been established for managing the IRB or advanced approaches data management [information technology] environment for change management and information security? 12. To the extent that the management of data security is unique for wholesale IRB credit-related systems, what are the systems, internal controls, and processes for safeguarding these systems? Have any weaknesses or issues been noted by management or any independent review functions? 13. What is the nature of audit findings? Are these findings considered severe? Are audit findings addressed adequately and in a timely manner? 14. Are sufficient resources provided to ensure that systems are adequate to support all aspects of the wholesale IRB system and the timely and accurate reporting of risk-based capital requirements? 15. What issues has management been discussing relative to its wholesale IRB credit systems? 16. In the Sarbanes-Oxley Section 404 documentation, are there any significant deficiencies or material weaknesses noted in relation to wholesale IRB systems or exposures? • If so, what is the nature of the deficiencies or weaknesses? • What are management's plans to address the deficiencies or weaknesses and are they adequate? 17. Observe the process for risk rating an obligor and a facility to ensure that practice is consistent with policies and procedures. 18. Observe the process for updating the characteristics and, if necessary, the ratings of an existing obligor and facility to ensure that practice is consistent with policies and procedures. 19. Observe the process for coding a new borrower and facility to ensure that practice is consistent with policies and procedures.	

5.02	**Work program question**	**Overall assessment**	**Reference**
Does the organization have data management and maintenance systems that support timely and accurate reporting of risk-based capital requirements?			122(h)(1)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	

1. Does the data repository use the IRB default definition for wholesale obligor consistently over the entire data history? If not, how does the organization compensate for the inconsistency? 2. Does the data management framework provide the organization with the ability to trace the lineage of data from source to final report through technical and/or manual processes (i.e., metadata)? 3. Does the organization have data reconciliation processes that ensure all exposures are appropriately accounted for? 4. What standards and processes have been developed and established for managing the wholesale advanced credit risk system's data correction, reconciliation, and changes to ensure data integrity and quality? 5. Describe the organization's program to ensure end-to-end data integrity. • Has the organization established tolerances for data integrity? • Does the organization have a certification process for data integrity, a tracking and reporting process, and a requirement to have an action plan for resolution for out-of-tolerance conditions? 6. How are data quality problems identified and addressed? 7. Does the technology supporting the advanced IRB systems include an integrated platform that assimilates data collection, data warehousing, and report creation? 8. How much time after quarter-end is needed to produce accurate reports of the organization's risk-based capital requirements for wholesale exposures? 9. How much manual intervention is required to produce the reports? 10. How frequently are published reports revised? Are the revisions due to errors or are they due to adjustments? 11. Are the reports tested for accuracy by an independent third party? 12. Once the organization starts submitting its reports to its primary regulator, review the exceptions produced from its submissions. Review the organization's submissions with regulatory report review personnel. • How many validity and quality edits do the organization's submissions produce? • What is the nature of the quality edits? Are they primarily due to errors, or does the organization generally have satisfactory explanations for the differences? • Does the volume of edits appear excessive relative to peers?	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

5.03	Work program question	Overall assessment	Reference
Does the organization have the data and systems to determine which of its exposures are wholesale exposures? This includes the ability to identify wholesale exposures maintained on non-wholesale systems of record.			131(b)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What is the process for determining that an exposure is a wholesale exposure? 2. For each line of business/area in the organization, who makes the determination that an exposure is a wholesale exposure and what is the process? 3. How are credits denoted as wholesale within the organization's systems of record or within the organization's data warehouse? 4. How are the less obvious types of wholesale IRB exposures, such as exposures		1. 2. 3. 4. 5. 6.	

to individuals, that are not managed as a part of a segment of exposures identified as wholesale exposures and by whom? 5. Do the organization's policies and procedures detail this process for determining that an exposure is a wholesale exposure? 6. What is the process and who is responsible (such as internal audit or internal loan review) for validating the accuracy of the processes for identifying wholesale exposures? 7. What is the scope of the procedures for testing and are the method(s) of testing sufficient to ensure the accuracy of the wholesale categorization process? Do they address all areas that could be involved in identifying wholesale exposures? 8. How does the organization ensure that the definitions of codes used to differentiate wholesale exposures from retail exposures are consistently applied across the organization? 9. Request a list of large loans to individuals. Determine if they are managed as part of a segment of loans. If not, determine if they are identified as wholesale exposures. 10. Request a list of loans to individuals on the organization's primary commercial loan system. Determine if they are managed as part of a segment of loans and if they are appropriately identified as wholesale or retail exposures. (Large loans to individuals are wholesale regardless of how they are managed.) 11. Request a list of loans to businesses on the organization's primary retail and mortgage loan systems. Determine if they are managed as part of a segment of loans and if they are identified as wholesale or retail exposures. 12. Request a list of corporate loans sold with full recourse. Determine if they are identified as wholesale exposures. 13. Observe the process for determining whether an exposure is a wholesale exposure or a retail exposure to ensure that practice is consistent with policies and procedures.	7. 8. 9. 10. 11. 12. 13.

5.04	**Work program question**	**Overall assessment**	**Reference**
Does the organization have the data and systems to identify which wholesale exposures are high-volatility commercial real estate (HVCRE) exposures, sovereign exposures, over-the-counter (OTC) derivative contracts, repo-style transactions, eligible margin loans, eligible purchased wholesale exposures, unsettled transactions, and eligible guarantees or eligible credit derivatives that are used as credit risk mitigants?			131(b)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What is the process for categorizing wholesale exposures? 2. For each line of business/area in the organization, who determines what types of wholesale exposure an exposure is and what is the process? 3. Within the organization's systems of record or within the organization's data warehouse, how is an exposure's wholesale subcategory denoted? Do the organization's policies and procedures detail the process for categorizing wholesale exposures? 4. What is the process and who is responsible (internal audit or internal loan review) for validating the accuracy of the processes for categorizing wholesale exposures? 5. What is the scope of the procedures for testing and the method(s) of testing?		1. 2. 3. 4. 5. 6. 7. 8.	

• Are the scope of procedures and methods of testing sufficient to ensure the accuracy of the wholesale categorization process? • Do the scope of procedures and methods of testing address all areas that could be involved in identifying wholesale exposures? 6. How does the organization ensure that the definitions of codes used to differentiate wholesale exposures from retail exposures are consistently applied across the organization? 7. Request a sample of internal audit or loan review reports that address loan coding and categorization. Determine the extent of errors. Review remediation plans and determine if errors and issues are elevated to the appropriate level and addressed in a timely manner. 8. Observe the process for categorizing wholesale exposures to ensure that practice is consistent with policies and procedures.	

5.05	Work program question	Overall assessment	Reference
Does the organization retain data in an electronic format that allows timely retrieval of data for analysis, validation, reporting, and disclosure purposes?			122(h)(2)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Obtain and review copies of the policies and procedures for data capture, retention, access, and retrieval. 2. What data are retained in electronic format? 3. What is the required retention period of the data? 4. How are historical data retrieved and how long is the actual retrieval process (e.g., instantaneous, etc.)? 5. Are all of the data stored in electronic format available for data analysis, validation, reporting, and disclosure purposes? • What limitations are placed on data retrieval and access? 6. Are there any data elements for the wholesale IRB system that are currently maintained in non-electronic format? Describe those data elements. 7. Does the organization address in policy any data maintained for wholesale IRB system purposes that are not maintained in electronic format? 8. Does the technology framework integrate both initial and refreshed borrower data? 9. How does the organization incorporate non-electronic data into its analysis, validation, reporting, and disclosure processes? 10. How are non-electronic data gathered by or made available to users and report generators? 11. How are non-electronic data reconciled to source systems and the general ledger (if appropriate)? 12. How long after quarter-end is new non-electronic data made available to users and report generators? 13. What are management's plans to address non-electronic data issues?		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.	

5.06	Work program question	Overall assessment	Reference
Does the organization have the ability to identify all of its wholesale exposures to an obligor?			122(h)(2)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What is the process for verifying “new” obligors against existing obligors to ensure that duplicate records are not created? 2. What audit procedures are designed to test for duplicate obligor records? 3. What is the nature of any audit findings related to duplicate obligor records? Have the findings been appropriately elevated and addressed? 4. What is the process for associating exposures with obligors? 5. How does the organization ensure that all exposures are assigned to an obligor? 6. Observe the process for verifying obligors against existing customer records to ensure that practice is consistent with policies and procedures.		1. 2. 3. 4. 5. 6.	

5.07	Work program question	Overall assessment	Reference
Does the organization retain sufficient data elements related to key risk drivers to permit adequate monitoring, validation, and refinement of its advanced systems?			122(h)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Are the criteria used to assign ratings to wholesale exposures and quantify associated risk parameters captured in such a manner as to facilitate development, ongoing monitoring, and validation of the organization’s advanced systems? 2. Compare the policies and procedures for obligor and loss severity ratings with the data acquisition policies and procedures to ensure that all significant quantitative and qualitative factors used to assign obligor and loss severity ratings at origination and whenever the rating is reviewed are captured, regardless of whether the rating is changed. 3. Compare the data elements captured in the data acquisition and maintenance systems with the data elements required in the obligor and facility risk rating policies and procedures to ensure that all significant quantitative and qualitative factors used to assign obligor and loss severity ratings at origination and whenever the rating is reviewed, regardless of whether the rating is changed, are being captured. 4. What is the process and frequency for updating the qualitative and quantitative characteristics used for rating assignments in the data warehouse? 5. How does the organization capture qualitative factors used to assign obligor or loss severity ratings? 6. How do data acquisition and maintenance policies and procedures address the following: • Specify all wholesale IRB and internal credit risk data elements that will be collected at loan origination, during ongoing loan monitoring, and for collection and recovery purposes? • Address the retention of disposition data for individual defaulted loans that includes collection, charge-off, and recovery information? • Require that retained loan data include a period of economic stress or high losses? (Note: For stress data outside of the last five-year time horizon, the organization can use data derived from representative statistical samples of		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25.	

portfolios, or data from the individual loans in those portfolios.) • Address documentation for asset sales? • Address the use of alternative internal data sources and the use of external data sources in the risk quantification systems? Is the use of external data as a proxy for internally-derived data a wide spread practice within wholesale lending programs? Do the external data meet or exceed the organization's internal data maintenance policies and practices? • Address missing data? Does management have a plan to address the effects of missing data on risk segmentation and quantification systems? • Address the process for requesting, implementing, documenting, and verifying system changes and data changes? 7. Are risk drivers not currently used to risk rate and quantify risk, but with potential explanatory power, retained in the data systems? 8. How are the data for obligors and facilities retained at disposition? At a minimum, do these data include the following: • The nature of disposition for each facility: renewal, repayment, loan sale, default, and restructuring? • For defaults: exposure amount, actual recoveries, source of recoveries, costs of workouts, and timing of recoveries and costs? • The nature and extent of guarantor support? • The sale price for loans sold? 9. What are the organization's guidelines for data purging? 10. Under what circumstances will the organization cease the collection and retention of data? 11. What are the organization's data retention periods (including for charged off, paid-off, and sold loans)? Are they appropriate? 12. How are current and past ratings and characteristic data retained throughout the obligor and exposure life cycle? At a minimum, do these ratings and data include the following: • Key borrower and exposure characteristics? • Ratings for obligors and facilities? • Key factors used to assign the ratings? • Date ratings assigned? • Overrides to the ratings and authorizing individual? 13. Does the organization track overrides of obligor or loss severity ratings for its wholesale IRB systems? 14. Review a sample of recent overrides of the obligor or loss severity ratings to ensure that the overrides were processed in accordance with policy. 15. Review a sample of internal audit or loan review reports to determine the extent to which overrides of obligor or loss severity rating were missed or misprocessed. 16. What is the nature of previous exam findings related to required data elements, and have the findings been adequately addressed? 17. What controls are in place to ensure that overrides are only processed in accordance with policy and are monitored by management? 18. What controls are in place to ensure that the reasons for overrides are adequately documented? 19. What controls are in place to ensure that data elements used in the wholesale	

IRB system are updated as new data become available and historic data are retained? 20. What controls are in place to ensure that the qualitative and quantitative characteristics used for obligor and loss severity rating assignments are maintained in the data management system and are updated as appropriate? 21. How does the organization address data maintained or managed by third parties? 22. Determine if any processes are outsourced to third parties. How does the organization validate that data capture and oversight of risk management standards for these portfolios and processes are carried appropriately? 23. Review service level agreements and/or contracts on the process carried out by third parties and ensure the data capture and oversight of risk management are appropriately addressed. 24. On a sample basis, review documentation provided by third parties verifying compliance with service level agreements and contracts. 25. In instances where the process carried out by third parties was not consistent with service level agreements and contracts, determine management's response.	

D. Quantification of Risk Parameters

Section 122(c)	**Quantification of risk parameters for wholesale exposures.** (1) The organization must have a comprehensive risk parameter quantification process that produces accurate, timely, and reliable estimates of the risk parameters on a consistent basis for the organization's wholesale exposures. (2) An organization's estimates of PD, LGD, and EAD must incorporate all relevant, material, and available data that is reflective of the organization's actual wholesale exposures and of sufficient quality to support the determination of risk-based capital requirements for the exposures. In particular, the population of exposures in the data used for estimation purposes, and lending standards in use when the data were generated, and other relevant characteristics, should closely match or be comparable to the organization's exposures and standards. In addition, an organization must: (i) Demonstrate that its estimates are representative of long-run experience, including periods of economic downturn conditions, whether internal or external data are used; (ii) Take into account any changes in lending practice or the process for pursuing recoveries over the observation period; (iii) Promptly reflect technical advances, new data, and other information as they become available; (iv) Demonstrate that the data used to estimate risk parameters support the accuracy and robustness of those estimates; and (v) Demonstrate that its estimation technique performs well in out-of sample tests whenever possible. (3) The organization's risk parameter quantification process must produce appropriately conservative risk parameter estimates where the organization has limited relevant data, and any adjustments that are part of the quantification process must not result in a pattern of bias toward lower-risk parameter estimates. (4) The organization's risk parameter estimation process should not rely on the possibility of U.S. government financial assistance, except for the financial assistance that the U.S. government has a legally binding commitment to provide. (5) The organization must be able to demonstrate which variables have been found to be statistically significant with regard to EAD. The organization's EAD estimates must reflect its specific policies and strategies with regard to account management, including account monitoring and payment processing, and its ability and willingness to prevent further drawdowns in circumstances short of payment default. The organization must have adequate systems and procedures in place to monitor current outstanding amounts against committed lines, and changes in outstanding amounts per obligor and obligor rating grade. The organization must be able to monitor outstanding amounts on a daily basis. (6) At a minimum, PD estimates for wholesale obligors must be based on at least five years of default data. LGD estimates for wholesale exposures must be based on at least seven years of loss severity data. EAD estimates for wholesale exposures must be based on at least seven years of exposure amount data. If the organization has relevant and material reference data that span a longer period of time than the minimum time periods specified above, the organization must incorporate such data in its estimates, provided that it does not place undue weight on periods of favorable or benign

	economic conditions relative to periods of economic downturn conditions. (7) Default, loss severity, and exposure amount data must include periods of economic downturn conditions, or the organization must adjust its estimates of risk parameters to compensate for the lack of data from periods of economic downturn conditions. (8) The organization's PD, LGD, and EAD estimates must be based on the definition of default in section 101. (9) If an organization uses internal data obtained prior to becoming subject to the advanced approaches rule or external data to arrive at PD, LGD, or EAD estimates, the organization must demonstrate to the primary federal supervisor that the organization has made appropriate adjustments if necessary to be consistent with the definition of default in section 101. Internal data obtained after the organization becomes subject to the advanced approaches rule must be consistent with the definition of default in section 101. (10) The organization must review and update (as appropriate) its risk parameters and its risk parameter quantification process at least annually. (11) The organization must at least annually conduct a comprehensive review and analysis of reference data to determine relevance of reference data to the organization's exposures, quality of reference data to support PD, LGD, and EAD estimates, and consistency of reference data to the definition of default contained in section 101.
Section 131(d)(2)	**Floor on PD assignment.** The PD for each wholesale obligor may not be less than 0.03 percent, except for exposures to or directly and unconditionally guaranteed by a sovereign entity, a supranational entity listed in section 131(d)(2), or a multilateral development bank as defined in the advanced approaches rule, to which the organization assigns a rating grade associated with a PD of less than 0.03 percent.
Section 131(d)(4)	**Eligible purchased wholesale exposures**. An organization must assign a PD, LGD, EAD, and M to each segment of eligible purchased wholesale exposures. If the organization can estimate ECL (but not PD or LGD) for a segment of eligible purchased wholesale exposures, the organization must assume that the LGD of the segment equals 100 percent and that the PD of the segment equals ECL divided by EAD. The estimated ECL must be calculated for the exposures without regard to any assumption of recourse or guarantees from the seller or other parties.
Section 131(d)(6)	**EAD for OTC derivative contracts, repo-style transactions, and eligible margin loans.** An organization must calculate its EAD for an OTC derivative contract as provided in paragraphs (c) and (d) of section 132. An organization may take into account the risk-reducing effects of financial collateral in support of a repo-style transaction or eligible margin loan and of any collateral in support of a repo-style transaction that is included in the organization's VaR-based measure under the market risk capital rule in subpart F of the federal agencies' regulatory capital rules through an adjustment to EAD as provided in paragraphs (b) and (d) of section 132. An organization that takes collateral into account through such an adjustment to EAD under section 132 may not reflect such collateral in LGD.
Section 131(d)(7)	**Effective maturity.** An exposure's effective maturity (M) must be no greater than five years and no less than one year, except that an exposure's M must be no less than one day if the exposure is a trade-related letter of credit, or if the exposure has an original maturity of less than one year and is not part of an organization's ongoing financing of the obligor. An exposure is not part of an organization's ongoing financing of the obligor if the organization: (i) Has a legal and practical ability not to renew or roll over the exposure in the event of credit deterioration of the obligor; (ii) Makes an independent credit decision at the inception of the exposure and at every renewal or roll over; and (iii) Has no substantial commercial incentive to continue its credit relationship with the obligor in the event of credit deterioration of the obligor.
Section 101	**Exposure at Default (EAD)** means: (1) For the on-balance sheet component of a wholesale exposure… (except as provided in the advanced approaches rule), EAD means the carrying value (including net accrued but unpaid interest and fees) for the exposure less any allocated transfer risk reserve for the exposure. **(2)** For the off-balance sheet component of a wholesale exposure (except as provided in the advanced approaches rule), in the form of a loan commitment, line of credit, trade-related letter of credit, or transaction-related contingency, the organization's best estimate of net additions to the outstanding amount owed the organization, including estimated future additional draws of principal and accrued but unpaid interest and fees, that are likely to occur over a one-year horizon assuming the wholesale exposure were to go into default. This estimate of net additions must reflect what would be expected during economic downturn conditions.

Suggested Review Items

Policies and Procedures

- Policy governing risk parameter estimation methods including the specific calculation methods and data history utilized for the PD, LGD, and EAD.

Management Reporting

- MIS trend reporting of key measurements, such as the portfolio risk distribution, credit line and balance measurements, prepayment and attrition rates, and charge-offs.
- MIS reporting for defaulted loans of charge-offs plus credit line and balance measurements before default.

- Collections reporting on charged off balances and the associated recovery streams, as well as analyses of recovery costs and timing from charge-off to recovery.

Documentation

- Documentation describing the parameter estimation, mapping, and application stages.
- Documentation describing the frequency of updates to risk rating criteria and parameter estimates.
- Policy and documentation related to the IRB system's data warehouse design, including detailed information on variables available at the loan level (borrower and loan characteristics and disposition variables) and the length of data history.
- Policy and documentation of the organization's MIS, specifically the balance, credit line and loss measures that are reported, the data granularity, and the length of data history.
- Policy and documentation of the organization's data system for collections, such as the loss and recovery measures tracked for loans in collections, the granularity of these measurements, and the length of history available for the collections data.
- Documentation on external data utilized in the quantification process of risk parameters.
- Documentation of historical asset sales and securitization activity.
- Documentation of differences in credit quality between asset sales or securitizations and the entire portfolio.
- Documentation on whether the reference data include downturn credit cycle(s), and if not, the adjustment methodology of arriving at a long-run average one-year PD.

Audit and Independent Review

- Analysis of reference data and relevance to the organization's exposure.
- Analysis of the quality of the reference data.
- Documentation of the result of the periodic review of the quality and relevance of the reference data.

Supervisory Review

- Previous examination findings, data, and analysis related to the organization's quantification processes, including findings from credit, MIS, and economic capital reviews.

6. General Topics

Update log		
Subcategory/portfolio	Date	Prepared by

6.01	**Work program question**	**Overall assessment**	**Reference**
Does the risk parameter estimation process exclude consideration of U.S. government financial assistance except for instances where the U.S. government has a legally binding commitment to provide such assistance?			122(c)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory and/or portfolio as appropriate**	
1. Does the documentation describe how U.S. government financial assistance is considered in the quantification process? 2. How is implicit U.S. government support handled within the organization's risk parameter estimation process?		1. 2.	

<table>
<tr><th>6.02</th><th>Work program question</th><th>Overall assessment</th><th>Reference</th></tr>
<tr><td colspan="2">Are risk parameters and risk parameter quantification processes reviewed by the organization at least annually and updated (as appropriate)?</td><td></td><td>122(c)(10)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory or portfolio, as appropriate</td></tr>
<tr><td colspan="2">1. Review the policy/procedures for assessing the accuracy of risk parameter estimates and updates of the risk parameter quantification.
• Does the policy make reference to review frequency? Have such reviews been performed at least annually?
• What drives the timing of risk parameter reviews?
• How does the organization factor into these reviews significant changes in products and underwriting standards of the organization?
• Which groups within the organization are responsible for conducting risk parameter reviews?
2. Obtain and review available management reports documenting the annual review.
3. Describe the testing procedures used by the organization to ensure its risk parameter estimates represent accurate, reliable, and relevant risk estimates of the organization’s current portfolio.
• Do reviews of the quantification process include
– the consideration of additional empirical data?
– application of different statistical estimation techniques?
– revisions to key assumptions made in deriving risk parameter estimates from reference data?
4. What updates (if any) were made to the quantification process (i.e., general estimation methodology) as a result of the last (two) review(s)?
• What changes (if any) were made to risk parameters as a result of the last (two) review(s)?
• Did these methodological changes help improve the accuracy, timeliness, reliability, and relevance of risk parameter estimates?</td><td colspan="2">1.
2.
3.
4.</td></tr>
</table>

<table>
<tr><th>6.03</th><th>Work program question</th><th>Overall assessment</th><th>Reference</th></tr>
<tr><td colspan="2">Does the organization conduct a comprehensive review and analysis of all reference data at least annually to determine the relevance of such reference data to the organization’s exposures, the quality of the reference data used to support the parameter estimates, and the consistency of the reference data to the definition of default for wholesale exposures in section 101?</td><td></td><td>122(c)(11)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory or portfolio, as appropriate</td></tr>
<tr><td colspan="2">1. How does the organization evaluate the relevance of the reference data to the organization’s exposures?
• Does the organization have established and documented criteria to assess the relevance of the reference data to the organization’s exposures?
• Does the organization have established and documented criteria to assess the quality of the reference data to support risk parameter estimates?
• How does the organization align the risk profile of its current exposures with the risk profile of the reference data used for parameter estimation?
• How does the organization evaluate the quality of data to support risk</td><td colspan="2">1.
2.
3.
4.</td></tr>
</table>

parameter estimates? Describe the components of such an evaluation. 2. How often does the organization analyze its reference data to ensure its ongoing relevance, quality, and consistency? • How does the organization justify the timing of its reviews of the reference data? • How often does the organization update its reference data? – Do all such updates result in the re-estimation of the risk parameters? 3. Examine summary statistics for certain key variables in the reference data and current portfolio (portfolio mix, characteristics, min, max, mean, median, variance, etc.) to assess their reasonableness. 4. Examine the characteristics of the entire reference data—number of observations, number of fields, and overall size of the data—and document how they have changed over the last several years. • Compare the results to the current portfolio for reasonableness.	

7. Probability of Default

Update log		
Subcategory/portfolio	Date	Prepared by

7.01	Work program question	Overall assessment	Reference
Does the PD quantification process produce accurate, timely, and reliable estimates of the probability of default for the organization's wholesale exposures that are consistently assigned to each risk rating?			122(c)(1)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
Estimation of PD 1. Describe the method(s) used to estimate PD. • How are long-run average PD estimates calculated? Do they represent default-weighted average economic loss? • How are prepayments and attrition incorporated into the estimation method (i.e., withdrawn ratings in the cohorting methodology)? • How are loan sales or securitizations of assets incorporated? • What adjustments (if any) are made to the analytically-derived PD estimates? What rationale is provided for such adjustments (e.g., to ensure monotonicity)? • Does the long-run average PD estimation method comply with sound quantification practices? • What risk characteristics have been found to be statistically significant in explaining the variation in PD? • Does the organization's PD estimation process rely on the possibility of U.S. government financial assistance even in those cases where such assistance is only implied?		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	

• Determine if the organization has provided sufficient analysis and support for its methodology for PD estimation. 2. Does PD equal 100 percent for wholesale exposures meeting the definition of default? 3. How does the organization calculate average PD for a rating grade (simple average, exposure-weighted average)? • How does the organization calculate the average default rate for a rating grade? What weighting scheme (if any) does the organization use? 4. How does the organization construct cohorts for PD quantification purposes? Does the organization use overlapping or non-overlapping cohorts? • How does the organization ensure that its cohorting method does not introduce bias into the parameter estimation process? • How does the organization calculate the observed default rate for each cohort? • Does the calculation of observed default rates explore potential variances across business lines for similarly rated credits? • How does the organization factor in withdrawn ratings (loans that are prepaid, sold, etc.)? 5. What procedure does the organization use to estimate PD for each rating grade based on observed average default rates? • Does the organization make any judgmental adjustments in the process of PD quantification? At what stage in the quantification process are such adjustments applied? • How does the organization estimate PDs for rating grades with historically very low or zero observed defaults? • Does the organization make any judgmental adjustments to the resulting PD estimates (capping/flooring/scaling)? 6. Does the organization have a single PD master scale for all lines of business? • What analysis has the organization provided to support its mapping of rating grades from different business lines to a common PD master scale, if used? • How does the organization ensure that this policy is followed? 7. How does the organization apply estimated PDs to obligors of wholesale exposures? • How does the organization map obligors of wholesale exposures to the PD master scale, if used? 8. Does the PD estimate for each non-defaulted risk rating equal the organization's empirically based best estimate of the long-run average one-year default rate for the exposures in the risk rating? • Does the PD estimate for each non-defaulted risk rating capture the average default experience for exposures in the risk rating over a mix of economic conditions (including economic downturn conditions) sufficient to provide a reasonable estimate of the average one-year default rate over the economic cycle for the risk rating? 9. Does the PD estimate for each obligor rating grade mean either of the following: • For a wholesale exposure to a non-defaulted obligor, the organization's empirically based best estimate of the long-run average one-year default rate for the rating grade assigned by the organization to the obligor, capturing the average default experience for obligors in the rating grade	

over a mix of economic conditions (including economic downturn conditions) sufficient to provide a reasonable estimate of the average one-year default rate over the economic cycle for the rating grade? • For a wholesale exposure to a defaulted obligor,100 percent? **Accuracy, Timeliness, and Reliability** 10. What is the organization's definition of accuracy, timeliness, and reliability with respect to PD estimates? • What criteria did the organization establish to evaluate the accuracy, timeliness, and reliability of PD estimates? • How often does the organization evaluate the accuracy, timeliness, and reliability of PD estimates? • How does the organization document its assessment of accuracy, timeliness, and reliability? – Obtain copies of management reports documenting management's assessment and review for reasonableness. – Obtain copies of policy and review for inclusion. 11. What is the organization's policy for ratings exposures (e.g., annually, as new information is available, etc.)?	

7.02	Work program question	Overall assessment	Reference
Does the PD estimate for each non-default risk rating equal no less than 0.03 percent (unless unconditionally guaranteed by a sovereign entity, a supranational entity listed in section 131(d)(2), or a multilateral development organization as defined in the advanced approaches rule, to which the organization assigns a rating grade associated with a PD of less than 0.03 percent)?			131(d)(2)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Review policy and MIS for any flooring imposed in the PD estimation process. 2. Review policy and MIS to confirm that the minimum PD used for Pillar 1 purposes is 0.03 percent, except in cases as allowed by the advanced approaches rule.		1. 2.	

7.03	Work program question	Overall assessment	Reference
If the organization elects to segment its eligible purchased wholesale exposures, does it accurately, reliably, and on a timely basis assign a PD estimate to each segment? If the organization can estimate ECL (but not PD or LGD) for a segment of eligible purchased wholesale exposures, does it assume that the PD of the segment equals ECL divided by EAD?			131(d)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization elect to segment eligible purchased wholesale exposures? (If no, skip to section 7.04.) • Review policy to determine how an eligible purchased wholesale exposure is defined. • Review policy to determine what criteria these eligible purchased wholesale exposures need to meet in order to be segmented. • How does the organization ensure that the eligible purchased wholesale		1. 2. 3. 4. 5. 6. 7.	

exposures which are segmented meet the following criteria: – The purchased wholesale exposure must be purchased from an unaffiliated seller and must not have been directly or indirectly originated by the purchasing organization or securitization special purpose entity (SPE)? – The purchased wholesale exposure must be generated on an arm's-length basis between the seller and the obligor (intercompany accounts receivable and receivables subject to contra-accounts between firms that buy and sell to each other would not satisfy this criterion)? – The purchasing organization or securitization SPE must have a claim on all proceeds from the exposure or a pro rata interest in the proceeds? – The purchased wholesale exposure must have an effective remaining maturity of less than one year? – The purchased wholesale exposure must, when consolidated by obligor, not represent a concentrated exposure relative to the portfolio of purchased wholesale exposures? 2. In reference to question (1)(c)(i), how does the organization • define an unaffiliated seller? • determine if the exposure was directly or indirectly originated by the purchasing organization or securitization SPE? 3. In reference to question (1)(c)(ii), how does the organization determine if the exposure was generated on an arm's length basis between the seller and the obligor? 4. In reference to question (1)(c)(iii), how does the organization ensure that the purchasing organization or securitization SPE has a claim on all proceeds from the exposure or a pro rata interest in the proceeds? 5. In reference to question (1)(c)(iv), how does the organization calculate M and ensure it is less than one year? Is M calculated in accordance with sections 10.01–10.02 below? 6. In reference to question (1)(c)(v), how does the organization ensure that the purchased wholesale exposure, when consolidated by obligor, does not represent a concentrated exposure relative to the portfolio of purchased wholesale exposures? 7. What segmentation criteria does the organization use to segment its eligible purchased wholesale exposures? 8. What methodology does the organization use to derive a PD estimate for a segment of eligible purchased wholesale exposure? Is this approach theoretically sound? 9. What criteria did the organization establish to assess the accuracy, reliability, and timeliness of PD estimates for segments of eligible purchased wholesale exposures? 10. Do PD estimates for segments of eligible purchased wholesale exposures meet the aforementioned criteria? 11. If the organization can estimate ECL (but not PD or LGD) for a segment of eligible purchased wholesale exposures, does it assume that the PD of the segment equals ECL divided by EAD? 12. For PD estimates derived as described in question (11), explain the organization's process for estimating ECL and EAD for segments of eligible	8. 9. 10. 11. 12. 13.

purchased wholesale receivables. • Is the process consistent with estimation procedures used to analyze other categories of risk exposure? • Does the process rely on well-supported risk measurement methodologies? 13. In deriving PD estimates for segments of eligible purchased wholesale exposures, does the organization assume recourse to or guarantees from the seller or other parties?	

7.04	Work program question	Overall assessment	Reference
Are the data used to estimate PD relevant to the wholesale exposures and of sufficient quality to support the determination of risk-based capital requirements for the exposures, or have the PD estimates been adjusted to reflect appropriate conservatism?			122(c)(2) 122(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Are all data used for PD estimation purposes collected in a single database? 2. What are the sources of data for the reference data that the organization uses to estimate PD? 3. How many observations and years of history do the data include? 4. Obtain a listing of data fields available in the reference data. • What borrower-related information is captured in the reference data used for PD estimation? 5. Are the data used to estimate PD representative of the existing portfolio? • What analysis has the organization performed to demonstrate this? Obtain and review relevant management reports. • How often does the organization perform such analysis? 6. How does the organization review its reference data to determine ongoing relevance and quality? • How often does the organization review its reference data to determine its ongoing relevance and quality? • What criteria did the organization establish to evaluate the relevance of its reference data to the organization’s current wholesale portfolio? • How does the organization evaluate the quality of reference data? – What criteria did the organization establish to assess the quality of its reference data to support PD estimates? Are these criteria reasonable? – Does the reference data meet the established quality criteria in all material respects? 7. Does the PD reference data consist of internal data, external data, or a combination of the two? 8. If internal data are used: • Do the available internal data contain the necessary history to correctly quantify the PD estimates? • Do the internal historical loss data fully conform to the advanced approaches rule’s definition of default for wholesale obligors? • Where internal historical loss data do not fully conform to the definition of default, does the organization document and appropriately adjust for such discrepancies?		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.	

9. If external data are used, are the data appropriately incorporated into the quantification process?
• Document what data sources are used and why are such data sources chosen.
• If the organization uses exclusively or primarily external data, how does the organization justify not using its internal data?
• How does the organization ensure the quality of the external data?
• Have differences in underwriting and lack of mapping to comparable risk rating criteria been considered and documented?
  – Has conservatism in the parameter estimates been incorporated due to these differences?
• Does the organization regularly review mapping to external reference data and the appropriateness of uses of the reference data (vs. internal sources)?
  – Obtain and review documentation supporting such review.
• Has the organization documented its assumptions made in mapping to external data sources and fully supported those assumptions? Does the organization have a policy governing use of the external data in the parameter estimation process and does the organization regularly review alternative data, including internal data?
• Has the organization adequately documented key assumptions and uncertainties underlying its PD estimates?
• How has the organization ensured that its PD estimates are appropriately conservative in light of underlying modeling uncertainties, especially for low-default portfolios?
10. Did the organization identify areas (e.g., industry, time periods, etc.) where the organization has limited relevant data to support accurate and reliable PD estimates?
• If so, does the organization appropriately account for significant data gaps?
  – Does the organization take an appropriately conservative approach to quantification when data gaps exist?
  – What measures does the organization take to mitigate significant data gaps in the information on its own borrowers?
  – Where essential data elements necessary for accurate quantification are missing or have not been maintained, does the organization have a plan to capture the required data elements going forward?
  – Does the organization document transitional approaches it has used to account for gaps in data histories and data gaps due to mergers or acquisitions?
  – Review the approaches for reasonableness.
  – Did the organization consider using data rich segments of internal data to infer the estimation of PD for portfolios for which it has insufficient data?
  – Did the organization consider instances of near default or credit deterioration short of default to infer estimates of what might happen if a default were to occur in low-default portfolios, or portfolios with limited data?
11. Review portfolio performance metrics and determine if the recent history of loss	

severity has been adequately incorporated in the data and analysis. • Does the organization weight recent data more heavily when older data are less relevant? 12. How are data quality problems identified and addressed? • What is the organization's process for addressing identified deficiencies in reference data quality? • Who is responsible for ensuring data quality? • How does the organization minimize the likelihood that the data contains false defaults? • How does the organization minimize the likelihood of missing true defaults? • Does the organization estimate type 1 and type 2 errors in its data with respect to capturing defaults (i.e., the likelihood that the data missed true defaults and the likelihood that the data contain false defaults), and if so, how? • How does the organization ensure the accuracy of default data in its reference data? • What criteria does the organization use to differentiate between credit-related defaults and operational defaults ("false positives")? 13. What adjustments are made to the reference data and what support and analysis is performed by the organization to support such adjustments? • Does the organization apply any filters to exclude certain borrowers? How does the organization justify such exclusions? • Does the organization apply any filters to exclude certain facilities? How does the organization justify such exclusions? • Does the organization apply any filters to exclude certain defaults (e.g., operational defaults or "false positives")? How does the organization justify such filters? • Does the organization make any judgmental adjustments in the process of LGD quantification (e.g., winsorization, which is the limiting of extreme values in statistical data to reduce the effect of possibly spurious outliers)? How does the organization justify such adjustments? • Does the organization make any judgmental adjustments to the resulting LGD estimates (capping/flooring/scaling)? How does the organization justify such adjustments?	

7.05	**Work program question**	**Overall assessment**	**Reference**
Does the organization ensure that adjustments made during the PD quantification process do not result in a pattern of bias toward lower-risk parameter estimates?			122(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization adjust reference data in any way to account for differences in the portfolio from which the data were developed and the current portfolio? How are such adjustments supported? 2. How does the organization ensure that adjustments made during the PD quantification process do not result in a pattern of bias toward lower-risk parameter estimates? • How does the organization identify biases? • Does the organization test for instances of bias?		1. 2. 3.	

3. Does the organization perform sensitivity analysis to ensure that there is no systematic bias toward lower PD estimates? • Is the analysis sufficiently comprehensive and does it cover all possible sources of bias? • How often is such analysis performed? • How is such analysis documented? Obtain copies of and review recent management reports containing the results of such analysis.	

7.06	Work program question	Overall assessment	Reference
Are PD estimates for wholesale risk ratings based on at least five years of default data?			122(c)(6)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How many years of historical data are used in developing PD estimates? Does this data history encompass a minimum of five years? • If so, do the five or more years of data represent the data used to develop the estimates or are the same data used both to develop and validate the estimates? 2. How many years of data does the organization have that can be reasonably used for PD estimation purposes (given the description of the estimation process as provided in company documentation)? • How many years of data does the organization actually use for PD estimation purposes? • How does the organization justify not using all available data (assuming all available data are not used)? 3. Do the data come from a continuous period? If not, how are the data combined? • What is the rationale for using data from a non-continuous range? 4. Do the data come from the same source? If not, how are the data combined? • How does the organization ensure consistency of the data from multiple sources?		1. 2. 3. 4.	

7.07	Work program question	Overall assessment	Reference
Do the default data include a period of economic downturn conditions or have the PD estimates been adjusted appropriately to compensate for the lack of data from a period of economic downturn conditions?			122(c)(7)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization define economic downturn conditions? • Is the organization's definition of economic downturn conditions consistent with the definition in the rule: "with respect to an exposure held by the organization, those conditions in which the aggregate default rates for that exposure's wholesale…exposure subcategory (or subdivision of such subcategory selected by the organization) in the exposure's national jurisdiction (or subdivision of such jurisdiction selected by the organization) are significantly higher than average"? • Has the organization formally defined "significantly above the average"? 2. How does the organization subcategorize its wholesale portfolio when analyzing		1. 2. 3. 4.	

for periods of higher than average defaults? How does the organization justify such subcategorization? • At a minimum, does the organization differentiate between HVCRE and non-HVCRE? • Are other industry subcategories used? • Are exposures evaluated by national jurisdiction? • Are subdivisions of national jurisdictions used? 3. Based on the organization's analysis, do the reference data include economic downturn periods? • Does the period of economic downturn conditions for each wholesale subcategory (or subdivision thereof) appropriately reflect the organization's actual exposure profile? • What are the downturn periods identified? Which identified downturn periods link to the specified portfolio subcategories? • Are the downturn periods properly identified as periods where aggregate default rates are significantly above the average? • Are the downturn periods consistent with industry experience? If not, what support has the organization provided for such differences? 4. If the reference data do not include a period of economic downturn conditions, does the organization make any adjustments to the PD estimates? Evaluate the methodology and support for adjusting (or not adjusting) the PD estimates. • How has the organization adjusted the PD estimates to account for this lack of downturn conditions in the historical data? • Is the adjustment based on statistical analysis conducted by the organization, expert judgment, or some combination of the two? • Does the estimation methodology result in an appropriate degree of conservatism? What support has the organization provided to that effect?	

7.08	**Work program question**	**Overall assessment**	**Reference**
Are the organization's PD estimates based on the definition of default as specified in the advanced approaches rule?			122(c)(8) 101
Review questions and procedures		**Supervisor comments (with references) by subcategory and/or portfolio as appropriate**	
1. Describe the steps taken by the organization to ensure that the definition of default in the reference data is consistent with the advanced approaches rule. 2. What is the definition of default the organization uses for PD estimation purposes? • Does it differ in any way from the definition of default in the advanced approaches rule? • Does it differ in any way from the definition of default used in estimating other risk parameters (LGD and EAD)? • If the definition is different: – How does the organization justify any differences in the definitions? – How does the organization ensure its PD estimates are based on the definition of default as specified in the advanced approaches rule? • Has the organization's definition of default remained the same throughout		1. 2. 3. 4.	

the reference data period? • If not, how does the organization ensure its PD estimates are accurate (unbiased)? 3. If the organization uses external data in its estimation of PD, is the definition of default of the external data consistent with the advanced approaches rule? • If not, how does the organization justify using reference data that are not consistent with the definition of default provided in the advanced approaches rule? 4. Describe the organization's process for reconciling any differences between the definition of default used in the development of reference data and that in the advanced approaches rule. • What adjustments does the organization make to ensure that resulting PD estimates are based on the definition of default in the advanced approaches rule? • Does the organization properly document all adjustments?	

8. Loss Given Default

Update log		
Subcategory/portfolio	Date	Prepared by

8.01	Work program question	Overall assessment	Reference
Does the LGD quantification process produce accurate, timely, and reliable estimates of the loss given default for the organization's wholesale exposures that are consistently assigned to each exposure or loss severity rating grade?			122(c)(1) 22(c)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
Estimation of LGD 1. Describe the method(s) used to measure historical loss severities. • When calculating its actual historical loss severities, how does the organization determine post-default cash flows for each exposure? - Do the organization's data systems capture actual post-default cash inflows and outflows, or must these be estimated from other data, such as net charge-offs and book balances? - How does the organization estimate cash flow elements that were not captured directly by its legacy data systems? - What adjustments to cash flows, if any, are applied by the organization to remediate perceived shortcomings in its historical data systems (e.g., accounting data that sometimes imply negative cumulative net charge-offs)? Are such adjustments reasonable and unbiased? - How does the organization treat cash flows associated with real estate loans after they are transferred to other real estate (ORE) 2. How does the organization ensure that historical loss severities incorporate all post-default cash flows for each defaulted exposure?		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14	

• How long is the organization's assumed recovery period? What analysis supports the determination of the recovery period used? • When an exposure is refinanced or restructured after default, how does the organization ensure that cash flows on the new exposure(s) are linked back to the original exposures? • Are new credit extensions that facilitate repayment of an existing exposure treated as negative cash flows associated with that earlier exposure? 3. When measuring historical loss severities, how does the organization treat exposures to an obligor that defaults, but then 'cures'? • What is the organization's policy regarding when a defaulted obligor cures and is returned to non-default status? Does this policy comport with the requirement that an obligor remains defaulted until the organization is reasonably assured of full payment on all exposures that were outstanding at the time of default (e.g., none of these exposures has a positive cumulative net charge-off)? • Prior to the date an obligor is cured, are net cash flows discounted using a discount rate appropriate to the risk of the exposure at the time of default? 4. How are collection and recovery costs incorporated into LGDs? • How does the organization determine collection and recovery costs when information is not available due to data limitations? • How does the organization calculate and allocate expenses related to managing defaulted loans? 5. How does the organization determine the discount rate used to discount post-default cash flows to present value? • Are cash flows discounted to point of default? • What are the discount rates used and how were the rates determined? • Is this discount rate appropriate for the risk of the exposure at the time of default? How does the organization justify and demonstrate the appropriateness of this discount rate? 6. How are long-run LGDs calculated? Do they represent default-weighted economic losses? 7. How does the organization calculate average LGD for a group of exposures with similar characteristics (e.g., simple average, exposure-weighted average)? 8. What variables have been found to be statistically significant in explaining the variation in LGD (collateral, industry, capital structure, etc.)? 9. Determine if the organization has provided sufficient analysis and support for its LGD methodology. 10. How does the organization apply estimated LGD to wholesale exposures? 11. Does the LGD estimate for each exposure or loss severity rating grade equal to the greatest of: • zero. • the organization's empirically based best estimate of the long-run default-weighted average economic loss, per dollar of EAD, the organization would expect to incur if the exposures in the segment were to default within a one-year horizon over a mix of economic conditions, including economic downturn conditions. • the organization's empirically based best estimate of the economic loss, per dollar of EAD, the organization would expect to incur if the obligor (or a typical obligor in the loss severity grade assigned by the organization to the exposure) were to default within a one-year horizon during economic	

downturn conditions. 12. Does the organization's LGD estimation process rely on the possibility of U.S. government financial assistance even in those cases where such assistance is generally implied? 13. For exposures not covered by third-party guarantees, how does the organization ensure that LGDs are estimated on a standalone basis (i.e., they do not reflect any benefits of guarantees within the organization's historical reference data)? • Are LGD estimates derived using historical data that exclude guaranteed exposures, or are they based on data that include both guaranteed and non-guaranteed exposures? • Are LGD estimates robust to alternative methods for removing the historical benefits of guarantees from the organization's reference data? **Accuracy, Timeliness, and Reliability** 14. What is the organization's definition of accuracy, timeliness, and reliability with respect to LGD estimates? • What criteria did the organization establish to evaluate the accuracy, timeliness, and reliability of LGD estimates? • How often does the organization evaluate the accuracy, timeliness, and reliability of LGD estimates? • How does the organization document its assessment of accuracy, timeliness, and reliability? – Obtain copies of management reports documenting management's assessment and review for reasonableness. – Obtain copies of policy and review for inclusion.	

8.02	Work program question	Overall assessment	Reference
If the organization elects to segment its eligible purchased wholesale exposures, does it accurately, reliably, and on a timely basis assign each segment to an LGD estimate? If the organization can estimate ECL (but not PD or LGD) for a segment of eligible wholesale exposures, does it assume that the LGD of the segment equals 100 percent?			131(d)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization elect to segment eligible purchased wholesale exposures? • If no, skip to section 8.03. • If yes, complete section 7.03 #1–7 before proceeding. 2. What methodology does the organization use to derive an LGD estimate for a segment of eligible purchased wholesale exposures? Is this approach theoretically sound? 3. What criteria did the organization establish to assess the accuracy, reliability, and timeliness of LGD estimates for segments of eligible purchased wholesale exposures? 4. Do LGD estimates for segments of eligible purchased wholesale exposures meet the aforementioned criteria? 5. If the organization can estimate ECL (but not PD or LGD) for a segment of eligible wholesale exposures, does it assume that the LGD of the segment equals 100 percent?		1. 2. 3. 4. 5. 6. 7.	

6. For PD estimates derived as described in (5) above, explain the organization's process for estimating ECL and EAD for segments of eligible purchased wholesale receivables. • Is the process consistent with estimation procedures used to analyze other categories of risk exposure? • Does the process rely on well-supported risk measurement methodologies? 7. In deriving LGD estimates for segments of eligible purchased wholesale exposures, does the organization assume recourse to or guarantees from the seller or other parties?	

8.03	Work program question	Overall assessment	Reference
For OTC derivative contracts, eligible margin loans, and repo-style transactions where financial collateral is factored into the determination of EAD, does the estimate of LGD not reflect financial collateral?			131(d)(6)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. For transactions in which financial collateral factors into the assessment of EAD, how does the organization ensure that collateral benefit is not double-counted in the assessment of LGD? 2. Describe the organization's process for identifying exposure types in which financial collateral is deemed an eligible offset against estimated EAD. • For such exposures, how is LGD estimated?		1. 2.	

8.04	Work program question	Overall assessment	Reference
Are the data used to estimate LGD relevant to the wholesale exposures and of sufficient quality to support the determination of risk-based capital requirements for the exposures, or have the LGD estimates been adjusted to reflect appropriate conservatism?			122(c)(2) 122(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Are all data used for LGD estimation purposes collected in a single database? 2. What are the sources of reference data that the organization uses to estimate LGD? 3. How many observations and years of history do the data include? 4. Obtain a listing of data fields available in the reference data. • What borrower-related information is captured in the reference data used for LGD estimation? • What facility-related information is captured in the reference data used for LGD estimation? 5. Are the data used to estimate LGD representative of the existing portfolio? • What analysis has the organization performed to demonstrate this? Obtain relevant management reports. • How often does the organization perform such analysis? 6. How does the organization review its reference data to determine ongoing relevance and quality? • How often does the organization review its reference data to determine its ongoing relevance and quality? • What criteria did the organization establish to evaluate the relevance of its		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.	

reference data to the organization's current wholesale portfolio?
• How does the organization evaluate the quality of reference data?
  – What criteria did the organization establish to assess the quality of its reference data to support LGD estimates? Are these criteria reasonable?
  – Do the reference data meet the established quality criteria in all material respects?
7. Do the LGD reference data consist of internal data, external data, or a combination of the two?
8. If internal data are used,
• do the available internal data contain the necessary history to correctly quantify the LGD estimates?
• if any of the organization's historic internal data do not fully conform to the advanced approaches rule's definition of default for wholesale obligors, does the organization document and provide support for such discrepancies?
9. If external data are used, are the data appropriately incorporated into the quantification process?
• Document what data sources are used and why such data sources were chosen.
• How does the organization ensure the quality of the external data?
• If the organization uses exclusively or primarily external data, how does the organization justify not using its internal data?
• Have differences in underwriting and lack of mapping to comparable risk rating criteria been considered and documented?
  – Has conservatism in the parameter estimates been incorporated due to these differences?
• Does the organization regularly review mapping to external reference data and the appropriateness of use of the reference data (vs. internal sources)?
  – Obtain and review documentation supporting such review.
• Has the organization documented its assumptions made in mapping to external data sources and fully supported those assumptions?
• Does the organization have a policy governing use of the external data in the parameter estimation process and does the organization regularly review alternative data, including internal data?
10. Did the organization identify areas (e.g., industry, time periods, etc.) where the organization has limited relevant data to support accurate and reliable LGD estimates?
• If so, does the organization appropriately account for significant data gaps?
  – Does the organization take an appropriately conservative approach to quantification when data gaps exist?
  – What measures does the organization take to mitigate significant data gaps in the information on its own borrowers?
  – Where essential data elements necessary for accurate quantification are missing or have not been maintained, does the organization have a plan to capture the required data elements going forward?
  – Does the organization document transitional approaches it has used to account for gaps in data histories and data gaps due to mergers or acquisitions? Review these approaches for reasonableness.
  – Did the organization consider using data rich segments of internal data	

to infer the estimation of LGD for portfolios for which it has insufficient data? 11. Has the organization adequately documented key assumptions and uncertainties underlying its LGD estimates? 12. How has the organization ensured that its LGD estimates are appropriately conservative in light of underlying modeling uncertainties, especially for low-default portfolios? 13. Review portfolio performance metrics and determine if the recent history of loss severity has been adequately incorporated in the data and analysis. • Does the organization weight recent data more heavily when older data are less relevant? 14. How are data quality problems identified and addressed? • What is the organization's process for addressing identified deficiencies in reference data quality? • Who is responsible for ensuring data quality? • How does the organization minimize the likelihood that the data contains false defaults? • How does the organization minimize the likelihood of missing true defaults? • Does the organization estimate type 1 and type 2 errors in its data with respect to capturing defaults (i.e., the likelihood that the data missed true defaults and the likelihood that the data contain false defaults), and if so, how? • How does the organization ensure the accuracy of loss and recovery amounts in its reference data? • What criteria does the organization use to differentiate between credit-related defaults and operational defaults ("false positives")? 15. What adjustments are made to the reference data and what support and analysis are performed by the organization to support such adjustments? • Does the organization apply any filters to exclude certain borrowers? How does the organization justify such exclusions? • Does the organization apply any filters to exclude certain facilities? How does the organization justify such exclusions? • Does the organization apply any filters to exclude certain defaults (e.g. operational defaults or "false positives")? How does the organization justify such filters? • Does the organization make any judgmental adjustments in the process of LGD quantification (e.g., winsorization)? How does the organization justify such adjustments? • Does the organization make any judgmental adjustments to the resulting LGD estimates (capping/flooring/scaling)? How does the organization justify such adjustments?	

8.05	**Work program question**	**Overall assessment**	**Reference**
Does the organization ensure that adjustments made during the LGD quantification process do not result in a pattern of bias toward lower-risk parameter estimates?			122(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the company adjust reference data in any way to account for differences in the portfolio from which the data were developed and the current portfolio? How are such adjustments supported?		1. 2.	

2. How does the organization ensure that adjustments made during the LGD quantification process do not result in a pattern of bias toward lower-risk parameter estimates? • How does the organization identify biases? • Does the organization test for instances of bias? 3. Does the organization perform sensitivity analysis to ensure that there is no systematic bias toward lower LGD estimates? • Is the analysis sufficiently comprehensive and does it cover all possible sources of bias? • How often is such analysis performed? 4. How is such analysis documented? Obtain and review copies of recent management reports containing the results of such analysis.	3. 4.

8.06	Work program question	Overall assessment	Reference
For wholesale exposures where the organization's quantification of LGD directly or indirectly incorporates the effectiveness of the organization's ability to reduce its exposure to troubled obligors before default, does the organization provide sufficient empirical evidence that the incorporated reductions in exposures before default are consistent with the organization's historical experience for such exposures during economic downturn conditions?			122(c)(5)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization estimate the effectiveness of its credit risk management practices in reducing its exposure to troubled obligors before default? 2. Does the organization incorporate estimates of effectiveness of its credit risk management practices in reducing its exposure to troubled obligors in the estimation process? • Describe the process by which such estimates are incorporated in LGD quantification. • Do the historical reference data reflect such a practice? • If the reference data do not reflect such a practice, what support is provided for the incorporation of risk management's effectiveness? 3. Are these estimates consistent with the organization's historical experience in dealing with such exposures during economic downturn conditions? 4. Are these estimates supported by statistical analysis? Is this analysis thorough and comprehensive?		1. 2. 3. 4.	

8.07	Work program question	Overall assessment	Reference
Are LGD estimates for wholesale exposures based on at least seven years of loss severity data?			122(c)(6)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How many years of historical data are used in developing LGD estimates? Does the data history used for LGD estimation encompass a minimum of seven years? • If so, do the seven or more years of data represent the data used to develop the estimates or are the same data used both to develop and validate the estimates? 2. How many years of data does the organization have accumulated that can		1. 2. 3. 4. 5. 6.	

reasonably be used for LGD estimation purposes? • How many years of data does the organization use for LGD estimation purposes? • How does the organization justify not using all available data (assuming not all available data are used)? 3. Do the data come from a continuous period? If not, how are the data combined? • What is the rationale for using data from a non-contiguous range? 4. Do the data come from the same source? If not, • how are the data combined? • how does the organization ensure consistency of the data from multiple sources? 5. What is the recovery horizon for defaulted exposures (i.e., how much time must pass after default for the exposure to be included in the LGD calculations, regardless if all recovery cash flows had been realized)? How does this recovery horizon affect the availability of loss severity data? 6. Have all default events in the loss severity reference data been fully resolved (i.e., post-default cash flows have been recorded over a period consistent with the organization's recovery period)? • If not, what adjustments has the organization made to account for lack of full resolution?	

8.08	**Work program question**	**Overall assessment**	**Reference**
Do the loss severity data include a period of economic downturn conditions or have the LGD estimates been adjusted appropriately to compensate for the lack of data from a period of economic downturn conditions?			122(c)(7)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization define economic downturn conditions? • Is the organization's definition consistent with the rule: "with respect to an exposure held by the organization, those conditions in which the aggregate default rates for that exposure's wholesale…exposure subcategory (or subdivision of such subcategory selected by the organization) in the exposure's national jurisdiction (or subdivision of such jurisdiction selected by the organization) are significantly higher than average"? • Has the organization formally defined "significantly higher than average"? 2. What subcategories does the organization use for its wholesale portfolio when analyzing for periods of higher than average defaults? • At a minimum, does it use a subcategory for HVCRE and non-HVCRE? • Are other industry subcategories used? • Are subdivisions of national jurisdictions used? 3. Based on the organization's analysis, do the reference data include economic downturn periods? • Do periods of economic downturn conditions for each wholesale portfolio (or sub-segment thereof) appropriately reflect the organization's actual exposure profile? • What are the downturn periods identified? Which identified downturn periods link to the specified portfolio subcategories? • Are the downturn periods properly identified as periods where PD is significantly above the average? • Are the downturn periods consistent with the industry experience? If not,		1. 2. 3. 4. 5.	

what support has the organization provided for such differences? 4. If the reference data do not include a period of economic downturn conditions, does the organization make any adjustments to the LGD estimates? Evaluate the methodology and support for adjusting (or not adjusting) the LGD estimates. • How has the organization adjusted the LGD estimates to account for this lack of downturn conditions in the historical data? • Is the adjustment based on statistical analysis conducted by the organization, expert judgment, or some combination of the two? 5. Does the estimation methodology result in an appropriate degree of conservatism? What support has the organization provided to that effect?	

8.09	Work program question	Overall assessment	Reference
Are the organization's LGD estimates based on the definition of default as specified in the advanced approaches rule?			122(c)(8) 101
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Describe the steps taken by the organization to ensure that the definition of default in the reference data is consistent with the advanced approaches rule. 2. What is the definition of default the organization uses for LGD estimation purposes? • Does it differ in any way from the definition of default in the advanced approaches rule? • Does it differ in any way from the definition of default used in estimating other risk parameters (PD and EAD)? • How does the organization justify differences, if any, in the definitions? • If the definitions are different, how does the organization ensure its LGD estimates are based on the definition of default as specified in the advanced approaches rule? • Has the organization's definition of default remained the same throughout the reference data period? • If not, how does the organization ensure its LGD estimates are accurate (unbiased)? 3. If the organization uses external data in its estimation of LGD, is the definition of default of the external data consistent with the advanced approaches rule? • If not, how does the organization justify using reference data that are not consistent with the definition of default in the advanced approaches rule? 4. Describe the organization's process for reconciling any differences between the definition of default used in the development of reference data and that in the advanced approaches rule. • What adjustments does the organization make to ensure that resulting LGD estimates are based on the definition of default provided in the advanced approaches rule? • Does the organization properly document all adjustments?		1. 2. 3. 4.	

9. Exposure at Default

Update log		
Subcategory/portfolio	Date	Prepared by

9.01	Work program question	Overall assessment	Reference
Does the EAD quantification process produce accurate, timely, and reliable estimates of the exposure at default on a consistent basis for the organization's wholesale exposures?			122(c)(1)

Review questions and procedures	Supervisor comments (with references) by subcategory or portfolio, as appropriate
1. How does the organization define EAD? Is it consistent with the rule's definition of EAD? 2. Describe the method(s) used to estimate EAD. • What variables have been found to be statistically significant in explaining the variation in loan equivalent amount (LEQ) (e.g., obligor risk rating, industry, collateral, commitment size, etc.)? • How does the organization construct a pre-default time series of changes in loan balances? – What assumptions does the organization make about future repayments of amounts currently outstanding (i.e., treatment of amortization)? – How does the organization estimate potential utilization of unused commitments? • Does the organization apply any judgmental or empirically based adjustments (caps/floors/scaling) to estimated LEQs (credit conversion factor)? – Are these adjustment made in the process of LEQ quantification or are they made to the LEQs resulting from the quantification process? 3. What variables have been found to be statistically significant in explaining the variation in EAD? 4. Determine if the organization has provided sufficient analysis and support for its EAD methodology. 5. How does the organization apply estimated EAD to wholesale exposures? 6. Does the organization's EAD estimation process exclude the possibility of U.S. government financial assistance even in those cases where such assistance is generally implied? **Accuracy, Timeliness, and Reliability** 7. What is the organization's definition of accuracy, timeliness, and reliability with respect to EAD estimates? • What criteria did the organization establish to evaluate the accuracy, timeliness, and reliability of EAD estimates? • How often does the organization evaluate the accuracy, timeliness, and reliability of EAD estimates?	1. 2. 3. 4. 5. 6. 7.

• How does the organization document its assessment of accuracy, timeliness, and reliability? – Obtain copies of management reports documenting management's assessment and review for reasonableness. – Obtain copies of policy and review for inclusion.	

9.02	Work program question	Overall assessment	Reference
If the organization elects to segment its eligible purchased wholesale exposures, does it accurately, reliably, and on a timely basis assign an estimate of EAD to each segment?			131(d)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization elect to segment eligible purchased wholesale exposures? • If no, skip to section 9.03. • If yes, complete section 7.03 #1–7 before proceeding. 2. What methodology does the organization use to derive an EAD estimate for a segment of eligible purchased wholesale exposures? • Is this approach theoretically sound? • Is there a connection between the criteria used to segment eligible purchased wholesale exposures and the risk drivers used to estimate EAD? 3. Is the approach used consistent with the EAD estimation process as applied to different types of transactions? If so, which categories of transactions? 4. What criteria did the organization establish to assess the accuracy, reliability, and timeliness of EAD estimates for segments of eligible purchased wholesale exposures? 5. Do EAD estimates for segments of eligible purchased wholesale exposures meet the aforementioned criteria?		1. 2. 3. 4. 5.	

9.03	Work program question	Overall assessment	Reference
Are the data used to estimate EAD relevant to the wholesale exposures and of sufficient quality to support the determination of risk-based capital requirements for the exposures or have the EAD estimates been adjusted to reflect appropriate conservatism?			122(c)(2) 122(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Are all data used for EAD estimation purposes collected in a single database? 2. What are the sources of the reference data that the organization uses to estimate EAD? 3. How many observations and years of history do the data include? 4. Obtain a listing of data fields available in the reference data. • What borrower-related information is captured in the reference data used for EAD estimation? • What facility-related information is captured in the reference data used for EAD estimation? 5. Are the data used to estimate EAD representative of the existing portfolio? • What analysis has the organization performed to demonstrate this? Obtain and review relevant management reports. • How often does the organization perform such analysis?		1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.	

6. How does the organization review its reference data to determine ongoing relevance and quality? • How <u>often</u> does the organization review its reference data to determine the data's ongoing relevance and quality? • What criteria did the organization establish to evaluate the relevance of its reference data to the organization's current wholesale portfolio? • How does the organization evaluate the quality of reference data? – What criteria did the organization establish to assess the quality of its reference data to support EAD estimates? – Do the reference data meet the established quality criteria in all material respects? 7. Do the EAD reference data consist of internal data, external data, or a combination of the two? 8. If internal data are used, • do the available internal data contain the necessary history to correctly quantify the EAD estimates? • do the organization's historic internal loss data fully conform to the advanced approaches rule's definition of default for wholesale obligors? • where historical internal loss data do not fully conform to the definition of default, does the organization document and provide support for such discrepancies? 9. If external data are used, are the data appropriately incorporated into the quantification process? • Document what data sources were used and why such data sources were chosen. • How does the organization ensure the quality of the external data? • Have differences in underwriting and lack of mapping to comparable risk rating criteria been considered and documented? – Has conservatism in the parameter estimates been incorporated due to these differences? • Does the organization regularly review mapping to external reference data and the appropriateness of uses of the reference data (vs. internal sources)? – Obtain and review documentation supporting such review. • Has the organization documented its assumptions made in mapping to external data sources and fully supported those assumptions? • Does the organization have a policy governing use of the external data in the parameter estimation process and does the organization regularly review alternative data, including internal data? 10. Did the organization identify areas (e.g., industry, time periods, etc.) where the organization has limited relevant data to support accurate and reliable EAD estimates? • If so, does the organization appropriately account for significant data gaps? – Does the organization take an appropriately conservative approach to quantification when data gaps exist? – What measures does the organization take to mitigate significant data gaps in the information on its own borrowers? – Where essential data elements necessary for accurate quantification are missing or have not been maintained, does the organization have a plan to capture the required data elements going forward?	13.

– Does the organization document transitional approaches it has used to account for gaps in data histories and data gaps due to mergers or acquisitions? Review the approaches for reasonableness. – Did the organization consider using data rich segments of internal data to infer the estimation of EAD for portfolios for which it has insufficient data? 11. Review portfolio performance metrics and determine if recent history of default frequencies has been adequately incorporated in the data and analysis. • Does the organization weight recent data more heavily when older data are less relevant? 12. How are data quality problems identified and addressed? • What is the organization's process for addressing identified deficiencies in reference data quality? • Who is responsible for ensuring data quality? • How does the organization minimize the likelihood that the data contain false defaults? • How does the organization minimize the likelihood of missing true defaults? • Does the organization estimate type 1 and type 2 errors in its data with respect to capturing defaults (i.e., the likelihood that the data missed true defaults and the likelihood that the data contain false defaults), and if so, how? • How does the organization ensure the accuracy of exposure amount data in its reference data? • What criteria does the organization use to differentiate between credit-related defaults and operational defaults ("false positives")? 13. What adjustments are made to the reference data and what support and analysis does the organization perform to support such adjustments? • Does the organization apply any filters to exclude certain borrowers? How does the organization justify such exclusions? • Does the organization apply any filters to exclude certain facilities? How does the organization justify such exclusions? • Does the organization apply any filters to exclude certain defaults (e.g., operational defaults or "false positives")? How does the organization justify such exclusions? • Does the organization make any judgmental adjustments in the process of EAD quantification (e.g., winsorization)? How does the organization justify such adjustments? • Does the organization make any judgmental adjustments to the resulting EAD estimates (capping/flooring/scaling)? How does the organization justify such adjustments?	

9.04	**Work program question**	**Overall assessment**	**Reference**
Does the organization ensure that adjustments made during the EAD quantification process do not result in a pattern of bias toward lower-risk parameter estimates?			122(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the company adjust reference data in any way to account for differences in the portfolio from which the data were developed and the current portfolio? How are such adjustments supported? 2. How does the organization ensure that adjustments made during the EAD		1. 2. 3.	

quantification process do not result in a pattern of bias toward lower-risk parameter estimates? • How does the organization identify biases? • Does the organization test for instances of bias? 3. Does the organization perform sensitivity analysis to ensure that there is no systematic bias toward lower EAD estimates? • Is the analysis sufficiently comprehensive and does it cover all possible sources of bias? • How often is such analysis performed? • How is such analysis documented? Obtain and review copies of recent management reports containing the results of such analysis.	

9.05	Work program question	Overall assessment	Reference
Are EAD estimates for wholesale exposures based on at least seven years of exposure amount data?			122(c)(6)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How many years of historical data are used in developing EAD estimates? Does the data history used for EAD estimation encompass a minimum of seven years? • If so, do the seven or more years of data represent the data used to develop the estimates or are the same data used both to develop and validate the estimates? 2. How many years of data does the organization have accumulated that can reasonably be used for EAD estimation purposes? • How many years of data does the organization use for EAD estimation purposes? • How does the organization justify not using all available data (assuming not all available data are used)? 3. Do the data come from a continuous period? If not, how are the data combined? • What is the rationale for using data from a non-contiguous range? 4. Do the data come from the same source? If not, • how are the data combined? • how does the organization ensure consistency of the data from multiple sources?		1. 2. 3. 4.	

9.06	Work program question	Overall assessment	Reference
Do the exposures amount data include a period of economic downturn conditions or have the EAD estimates been adjusted appropriately to compensate for the lack of data from a period of economic downturn conditions?			122(c)(7)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization define economic downturn conditions? • Is the organization's definition consistent with the rule's definition in section 101: "with respect to an exposure held by the organization, those conditions in which the aggregate default rates for that exposure's wholesale…exposure subcategory (or subdivision of such subcategory selected by the organization) in the exposure's national jurisdiction (or subdivision of such jurisdiction selected by the organization) are		1. 2. 3. 4. 5.	

significantly higher than average"? • Has the organization formally defined "significantly higher than average"? 2. What subcategories does the organization use for its wholesale portfolio when analyzing for periods of higher than average defaults? • At a minimum, does it use a subcategory for HVCRE and non-HVCRE? • Are other industry subcategories used? • Are subdivisions of national jurisdictions used? 3. Based on the organization's analysis, do the reference data include economic downturn periods? • Does the period of economic downturn conditions for each wholesale subcategory (or subdivision thereof) appropriately reflect the organization's actual exposure profile? • What are the downturn periods identified? Which identified downturn periods link to the specified portfolio subcategories? • Are the downturn periods properly identified as periods where PD is significantly above the average? • Are the downturn periods consistent with the industry experience? What support has the organization provided for such differences? 4. If the reference data do not include a period of economic downturn conditions, does the organization make any adjustments to the EAD estimates? Evaluate the methodology and support for adjusting (or not adjusting) the EAD estimates. • How has the organization adjusted the EAD estimates to account for this lack of downturn conditions in the historical data? • Is the adjustment based on statistical analysis conducted by the organization, expert judgment, or some combination of the two? 5. Does the estimation methodology result in an appropriate degree of conservatism? What support has the organization provided to that effect?	

9.07	Work program question	Overall assessment	Reference
Are the organization's EAD estimates based on the definition of default as specified in the advanced approaches rule?			122(c)(8) 101
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Describe the steps taken by the organization to ensure that the definition of default in the reference data used to estimate EAD is consistent with the advanced approaches rule. 2. What is the definition of default the organization uses for EAD estimation purposes? • Does the definition of default in the reference data that the organization uses to estimate EAD differ in any way from the definition of default in the advanced approaches rule? • Does it differ in any way from the definition of default that the organization uses for reference data used to estimate other risk parameters (PD and LGD)? • If the definition of default that the organization uses is different from the rule definition, how does the organization justify any differences in the definitions and how does the organization ensure its EAD estimates are based on the definition of default as specified in the advanced approaches rule? • Has the organization's definition of default remained the same throughout the reference data period?		1. 2. 3. 4.	

• If not, how does the organization ensure its EAD estimates are accurate (unbiased)? 3. If the organization uses external data in its estimation of EAD, is the definition of default of the external data consistent with the advanced approaches rule? • If not, how does the organization justify using reference data that are not consistent with the definition of default provided in the advanced approaches rule? 4. Describe the organization's process for reconciling any differences between the definition of default used in the development of reference data and that found in the advanced approaches rule. • What adjustments does the organization make to ensure that resulting EAD estimates are based on the definition of default provided in the advanced approaches rule? • Does the organization properly document all adjustments?	

10. Maturity

Update log		
Subcategory/portfolio	Date	Prepared by

10.01	**Work program question**	**Overall assessment**	**Reference**
Is the maturity (M) of each exposure no greater than five years and no less than one year, except if the exposure is a trade-related letter of credit, or if the exposure has an original maturity of less than one year and is not part of the organization's ongoing financing to the obligor?			131(d)(7)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization calculate the effective M for its wholesale exposures? Is this methodology consistent with the advanced approaches rule, as follows: • The weighted-average remaining maturity (measured in years, whole or fractional) of the expected contractual cash flows from the exposure, using the undiscounted amounts of the cash flows as weights, **<u>or</u>** • The nominal remaining maturity (measured in years, whole or fractional) of the exposure? 2. Does the organization apply the proper M cap (five years) and floor (one year) for its wholesale exposures that are not a trade-related letter of credit or an exposure with an original maturity of less than one year that is not part of the organization's ongoing financing of the obligor? • How does the organization treat exposures whose maturity is estimated to be more than five years? – How does the organization determine whether an exposure is not part of the ongoing financing of the obligor? – When making a determination that an exposure is not part of the ongoing financing of the obligor, does the organization consider whether it		1. 2.	

▪ has a legal and practical ability not to renew or roll over the exposure in the event of credit deterioration of the obligor; ▪ makes an independent credit decision at the inception of the exposure and at every renewal or roll over; and ▪ has no substantial commercial incentive to continue its credit relationship with the obligor in the event of credit deterioration of the obligor. ○ How does the organization determine if it has the legal and practical ability not to renew or roll over the exposure in the event of a credit deterioration of the obligor? Are these criteria relevant to business practices and not just legal commitments (e.g., a 364-day facility that is always renewed although there is no legal obligation to renew)? ○ How does the organization ensure it makes an independent credit decision at the inception of the exposure and at every renewal or roll over? ○ How does the organization determine if it has "no substantial commercial incentive to continue its credit relationship with the obligor in the event of credit deterioration of the obligor"? Does this appear reasonable and in the spirit of the rule? • What types of exposures at the organization have qualified for the exemption from the one year maturity floor?	

10.02	**Work program question**	**Overall assessment**	**Reference**
If the organization elects to segment its eligible purchased wholesale exposures, does it accurately, reliably and on a timely basis assign an estimate of M to each segment?			131(d)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization elect to segment eligible purchased wholesale exposures? • If no, skip to section 8.03. • If yes, complete section 7.03 #1–7 before proceeding. 2. What methodology does the organization use to derive an M estimate for a segment of eligible purchased wholesale exposures? • Is this approach theoretically sound? 3. What criteria did the organization establish to assess the accuracy, reliability, and timeliness of M estimates for segments of eligible purchased wholesale exposures? 4. Do M estimates for segments of eligible purchased wholesale exposures meet the aforementioned criteria? 5. Is M for segments of eligible purchased wholesale exposures in all cases less than one year?		1. 2. 3. 4. 5.	

E. Credit Risk Mitigation

Section 2, subpart A of the regulatory capital rule[6] (eligible credit derivative)	Eligible credit derivative means a credit derivative in the form of a credit default swap, nth-to-default swap, total return swap, or any other form of credit derivative approved by the primary federal supervisors, provided that: (1) The contract meets the requirements of an eligible guarantee and has been confirmed by the protection purchaser and the protection provider; (2) Any assignment of the contract has been confirmed by all relevant parties; (3) If the credit derivative is a credit default swap or nth-to-default swap, the contract includes the following credit events: (i) Failure to pay any amount due under the terms of the reference exposure, subject to any applicable minimal payment threshold that is consistent with standard market practice and with a grace period that is closely in line with the grace period of the reference exposure; and (ii) Receivership, bankruptcy, insolvency, liquidation, conservatorship or inability of the reference exposure issuer to pay its debts, or its failure or admission in writing of its inability generally to pay its debts as they become due, and similar events; (4) The terms and conditions dictating the manner in which the contract is to be settled are incorporated into the contract; (5) If the contract allows for cash settlement, the contract incorporates a robust valuation process to estimate loss reliably and specifies a reasonable period for obtaining post-credit event valuations of the reference exposure; (6) If the contract requires the protection purchaser to transfer an exposure to the protection provider at settlement, the terms of at least one of the exposures that is permitted to be transferred under the contract provide that any required consent to transfer may not be unreasonably withheld; (7) If the credit derivative is a credit default swap or nth-to-default swap, the contract clearly identifies the parties responsible for determining whether a credit event has occurred, specifies that this determination is not the sole responsibility of the protection provider, and gives the protection purchaser the right to notify the protection provider of the occurrence of a credit event; and (8) If the credit derivative is a total return swap and the organization records net payments received on the swap as net income, the organization records offsetting deterioration in the value of the hedged exposure (either through reductions in fair value or by an addition to reserves).
Section 2, subpart A of the regulatory capital rules (eligible guarantor)	**Eligible guarantor means:** (1) A sovereign, the Bank for International Settlements, the International Monetary Fund, the European Central Bank, the European Commission, a Federal Home Loan Bank, Federal Agricultural Mortgage Corporation (Farmer Mac), a multilateral development bank (MDB), a depository organization, a bank holding company, a savings and loan holding company, a credit union, a foreign organization, or a qualifying central counterparty; or (2) An entity (other than a special purpose entity): (i) That at the time the guarantee is issued or anytime thereafter, has issued and outstanding an unsecured debt security without credit enhancement that is investment grade; (ii) Whose creditworthiness is not positively correlated with the credit risk of the exposures for which it has provided guarantees; and (iii) That is not an insurance company engaged predominately in the business of providing credit protection (such as a monoline bond insurer or re-insurer).
Section 101 (eligible double default guarantor)	**Eligible double default guarantor,** with respect to a guarantee or credit derivative obtained by a banking organization, means: (1) U.S.-based entities. A depository institution, a bank holding company, a savings and loan holding company, or a securities broker or dealer registered with the Securities Exchange Commission (SEC) under the Securities and Exchange Act, if at the time the guarantee is issued or anytime thereafter, has issued and outstanding an unsecured debt security without credit enhancement that is investment grade. (2) Non-U.S.-based entities. A foreign bank, or a non-U.S.-based securities firm if the organization demonstrates that the guarantor is subject to consolidated supervision and regulation comparable to that imposed on U.S. depository institutions, or securities broker-dealers, if at the time the guarantee is issued or at any time thereafter, has issued and outstanding an unsecured debt security without credit enhancement that is investment grade.
Section 2, subpart A of the regulatory capital rules (eligible guarantee)	**Eligible guarantee** means a guarantee that: (1) Is written; (2) Is either: (i) Unconditional, or (ii) A contingent obligation of the U.S. government or its agencies, the enforceability of which is dependent upon some affirmative action on the part of the beneficiary of the guarantee or a third party (for example, meeting servicing requirements); (3) Covers all or a pro rata portion of all contractual payments of the obligor on the reference exposure; (4) Gives the beneficiary a direct claim against the protection provider; (5) Is not unilaterally cancelable by the protection provider for reasons other than the breach of the contract by the beneficiary; (6) Except for a guarantee by the sovereign, is legally enforceable against the protection provider in a jurisdiction where the protection provider has sufficient assets against which a judgment may be attached and enforced; (7) Requires the protection provider to make payment to the beneficiary on the occurrence of a default (as defined in the guarantee) of the obligor on the reference exposure in a timely manner without the beneficiary first having to take legal actions to pursue the obligor for payment; (8) Does not increase the beneficiary's cost of credit protection on the guarantee in response to deterioration in the credit quality of the reference exposure; and (9) Is not provided by an affiliate of the organization, unless the affiliate is an insured depository organization, organization, securities broker or dealer, or insurance company that: (i) Does not control the organization; and (ii) Is subject to consolidated supervision and regulation comparable to that imposed on U.S. depository organizations, U.S. securities broker-dealers, or U.S. insurance companies (as the case may be).
Section 134(a)(1) – (2)	(1) This section applies to wholesale exposures for which: i. Credit risk is fully covered by an eligible guarantee or eligible credit derivative; or

[6] 12 CFR 3 (OCC); 12 CFR 217 (Federal Reserve); and 12 CFR 324 (FDIC).

	ii. Credit risk is covered on a pro rata basis that is, on a basis in which the organization and the protection provider share losses proportionately by an eligible guarantee or eligible credit derivative. (2) Wholesale exposures on which there is a tranching of credit risk (reflecting at least two different levels of seniority) are securitization exposures subject to the securitization framework in sections 141 through 145 of the advanced approaches rule.
Section 134(a)(3)	(3) An organization may elect to recognize the credit risk mitigation benefits of an eligible guarantee or eligible credit derivative covering an exposure described in paragraph (a)(1) of section 134 by using the PD substitution approach or the LGD adjustment approach in paragraph (c) of section 134 or, if the transaction qualifies, using the double default treatment in section 135. An organization's PD and LGD for the hedged exposure may not be lower than the PD and LGD floors described in paragraphs (d)(2) and (d)(3) of section 131.
Section 134(a)(4) – (5)	(4) If multiple eligible guarantees or eligible credit derivatives cover a single exposure described in paragraph (a)(1) of section 134, an organization may treat the hedged exposure as multiple separate exposures each covered by a single eligible guarantee or eligible credit derivative and may calculate a separate risk-based capital requirement for each separate exposure as described in paragraph (a)(3) of section 134. (5) If a single eligible guarantee or eligible credit derivative covers multiple hedged wholesale exposures described in paragraph (a)(1) of section 134, an organization must treat each hedged exposure as covered by a separate eligible guarantee or eligible credit derivative and must calculate a separate risk-based capital requirement for each exposure as described in paragraph (a)(3) of section 134.
Section 134(a)(6)	(6) An organization must use the same risk parameters for calculating expected credit loss as it uses for calculating the risk-based capital requirement for the exposure.
Section 134(b)	(1) An organization may only recognize the credit risk mitigation benefits of eligible guarantees and eligible credit derivatives. (2) An organization may only recognize the credit risk mitigation benefits of an eligible credit derivative to hedge an exposure that is different from the credit derivative's reference exposure used for determining the derivative's cash settlement value, deliverable obligation, or occurrence of a credit event if: (i) The reference exposure ranks pari passu (that is, equally) with or is junior to the hedged exposure; and (ii) The reference exposure and the hedged exposure are exposures to the same legal entity, and legally enforceable cross-default or cross-acceleration clauses are in place to assure payments under the credit derivative are triggered when the obligor fails to pay under the terms of the hedged exposure.
Section 134(c)(1)(i)	**PD substitution approach** (i) **Full coverage.** If an eligible guarantee or eligible credit derivative meets the conditions in paragraphs (a) and (b) of section 134 and the protection amount (P) of the guarantee or credit derivative is greater than or equal to the EAD of the hedged exposure, an organization may recognize the guarantee or credit derivative in determining the organization's risk-based capital requirement for the hedged exposure by substituting the PD associated with the rating grade of the protection provider for the PD associated with the rating grade of the obligor in the risk-based capital formula applicable to the guarantee or credit derivative in Table 1 of section 131 and using the appropriate LGD as described in paragraph (c)(1)(iii) of section 134. If the organization determines that full substitution of the protection provider's PD leads to an inappropriate degree of risk mitigation, the organization may substitute a higher PD than that of the protection provider.
Section 134(c)(1)(ii)	**PD substitution approach** (cont.) (ii) **Partial coverage.** If an eligible guarantee or eligible credit derivative meets the conditions in paragraphs (a) and (b) of section 134 and the protection amount (P) of the guarantee or credit derivative is less than the EAD of the hedged exposure, the organization must treat the hedged exposure as two separate exposures (protected and unprotected) in order to recognize the credit risk mitigation benefit of the guarantee or credit derivative. (A) The organization must calculate its risk-based capital requirement for the protected exposure under section 131, where PD is the protection provider's PD, LGD is determined under paragraph (c)(1)(iii) of section 134, and EAD is P. If the organization determines that full substitution leads to an inappropriate degree of risk mitigation, the organization may use a higher PD than that of the protection provider. (B) The organization must calculate its risk-based capital requirement for the unprotected exposure under section 131, where PD is the obligor's PD, LGD is the hedged exposure's LGD (not adjusted to reflect the guarantee or credit derivative), and EAD is the EAD of the original hedged exposure minus P. (C) The treatment in paragraph (c)(1)(ii) of section 134 is applicable when the credit risk of a wholesale exposure is covered on a partial pro rata basis or when an adjustment is made to the effective notional amount of the guarantee or credit derivative under paragraph (d), (e), or (f) of section 134.
Section 134(c)(1)(iii)	**PD substitution approach** (cont.) (iii) **LGD of hedged exposures.** The LGD of a hedged exposure under the PD substitution approach is equal to: (A) The lower of the LGD of the hedged exposure (not adjusted to reflect the guarantee or credit derivative) and the LGD of the guarantee or credit derivative, if the guarantee or credit derivative provides the organization with the option to receive immediate payout upon triggering the protection;

	or (B) The LGD of the guarantee or credit derivative, if the guarantee or credit derivative does not provide the organization with the option to receive immediate payout upon triggering the protection.
Section 134(c)(2)(i)	**LGD adjustment approach** (i) **Full coverage.** If an eligible guarantee or eligible credit derivative meets the scope and rules of recognition requirements in paragraphs 134(a) and (b), respectively, and the protection amount (P) of the guarantee or credit derivative is greater than or equal to the EAD of the hedged exposure, the organization's risk-based capital requirement for the hedged exposure is the greater of: (A) The risk-based capital requirement for the exposure as calculated under section 131, with the LGD of the exposure adjusted to reflect the guarantee or credit derivative; or (B) The risk-based capital requirement for a direct exposure to the protection provider as calculated under section 131, using the PD for the protection provider, the LGD for the guarantee or credit derivative, and an EAD equal to the EAD of the hedged exposure.
Section 134(c)(2)(ii)	**LGD adjustment approach** (cont.) (ii) **Partial coverage**. If an eligible guarantee or eligible credit derivative meets the scope and rules of recognition requirements in paragraphs 134(a) and (b), respectively, and the protection amount (P) of the guarantee or credit derivative is less than the EAD of the hedged exposure, the organization must treat the hedged exposure as two separate exposures (protected and unprotected) in order to recognize the credit risk mitigation benefit of the guarantee or credit derivative. (A) The organization's risk-based capital requirement for the protected exposure would be the greater of: (1) The risk-based capital requirement for the protected exposure as calculated under section 131, with the LGD of the exposure adjusted to reflect the guarantee or credit derivative and EAD set equal to P; or (2) The risk-based capital requirement for a direct exposure to the guarantor as calculated under section 131, using the PD for the protection provider, the LGD for the guarantee or credit derivative, and an EAD set equal to P. (B) The organization must calculate its risk-based capital requirement for the unprotected exposure under section 131, where PD is the obligor's PD, LGD is the hedged exposure's LGD (not adjusted to reflect the guarantee or credit derivative), and EAD is the EAD of the original hedged exposure minus P.
Section 134(c)(3)	**M of hedged exposures**. The M of the hedged exposure is the same as the M of the exposure if it were unhedged.
Section 134(d)	**Maturity mismatch** (1) An organization that recognizes an eligible guarantee or eligible credit derivative in determining its risk-based capital requirement for a hedged exposure must adjust the effective notional amount of the credit risk mitigant to reflect any maturity mismatch between the hedged exposure and the credit risk mitigant. (2) A maturity mismatch occurs when the residual maturity of a credit risk mitigant is less than that of the hedged exposure(s). (3) The residual maturity of a hedged exposure is the longest possible remaining time before the obligor is scheduled to fulfill its obligation on the exposure. If a credit risk mitigant has embedded options that may reduce its term, the organization (protection purchaser) must use the shortest possible residual maturity for the credit risk mitigant. If a call is at the discretion of the protection provider, the residual maturity of the credit risk mitigant is at the first call date. If the call is at the discretion of the organization (protection purchaser), but the terms of the arrangement at origination of the credit risk mitigant contain a positive incentive for the organization to call the transaction before contractual maturity, the remaining time to the first call date is the residual maturity of the credit risk mitigant. For example, where there is a step-up in cost in conjunction with a call feature or where the effective cost of protection increases over time even if credit quality remains the same or improves, the residual maturity of the credit risk mitigant will be the remaining time to the first call. (4) A credit risk mitigant with a maturity mismatch may be recognized only if its original maturity is greater than or equal to one year and its residual maturity is greater than three months. (5) When a maturity mismatch exists, the organization must apply the following adjustment to the effective notional amount of the credit risk mitigant: Pm = E x (t-0.25)/(T-0.25), where: (i) Pm = effective notional amount of the credit risk mitigant, adjusted for maturity mismatch; (ii) E = effective notional amount of the credit risk mitigant; (iii) t = the lesser of T or the residual maturity of the credit risk mitigant, expressed in years; and (iv) T = the lesser of five years or the residual maturity of the hedged exposure, expressed in years.

Section 134(e)	**Credit derivatives without restructuring as a credit event**. If an organization recognizes an eligible credit derivative that does not include as a credit event a restructuring of the hedged exposure involving forgiveness or postponement of principal, interest, or fees that results in a credit loss event (that is, a charge-off, specific provision, or other similar debit to the profit and loss account), the organization must apply the following adjustment to the effective notional amount of the credit derivative: Pr = Pm x 0.60, where: (1) Pr = effective notional amount of the credit risk mitigant, adjusted for lack of restructuring event (and maturity mismatch, if applicable); and (2) Pm = effective notional amount of the credit risk mitigant adjusted for maturity mismatch (if applicable).
Section 134(f)	**Currency mismatch** (1) If an organization recognizes an eligible guarantee or eligible credit derivative that is denominated in a currency different from that in which the hedged exposure is denominated, the organization must apply the following formula to the effective notional amount of the guarantee or credit derivative: Pc = Pr x (1-H_{FX}), where: (i) Pc = effective notional amount of the credit risk mitigant, adjusted for currency mismatch (and maturity mismatch and lack of restructuring event, if applicable); (ii) Pr = effective notional amount of the credit risk mitigant (adjusted for maturity mismatch and lack of restructuring event, if applicable); and (iii) H_{FX} = haircut appropriate for the currency mismatch between the credit risk mitigant and the hedged exposure. (2) An organization must set H_{FX} equal to 8 percent unless it qualifies for the use of and uses its own internal estimates of foreign exchange volatility based on a ten-business-day holding period and daily marking-to-market and remargining. An organization qualifies for the use of its own internal estimates of foreign exchange volatility if it qualifies for: (i) The own-estimates haircuts in paragraph (b)(2)(iii) of section 132; (ii) The simple VaR methodology in paragraph (b)(3) of section 132; or (iii) The internal models methodology in paragraph (d) of section 132. (3) An organization must adjust H_{FX} calculated in paragraph (f)(2) of section 134 upward if the organization revalues the guarantee or credit derivative less frequently than once every ten business days using the square root of time formula provided in paragraph (b)(2)(iii)(A)(*2*) of section 132.
Section 135(a)	**Double Default Treatment** **Eligibility and operational criteria for double default treatment**. An organization may recognize the credit risk mitigation benefits of a guarantee or credit derivative covering an exposure described in paragraph (a)(1) of section 134 by applying the double default treatment in this section if all the following criteria are satisfied. (1) The hedged exposure is fully covered or covered on a pro rata basis by: (i) An eligible guarantee issued by an eligible double default guarantor; or (ii) An eligible credit derivative that meets the requirements of paragraph (b)(2) of section 134 and is issued by an eligible double default guarantor. (2) The guarantee or credit derivative is: (i) An uncollateralized guarantee or uncollateralized credit derivative (for example, a credit default swap) that provides protection with respect to a single reference obligor; or (ii) An nth-to-default credit derivative (subject to the requirements of paragraph (m) of section 142). (3) The hedged exposure is a wholesale exposure (other than a sovereign exposure). (4) The obligor of the hedged exposure is not: (i) An eligible double default guarantor or an affiliate of an eligible double default guarantor; or (ii) An affiliate of the guarantor. (5) The organization does not recognize any credit risk mitigation benefits of the guarantee or credit derivative for the hedged exposure other than through application of the double default treatment as provided in section 135. (6) The organization has implemented a process (which has received the prior, written approval of its primary federal supervisor) to detect excessive correlation between the creditworthiness of the obligor of the hedged exposure and the protection provider. If excessive correlation is present, the organization may not use the double default treatment for the hedged exposure.
Section 135(b)	**Full coverage**. If the transaction meets the criteria in paragraph (a) of section 135 and the protection amount (P) of the guarantee or credit derivative is at least equal to the EAD of the hedged exposure, the organization may determine its risk-weighted asset amount for the hedged exposure under paragraph (e) of section 135.

Section 135(c)	**Partial coverage**. If the transaction meets the criteria in paragraph (a) of section 135 and the protection amount (P) of the guarantee or credit derivative is less than the EAD of the hedged exposure, the organization must treat the hedged exposure as two separate exposures (protected and unprotected) in order to recognize double default treatment on the protected portion of the exposure. (1) For the protected exposure, the organization must set EAD equal to P and calculate its risk-weighted asset amount as provided in paragraph (e) of section 135. (2) For the unprotected exposure, the organization must set EAD equal to the EAD of the original exposure minus P and then calculate its risk-weighted asset amount as provided in section 131.
Section 135(d)	**Mismatches**. For any hedged exposure to which an organization applies double default treatment, the organization must make applicable adjustments to the protection amount as required in paragraphs (d), (e), and (f) of section 134.
Section 135(e)	**The double default dollar risk-based capital requirement** The dollar risk-based capital requirement for a hedged exposure to which an organization has applied double default treatment is K_{DD} multiplied by the EAD of the exposure. K_{DD} is calculated according to the following formula: K_{DD} = Ko × (0.15 + 160 × PDg), Where: (1) $K_o = LGD_g \times \left[N\left(\frac{N^{-1}(PD_o) + N^{-1}(0.999)\sqrt{\rho_{os}}}{\sqrt{1-\rho_{os}}} \right) - PD_o \right] \times \left[\frac{1+(M-2.5)\times b}{1-1.5\times b} \right]$ (2) PDg = PD of the protection provider. (3) PDo = PD of the obligor of the hedged exposure. (4) LGDg = (i) The lower of the LGD of the hedged exposure (not adjusted to reflect the guarantee or credit derivative) and the LGD of the guarantee or credit derivative, if the guarantee or credit derivative provides the organization with the option to receive immediate payout on triggering the protection; or (ii) The LGD of the guarantee or credit derivative, if the guarantee or credit derivative does not provide the organization with the option to receive immediate payout on triggering the protection. (5) ρ_{os} (asset value correlation of the obligor) is calculated according to the appropriate formula for (R) provided in Table 1 in section 131, with PD equal to PDo. (6) b (maturity adjustment coefficient) is calculated according to the formula for b provided in Table 1 in section 131, with PD equal to the lesser of PDo and PDg. (7) M (maturity) is the effective maturity of the guarantee or credit derivative, which may not be less than one year or greater than five years.

Suggested Review Items

Policies and Procedures
- Policy and procedures governing recognition of credit risk mitigation benefits.
- Policies and procedures governing ongoing monitoring of credits with recognized credit risk mitigation.

Management Reporting
- Reports used to monitor credits with recognized credit risk mitigation.

Documentation
- Documentation describing and supporting the organization’s recognition of credit risk mitigation benefits.
- Documentation describing and supporting the organization’s quantification of the benefits of credit risk mitigation.
- Documentation of the data used to quantify the benefits of credit risk mitigation.

Audit and Independent Review
- Audit review of the annual assessment of the IRB system.
- Scope, findings, and supporting documentation of internal loan review’s assessments of the application of the credit risk mitigation methodology.

Supervisory Review
- Previous examination findings, data, and analysis related to the organization’s quantification processes, including findings from credit, MIS, and economic capital reviews.
- Previous examination findings and analysis related to the organization’s recognition of credit risk mitigation benefits.

11. Credit Risk Mitigation

Update log		
Subcategory/portfolio	Date	Prepared by

11.00	Work program question	Overall assessment	Reference
NOTE: This section is only relevant for wholesale exposures for which • credit risk is fully covered by an eligible guarantee or eligible credit derivative; or • credit risk is covered on a pro rata basis (that is, on a basis in which the organization and the protection provider share losses proportionally) by an eligible guarantee or eligible credit derivative. Wholesale exposures on which there is tranching of credit risk (reflecting at least two different levels of seniority) are securitization exposures subject to the securitization framework in sections 141 to 145 of the advanced approaches rule (Risk-Weighted Assets for Securitization Exposures).			134(a)(1) 134(a)(2)

11.01	Work program question	Overall assessment	Reference
What approaches has the organization elected to use to recognize the credit risk mitigation benefits of an eligible guarantee or eligible credit derivative? What steps is the organization taking to ensure that the regulatory floor for PD is properly applied?			134(a)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. What approaches has the organization elected to recognize the credit risk mitigation benefits of an eligible guarantee or eligible credit derivative? • Is the PD substitution approach utilized? • Is the LGD adjustment approach utilized? • Is some other approach utilized? 2. How does the organization ensure that the PD for each guarantor is not less than 0.03 percent, except for exposures to or directly and unconditionally guaranteed by a sovereign entity, a supranational entity listed in section 131(d)(2), or a multilateral development organization as defined in the advanced approaches rule, to which the organization assigns a rating grade associated with a PD of less than 0.03 percent?		1. 2.	

<table>
<tr><td>11.02</td><td>Work program question</td><td>Overall assessment</td><td>Reference</td></tr>
<tr><td colspan="2">If multiple eligible guarantees or eligible credit derivatives cover a single exposure described in paragraph (a)(1) of section 134, does the organization treat the hedged exposure as multiple separate exposures each covered by a single eligible guarantee or eligible credit derivative and calculate a separate risk-based capital requirement for each separate exposure as described in paragraph (a)(3) of section 134?</td><td></td><td>134(a)(4)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory and/or portfolio as appropriate</td></tr>
<tr><td colspan="2">1. How does the organization treat multiple eligible guarantees or eligible credit derivatives that cover a single exposure?
• Does the organization treat the hedged exposure as multiple separate exposures each covered by a single eligible guarantee or eligible credit derivate?
– If so, is a separate risk-based capital requirement calculated for each separate exposure?
– If not, how does the organization justify this deviation from the rule?</td><td colspan="2">1.</td></tr>
</table>

<table>
<tr><td>11.03</td><td>Work program question</td><td>Overall assessment</td><td>Reference</td></tr>
<tr><td colspan="2">If a single eligible guarantee or eligible credit derivative covers multiple hedged wholesale exposures described in paragraph (a)(1) of section 134, does the organization treat each hedged exposure as covered by a separate eligible guarantee or eligible credit derivative and calculate a risk-based capital requirement for each exposure as described in paragraph (a)(3) of section 134?</td><td></td><td>134(a)(5)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory or portfolio, as appropriate</td></tr>
<tr><td colspan="2">1. How does the organization calculate risk-based capital requirements of multiple hedged exposures that are covered by the same eligible guarantee or eligible credit derivative?
2. Does the organization treat each hedged exposure as covered by a separate eligible guarantee or eligible credit derivative and calculate a separate risk-based capital requirement for each exposure?
• If not, how does the organization justify this deviation from the rule?</td><td colspan="2">1.
2.</td></tr>
</table>

<table>
<tr><td>11.04</td><td>Work program question</td><td>Overall assessment</td><td>Reference</td></tr>
<tr><td colspan="2">Does the organization use the same risk parameters for calculating ECL as it uses for calculating the risk-based capital requirement for the exposure?</td><td></td><td>134(a)(6)</td></tr>
<tr><td colspan="2">Review questions and procedures</td><td colspan="2">Supervisor comments (with references) by subcategory or portfolio, as appropriate</td></tr>
<tr><td colspan="2">1. What parameters are used for calculating ECL?
2. Are these the same parameters used for calculating risk-based capital for the given exposure?</td><td colspan="2">1.
2.</td></tr>
</table>

11.05	Work program question	Overall assessment	Reference
Does the organization recognize credit risk mitigation benefits of only eligible guarantees and eligible credit derivatives?			134(b) 2, subpart A of the regulatory capital rules

Review questions and procedures

1. What steps does the organization take to ensure that it only recognizes the credit risk mitigation benefits of eligible guarantees and eligible credit derivatives?
2. What product types are recognized by the organization as eligible credit derivatives? Are only the following types included:
   - Credit default swaps?
   - Nth to default swaps?
   - Total return swaps?
   - Other forms of credit derivatives approved by the primary federal supervisor (if so, what types)?
3. What criteria does the organization use to identify eligible credit derivatives? Are the following criteria met:
   - The contract meets the requirements of an eligible guarantee and has been confirmed by the protection purchaser and the protection provider?
     - How is confirmation performed and documented?
   - If a contract has been assigned, has the assignment been confirmed by all relevant parties?
     - How does the organization define and identify “relevant parties”?
     - How is contract assignment confirmed and documented?
   - If the credit derivative is a credit default swap or nth-to-default swap, does the contract include the following credit events:
     - Failure to pay any amount due under the terms of the reference exposure, subject to any applicable minimal payment threshold that is consistent with standard market practice and with a grace period that is closely in line with the grace period of the reference exposure; and
       - How does the organization define this standard market practice?
     - Receivership, insolvency, liquidation, or similar proceeding, or inability of the obligor on the reference exposure to pay its debts, or its failure or admission in writing of its inability generally to pay its debts as they become due, and similar events;
       - What credit events are included in standard contracts at the organization?
   - Are the terms and conditions dictating the manner in which the contract is to be settled incorporated into the contract?
     - How are the terms and conditions dictating the settlement incorporated into the contract?
     - Is a standard contract form used for all transactions? If so, obtain and review copy of the contract.
   - If the contract allows for cash settlement, does the contract incorporate a robust valuation process to estimate loss reliably and specify a

Supervisor comments (with references) by subcategory or portfolio, as appropriate

1.
2.
3.
4.
5.

reasonable period for obtaining post-credit event valuations of the reference exposure? – How is the valuation process performed? – Which party to the contract performs the valuation (is a third party involved)? – What time frame do the contracts require the valuations to be performed post a credit event? • If the contract requires the protection purchaser to transfer an exposure to the protection provider at settlement, do the terms of at least one of the exposures that is permitted to be transferred under the contract provide that any required consent to transfer may not be unreasonably withheld? – For contracts with physical settlement, what steps must be taken to transfer the related security to the protection provider? • If the credit derivative is a credit default swap or nth-to-default swap, does the contract clearly identify the parties responsible for determining whether a credit event has occurred, specify that this determination is not the sole responsibility of the protection provider, and give the protection purchaser the right to notify the protection provider of the occurrence of a credit event? – What parties determine whether a credit even has occurred? Is this stated in the contracts? – Is this responsibility the sole responsibility of the protection provider? – Does the protection purchaser have authority to notify the protection seller as to the occurrence of a credit event? • If the credit derivative is a total return swap and the organization records net payments received on the swap as net income, does the organization record offsetting deterioration in the value of the hedged exposure (either through reductions in fair value or by an addition to reserves)? – What is the organization's policy for the recognition of the payments received as net income, and the deterioration in the value of the hedged exposures? 4. Obtain and review relevant policy, determining how the organization ensures that all recognized guarantees meet the following criteria: • How does the organization ensure that the guarantees it considers eligible (except for contingent obligations of the U.S. government) are written and unconditional? – Does the organization recognize implicit support? Implicit support includes, but may not be limited to, written, but not legally enforceable, assurances from a third party of the performance of the obligor on its obligations such as comfort letters. • How does the organization ensure that the guarantees it considers eligible cover all or a pro rata portion of all contractual payments of the obligor on the reference exposure? • How does the organization ensure that the guarantees it considers eligible give the beneficiary a direct claim against the protection provider? • Are the guarantees non-cancelable by the protection provider for reasons other than the breach of the contract by the beneficiary? • How does the organization ensure that the guarantees it considers eligible are legally enforceable against the protection provider in a jurisdiction where the protection provider has sufficient assets against	

which a judgment may be attached and enforced? – How does the organization determine the legal enforceability of the guarantees? – What due diligence is performed to ensure that the protection provider has sufficient assets against which a judgment may be attached and enforced? • How does the organization ensure that the guarantees it considers eligible require the protection provider to make payments to the beneficiary on the occurrence of a default (as defined in the guarantee) of the obligor on the reference exposure without first requiring the beneficiary to demand payment from the obligor? • What are the steps required for the organization to obtain payments from the protection provider given a default event of a reference exposure? • How does the organization ensure that the guarantees it considers eligible don't increase the beneficiary's cost of credit protection in response to deterioration in the credit quality of the reference exposure? • How does the organization ensure that the guarantees it considers eligible are provided by an affiliate of the organization, unless the affiliate is an insured depository institution, securities broker or dealer, or insurance company that does not control the organization and that is subject to consolidated supervision and regulation comparable to that imposed on U.S. depository institutions, securities broker-dealers, or insurance companies? – How does the organization define and identify affiliated entities? – What affiliated entities are allowed to provide guarantees to the organization? 5. Does the organization recognize the credit risk mitigation benefits of an eligible credit derivative used to hedge an exposure that is different from the credit derivative's reference exposure which is used for determining the derivative's cash settlement value, deliverable obligation, or occurrence of a credit event? • If yes, – how does the organization ensure the reference exposure ranks *pari passu* with or is junior to the hedged exposure? – how does the organization ensure that the reference exposure and the hedged exposure are exposures to the same legal entity? – does the organization ensure that legally enforceable cross-default or cross-acceleration clauses are in place to assure payments made under the credit derivative are triggered when the obligor fails to pay under the terms of the hedged exposures? – what triggers a default of the reference entity?	

11.06	Work program question	Overall assessment	Reference
Does the organization's application of the PD substitution approach, if any, appropriately account for instances where an eligible guarantee/credit derivative fully covers the estimated exposure at default or the underlying exposure, and does the organization apply the appropriate LGD estimate, taking into account contract payment terms, for hedged exposures in which the PD substitution approach is applied?			134(c)(1)(i)

Review questions and procedures	Supervisor comments (with references) by subcategory or portfolio, as appropriate
1. Does the organization use, or intend to use, the PD substitution approach? • If yes, continue with this section. • If no, skip to section 11.07. 2. How does the organization calculate the protection amount (P) of the guarantee or credit derivative? 3. How does the organization implement the PD substitution approach where the eligible guarantee or credit derivative fully covers the EAD of the underlying exposure? 4. How does the organization determine if the full substitution of the protection provider's PD leads to an appropriate degree of risk mitigation? • If analysis reveals an inappropriate degree of risk mitigation, how does the organization address the situation? 5. How does the organization determine if the guarantee or credit derivative provides the organization with the option to receive immediate payout upon triggering the protection? 6. How does the organization calculate the LGD of the hedged exposure under the PD substitution approach? Does it equal • the lower of – the LGD of the hedged exposure (not adjusted to reflect the guarantee or credit derivative), and – the LGD of the guarantee or credit derivative, if the guarantee or credit derivative provides the organization with the option to receive immediate payout upon triggering the protection; or • the LGD of the guarantee or credit derivative, if the guarantee or credit derivative does not provide the organization with the option to receive immediate payout upon triggering the protection?	1. 2. 3. 4. 5. 6.

11.07	Work program question	Overall assessment	Reference
Does the organization's application of the PD substitution approach, if any, appropriately account for instances where an eligible guarantee/credit derivative partially covers the estimated exposure at default or the underlying exposure, and does the organization apply the appropriate LGD estimate, taking into account contract payment terms, for hedged exposures in which the PD substitution approach is applied?			134(c)(1)(ii)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization utilize the PD substitution approach? If no, skip the remainder of this section and go to section 11.08. 2. How does the organization treat hedged exposures that are only partially hedged by an eligible guarantee or eligible credit derivative? • does the organization treat the hedged exposure as two separate exposures (protected and unprotected) to recognize the credit risk mitigation benefit of the guarantee of credit derivative? • how does the organization calculate the coverage provided by the eligible guarantee or eligible credit derivative? 3. For the partially hedged portion of the exposure, • is the guarantor's PD rate applied? • is LGD calculated as described below in #6 of this section 11.07? • what EAD is used?		1. 2. 3. 4. 5. 6.	

4. For the non-hedged portion of the exposure, • is the obligor's PD rate applied? • is the LGD the hedged exposure's LGD (not adjusted to reflect the guarantee or the credit derivative)? • is the EAD applied equal to the EAD of the original exposure less P? 5. How does the organization determine if the guarantee or credit derivative provides the organization with the option to receive immediate payout upon triggering the protection? 6. How does the organization calculate the LGD of the hedged exposure under the PD substitution approach? Does it equal • the lower of – the LGD of the hedged exposure (not adjusted to reflect the guarantee or credit derivative), and – the LGD of the guarantee or credit derivative, if the guarantee or credit derivative provides the organization with the option to receive immediate payout upon triggering the protection; or • the LGD of the guarantee or credit derivative, if the guarantee or credit derivative does not provide the organization with the option to receive immediate payout upon triggering the protection. Note: The treatment of eligible guarantees or eligible credit derivatives that provide partial coverage is applicable when the credit risk of a wholesale exposure is covered on a partial pro rata basis or when an adjustment is made to the effective notional amount of the guarantee or credit derivative under paragraph (d), (e), or (f) of section 134.	

11.08	Work program question	Overall assessment	Reference
Does the organization's application of the LGD adjustment approach, if any, appropriately account for instances where an eligible guarantee/credit derivative either fully or partially covers the estimated exposure at default of the underlying exposure?			134(c)(2)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization utilize the LGD adjustment approach? If no, skip the remainder of this section and go to section 11.04. 2. How does the organization determine the amount of a hedged exposure that is covered by an eligible guarantee or eligible credit derivative? 3. How does the organization apply the LGD adjustment approach to hedged exposures that are fully covered by an eligible guarantee or eligible credit derivative that meets the requirements above? • If P of the guarantee or credit derivative is greater than or equal to the EAD of the hedged exposure, when calculating the organization's risk-based capital of the hedged exposure does the organization use the greater of – the risk-based capital requirement for the exposure as calculated under section 131, with the LGD of the exposure adjusted to reflect the guarantee or credit derivative; or – the risk-based capital requirement for a direct exposure to the protection provider as calculated under section 131, using the PD for the protection provider, the LGD for the guarantee or credit		1. 2. 3. 4.	

derivative, and an EAD equal to the EAD of the hedged exposure? 4. How does the organization apply the LGD adjustment approach to hedged exposures that are partially covered by an eligible guarantee or eligible credit derivative that meets the requirements above? • Does the organization treat the covered and uncovered portions of the exposure as two separate exposures in calculating risk-based capital? • For the protected portion of the exposure is the risk-based capital calculated as the greater of – the risk-based capital requirement for the protected exposure as calculated under section 131, with the LGD of the exposure adjusted to reflect the guarantee or credit derivative and EAD set equal to P; or – the risk-based capital requirement for a direct exposure to the guarantor as calculated under section 131, using the PD for the protection provider, the LGD for the guarantee or credit derivative, and an EAD set equal to P. • For the unprotected portion of the exposure, is the risk-based capital requirement calculated under section 131, where the PD is the obligor's PD, LGD is the hedged exposure's LGD (not adjusted to reflect the guarantee or credit derivative), and EAD is the EAD of the original exposure minus P?	

11.09	**Work program question**	**Overall assessment**	**Reference**
Does the organization apply the appropriate calculation to account for maturity mismatches, contract settlement terms, and currency mismatches between the underlying exposure and the applicable guarantee/credit derivative?			134(d) 134(e) 134(f)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
Maturity Mismatch 1. How does the organization determine if there is a maturity mismatch of the hedged exposure and the credit risk mitigant? Does it consider if the residual maturity of a credit risk mitigant is less than that of the hedged exposure(s)? • Does it adjust the notional amount of the credit risk mitigant? • How does the organization calculate the residual maturity of a hedged exposure? – Does it consider the residual maturity of a hedged exposure to be the longest possible remaining time before the obligor is scheduled to fulfill its obligation on the exposure? – How does the organization determine if the risk mitigant has an embedded option that may reduce its term? ▪ In cases where the organization identifies an embedded option, does the organization (protection purchaser) use the shortest possible residual maturity for the credit risk mitigant? ▪ For cases where a call is at the discretion of the protection provider, does the organization set the residual maturity of the credit risk mitigant at the first call date? ▪ For cases where a call is at the discretion of the organization (protection purchaser), but the terms of the arrangement at origination of the credit risk mitigant contain a positive incentive for the organization to call the transaction before the contractual		1. 2. 3. 4. 5. 6. 7. 8. 9.	

maturity, does the organization set the remaining time to the first call date as the residual maturity of the credit risk mitigant? ○ How does the organization determine if there is positive incentive for the organization to call the transaction before contractual maturity? 2. When a maturity mismatch is determined to exist, how does the organization adjust the effective notional amount of the credit risk mitigant? Does it apply the following formula required by the rule: • Pm = E x (t-0.25)/(T-0.25), where – Pm = effective notional amount of the credit risk mitigant, adjusted for maturity mismatch; – E = effective notional amount of the credit risk mitigant; – t = the lesser of T or the residual maturity of the credit risk mitigant, expressed in years; and – T = the lesser of five or the residual maturity of the hedged exposure, expressed in years? **Events of Restructuring** 3. Does the organization recognize eligible credit derivatives that do not include as a credit event a restructuring of the hedged exposure involving forgiveness or postponement of principal, interest, or fees that results in a credit loss event (that is, a charge-off, specific provision, or other similar debit to the profit and loss account)? • If yes, does the organization adjust the nominal amount of the credit derivative as follows: – Pr = Pm x 0.60, where ▪ Pr = effective notional amount of the credit risk mitigant, adjusted for lack of restructuring event (and maturity mismatch, if applicable); and ▪ Pm = effective notional amount of the credit risk mitigant adjusted for maturity mismatch (if applicable)? **Currency Mismatch** 4. Does the organization recognize eligible guarantees or eligible credit derivatives that are denominated in a currency different from that in which the hedged exposure is denominated? 5. If yes, what adjustments are made to the effective notional amount of the guarantee or credit derivative? Do these adjustments correspond to what is prescribed in the rule: • Pc = Pr x (1- H_{FX}), where – Pc = effective notional amount of the credit risk mitigant, adjusted for currency mismatch (and maturity mismatch and lack of restructuring event, if applicable); – Pr = effective notional amount of the credit risk mitigant (adjusted for maturity mismatch and lack of restructuring event, if applicable); and – H_{FX} = haircut appropriate for the currency mismatch between the credit risk mitigant and the hedged exposure? 6. How does the organization calculate H_{FX} in the above formula? • Does the organization qualify for the use of and use its own internal estimates of foreign exchange volatility (as defined in section 132)?	

– An organization qualifies for the use of its own internal estimates of foreign exchange volatility if it qualifies for ▪ the own-estimates haircuts in paragraph (b)(2)(iii) of section 132; ▪ the simple VaR methodology in paragraph (b)(3) of section 132; or ▪ the internal models methodology in paragraph (d) of section 132. • If not, does the organization set H_{FX} equal to 8 percent? 7. For eligible guarantees or eligible credit derivatives that are denominated in a currency that is different from the hedged exposure, how often does the organization revalue the guarantee or credit derivative? • If it is revalued less frequently than once every 10 business days using the square root of time formula provided in paragraph (b)(2)(iii)(A)(2) of section 132, does the organization adjust H_{FX} upward? – How is the upward adjustment determined? Is this adjustment reasonable? **Sample Contracts** 8. Obtain a listing of all risk mitigants applied in the capital calculator. 9. Identify and obtain a representative sample of contracts and review contract terms to assure adherence to the above requirements.	

11.10	Work program question	Overall assessment	Reference
Has the organization satisfied all of the criteria of the advanced approaches rule to use the double default treatment to recognize the credit risk mitigation benefits of a guarantee or a credit derivative including implementing a process (which has received the prior, written approval of the primary federal supervisor) to detect excessive correlation between the creditworthiness of the obligor of the hedged exposure and the protection provider?			135(a)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization apply the double default treatment when recognizing the credit risk mitigation benefits of a guarantee or credit derivative? If no, skip the remainder of this section and go to section 11.12. 2. What is the process the organization has implemented to detect excessive correlation between the creditworthiness of the obligor of the hedged exposure and the protection provider? If excessive correlation is present, the organization may not use the double default treatment for the hedged exposure. • How does the organization ensure that excessive correlation is not present or that when it is present, the double default treatment is not used? 3. How does the organization ensure that the hedged exposure is fully covered or covered on a pro rata basis by • an eligible guarantee issued by an eligible double default guarantor (see section 11.01 and 11.08) or • an eligible credit derivative that meets the requirements of paragraph (b)(2) of section 134 and is issued by an eligible double default guarantor (see section 11.01 and 11.08)?		1. 2. 3. 4. 5. 6. 7.	

4. How does the organization ensure that a guarantee or credit derivative is • an uncollateralized guarantee or uncollateralized credit derivative (for example, a credit default swap) that provides protection with respect to a single reference obligor or • an nth-to-default credit derivative (subject to the requirements of paragraph [m] of section 142)? 5. How does the organization ensure that a hedged exposure is a wholesale exposure (other than a sovereign exposure)? 6. How does the organization ensure that the obligor of the hedged exposure is not • an eligible double default guarantor or an affiliate of an eligible double default guarantor or • an affiliate of the guarantor? 7. How does the organization ensure that the organization does not recognize any credit risk mitigation benefits of the guarantee or credit derivative for the hedged exposure other than through application of the double default treatment as provided in this section?	

11.11	Work program question	Overall assessment	Reference
For fully covered exposures (and eligible portions of partially covered exposures) to which the double default treatment applies, does the organization provide the appropriate risk parameter inputs to the capital formula and adjust the capital percentage estimate according to the advanced approaches rule?			135(b) 135(c)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization apply the double default treatment when recognizing the credit risk mitigation benefits of a guarantee or credit derivative, and meet all of the requirements outlined in section 11.05 above? If no, skip the remainder of this section and go to section 11.12. 2. If P is at least equal to the EAD of the hedged exposure, does the organization determine its risk-weighted asset amount for the hedged exposure in accordance with section 135(e) (addressed below in section 11.14)? 3. If P is less than the EAD of the hedged exposure, does the organization treat the hedged exposure as two separate exposures (protected and unprotected)? • For the protected portion of the exposure, does the organization set EAD equal to P and calculate its risk-weighted asset amount as provided in section 11.14 below? • For the unprotected portion of the exposure, does the organization set EAD equal to the EAD of the original exposure minus P and then calculate the risk-weighted asset amount as provided in section 131?		1. 2. 3.	

11.12	Work program question	Overall assessment		Reference
How is the Effective Maturity (M) of a hedged exposure calculated?				134(c)(3)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**		
1. How is M of a hedged exposure calculated? • Is it calculated the same way as the M of the exposure if it were unhedged?		1.		

11.13	Work program question	Overall assessment	Reference
For exposures eligible for double default treatment, are the appropriate adjustments made for maturity, contract settlement term, and currency mismatches (as outlined in section 134 [d, [e], and [f] [see question 11.04])?			135(d)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. How does the organization determine if there is a mismatch (maturity, currency, or restructuring event) between the credit risk mitigant and the hedged exposure? • For cases in which it is determined that there is a mismatch, how does the organization make the adjustments as required?		1.	

11.14	Work program question	Overall assessment	Reference
Is the dollar risk-based capital requirement for a hedged exposure to which an organization has applied double default treatment K_{DD} multiplied by the EAD of the exposure, where K_{DD} is calculated according to the following formula: $K_{DD} = Ko \times (0.15 + 160 \times PDg)$? Does the organization only provide double default treatment for eligible double default guarantors?			135(e)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Does the organization apply the double default treatment when recognizing the credit risk mitigation benefits of a guarantee or credit derivative, and meet all of the requirements outlined in section 11.05 above? If no, skip the remainder of this section. 2. How does the organization calculate the dollar risk-based capital requirement for a hedged exposure to which an organization has applied double default treatment? • Does the organization use the formula as follows: The dollar risk-based capital requirement for a hedged exposure to which an organization has applied double default treatment is K_{DD} multiplied by the EAD of the exposure. K_{DD} is calculated according to the following formula: $K_{DD} = Ko \times (0.15 + 160 \times PDg)$, where $K_O = LGD_g \times \left[N\left(\frac{N^{-1}(PD_o) + N^{-1}(0.999)\sqrt{\rho_{os}}}{\sqrt{1-\rho_{os}}} \right) - PD_o \right] \times \left[\frac{1+(M-2.5)\times b}{1-1.5\times b} \right]$ – PDg = PD of the protection provider? – PDo = PD of the obligor of the hedged exposure? – LGDg = (i) the lower of the LGD of the hedged exposure (not adjusted to reflect the guarantee or credit derivative) and the LGD of the guarantee or credit derivative, if the guarantee or credit derivative provides the organization with the option to receive immediate payout on triggering the protection; or (ii) the LGD of the guarantee or credit derivative, if the guarantee or credit derivative does not provide the organization with the option to receive immediate payout on triggering the protection? – ρ_{os} (asset value correlation of the obligor) is calculated according to		1. 2.	

the appropriate formula for (R) provided in table 1 in section 131, with PD equal to PDo? – b (maturity adjustment coefficient) is calculated according to the formula for b provided in table 1 in section 131 of the advanced approaches rule, with PD equal to the lesser of PDo and PDg? – M (maturity) is the effective maturity of the guarantee or credit derivative, which may not be less than one year or greater than five years?	

F. Calculation of Risk-Weighted Assets

Section 131(e)[7]	**Calculation of risk-weighted assets** **(1) Non-defaulted exposures.** (i) An organization must calculate the dollar risk-based capital requirement for each of its wholesale exposures to a non-defaulted obligor (except eligible guarantees and eligible credit derivatives that hedge another wholesale exposure and exposures to which the organization applies the double default treatment in section 135) … by inserting the assigned risk parameters for the wholesale obligor and exposure … into the appropriate risk-based capital formula specified in Table 1 to section 131 and multiplying the output of the formula (K) by the EAD of the exposure or segment. Alternatively, an organization may apply a 300 percent risk weight to the EAD of an eligible margin loan if the organization is not able to meet its primary federal supervisor's requirements for estimation of PD and LGD for the margin loan. **(2) Wholesale exposures to defaulted obligors.** (i) The dollar risk-based capital requirement for each wholesale exposure not covered by an eligible guarantee from the U.S. government to a defaulted obligor equals 0.08 multiplied by the EAD of the exposure. (ii) The dollar risk-based capital requirement for the portion of each wholesale exposure to a defaulted obligor covered by an eligible guarantee from the U.S. government equals the sum of: (A) the sum of the EAD of the portion of each wholesale exposure to a defaulted obligor covered by an eligible guarantee from the U.S. government multiplied by 0.016 and (B) The sum of the EAD of the portion of each wholesale exposure to a defaulted obligor not covered by an eligible guarantee from the U.S. government multiplied by 0.08. (iii) The sum of all the dollar risk-based capital requirements for each wholesale exposure to a defaulted obligor calculated in section (e)(2)(i) of section 131 of the advanced approaches rule plus the dollar risk-based capital requirements for each wholesale exposure to a defaulted obligor calculated in paragraph (e)(2)(ii) of section 131 of the advanced approaches rule equals the total dollar risk-based capital requirement for those exposures. (iv) The aggregate risk-weighted asset amount for wholesale exposures to defaulted obligors equals the total risk-based capital requirement calculated in paragraph (e)(2)(iii) of section 131 of the advanced approaches rule multiplied by 12.5.

Suggested Review Items

- Documentation supporting the capital calculation engine.
- Reconciliation reports tying exposures in the general ledger to exposures used to report risk-weighted assets.
- Internal analysis of the general risk-based capital rules versus the advanced approaches rule risk-weighted assets by subcategory or portfolio.

Audit and Independent review

- Audit review of the annual assessment of the IRB system.
- Scope, findings, and supporting documentation from independent IRB system reviews and the annual IRB assessment. (Note: Independent reviews are not required if validation is conducted independently.)

[7] Refer to the advanced approaches rule to the formulas for section 131.

12. Calculation of Risk-Weighted Assets

Update log		
Subcategory/portfolio	Date	Prepared by

12.01 Work program question	Overall assessment	Reference
Does the organization calculate the dollar risk-based capital requirement for each of its wholesale exposures to a non-defaulted obligor (except eligible guarantees and eligible credit derivatives that hedge another wholesale exposure and exposures to which the organization applies the double default treatment in section 135) … by inserting the assigned risk parameters for the wholesale obligor and exposure … into the appropriate risk-based capital formula specified in table 1 to section 131 of the advanced approaches rule and multiplying the output of the formula (K) by the EAD of the exposure or segment? Alternatively, does the organization apply a 300 percent risk weight to the EAD of an eligible margin loan if the organization is not able to meet its primary federal supervisor's requirements for estimation of PD and LGD for the margin loan? Does the dollar risk-based capital requirement for each wholesale exposure to a defaulted obligor equal the sum of: (i) 0.08 multiplied by the EAD of the portion of the exposure not covered by an eligible guarantee from the U.S. government, plus (ii) 0.016 multiplied by the EAD of the portion of the exposure covered by an eligible guarantee from the U.S. government?		131(e)(1)(i) 131(e)(2)(i)

Review questions and procedures	Supervisor comments (with references) by subcategory or portfolio, as appropriate
1. Review the organization's policy and calculations for risk-weighted assets. 2. Does the organization calculate the risk-based capital requirement for each of its wholesale exposures to a non-default obligor? 3. For wholesale exposures to non-defaulted obligors not covered by an eligible guarantee or an eligible credit derivative, does the organization use the risk parameter estimates for the wholesale obligor and exposure? 4. Does the organization use the appropriate risk-based capital formula specified in table 1 to section 131 of the advanced approaches rule? 5. Does the organization multiply the output of the formula (K) by the EAD of the exposure? 6. Does the organization meet the agency's requirements for estimation of PD and LGD for margin loans? • If not, does the organization apply a 300 percent risk weight to the EAD of an eligible margin loan? 7. How does the organization ensure all exposures flow through the capital calculator? • What reconciliations are performed? 8. How does the organization calculate the dollar risk-based capital requirement for each wholesale exposure to a defaulted obligor? • Does the dollar risk-based capital requirement for each wholesale exposure to a defaulted obligor equal 0.08 multiplied by the EAD of the exposure?	1. 2. 3. 4. 5. 6. 7. 8.

G. Validation, Stress Testing, and Review

Section 122(i)(4) Section 122(i)(6)	**Control, oversight, and validation mechanisms.** (3) The organization must validate, on an ongoing basis, its advanced systems. The organization's validation process must be independent of the advanced systems' development, implementation, and operation, or the validation process must be subjected to an independent review of its adequacy and effectiveness. Validation must include: (i) An evaluation of the conceptual soundness of (including developmental evidence supporting) the advanced systems; (ii) An ongoing monitoring process that includes verification of processes and benchmarking; and (iii) An outcomes analysis process that includes back testing. ... (6) The organization must periodically stress test its advanced systems. The stress testing must include a consideration of how economic cycles, especially downturns, affect risk-based capital requirements (including migration across rating grades and segments and the credit risk mitigation benefits of double default treatment).

Suggested review items

Governance

- Organization charts and reporting structures indicating position and reporting lines of validation staff relative to risk rating and quantification staff.
- Background information on staff conducting the validation or other independent reviews of this area.
- Minutes from credit risk management meetings and other executive management meetings devoted to discussion of wholesale IRB systems and model validation.

Policies and procedures

- Validation policy.
- Model policies.
- Updating of developmental evidence.
- Ongoing monitoring, outcomes analysis/back testing, and benchmarking.
- Methodology for setting tolerance thresholds.
- Validation methods employed and the frequency of validation.

Management Reporting

- Ongoing override monitoring reports.
- Reports to senior management on the performance of the wholesale risk rating system.
- MIS on portfolio distributions by segment over time.

Documentation

- Model risk assessment documentation and model inventory.
- Documentation of the validation processes.
- Internal or external validation studies used by the organization.
- Recent model validation results.
- Management's plans for implementation of model review recommendations including plans for remedial action.
- Developmental evidence for the IRB system.
- Results of process verification and benchmarking exercises.
- Statistical models fit to long-run outcomes, to establish organization tolerance thresholds (e.g., time series models).
- Evidence that tolerance thresholds consider the relative frequency of backtesting and parameter updates.
- Procedures and results of the backtesting process.
- Justification for any adjustments in the forecasted risk parameters when comparing to recent outcomes, e.g., backing-out any conservative adjustments to the risk parameters.
- Results of any stress testing for these portfolios.

• Results of any analyses of migrations between segments. • Documentation of realized recessionary outcomes. • Documentation of variables specified in a recessionary scenario, such as interest rates, transition matrices (ratings and score-band segments), asset values, growth rates, or unemployment rates. • Documentation pertaining to model performance monitoring (regularly performed model backtesting), the quantification process, and additional periodic testing/verification activities. **Supervisory Review** • Scope, findings, and relevant documentation from examinations of IRB components (including assessments of organization modeling experience and expertise). **Audit and Independent review** • Audit review of ongoing validation, ongoing monitoring, backtesting, and benchmarking processes. • Audit review of the annual assessment of the IRB system. • Scope, findings, and supporting documentation from independent IRB system reviews and the annual IRB assessment. (Note: Independent reviews are not required if validation is conducted independently.)

13. Validation, Stress Testing, and Review

Update log		
Subcategory/portfolio	Date	Prepared by

13.01	**Work program question**	**Overall assessment**	**Reference**
Does the organization validate, on an ongoing basis, its advanced systems?			122(i)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Determine whether the organization has a well-documented and board-approved validation policy that encompasses key aspects of the risk rating systems and quantification processes and describes • independence. • the process and the timetable for validation activities. • the documentation requirements for validation. • specific assigned responsibilities. • tests and analysis to be performed. • expectations regarding the assessment of the risk parameter quantification process including – a well-defined governance structure to address, escalate, and resolve disagreements between validation and model development. – well-defined model adequacy thresholds for model/estimate error. – corrective actions to be taken when inaccuracies are found. – monitoring to ensure corrective actions are taken in a timely manner. – model risk and the organization's approach for addressing model risk. 2. Does the organization maintain an updated schedule of validation activities that covers all material risk rating systems and wholesale IRB quantification processes?		1. 2. 3. 4. 5. 6. 7.	

3. Is the frequency of validation reviews sufficient to ensure that wholesale advanced systems are reasonably valid on a continuous basis? 4. Determine whether the organization's validation activities ensure the accuracy and reliability of the quantification process including the following: • Validation of the analysis of the relevance of the reference data used in the parameter estimation process? • Validation of any adjustments made to the reference data to account for identified differences between the reference data and the current portfolio, as well as any supporting rationale? • Validation of the quantitative processes involved in translating the reference data into risk parameter estimates? • Validation of the application of the risk parameter estimates to the current portfolio? 5. What role does expert opinion play in validating the risk rating systems? 6. Does the organization have standards for the qualifications of validators? 7. Which group(s) tests and monitors assignment of internal rating grades? Are there any groups that test and monitor assignment of internal rating grades that are independent from personnel and management functions responsible for originating exposures?	

13.02	Work program question	Overall assessment	Reference
Does validation include sufficient evaluation of the conceptual soundness of (including developmental evidence supporting) the advanced systems?			122(i)(4)(i)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Determine whether the validation evaluates developmental evidence supporting the risk rating and quantification processes, and whether the developmental evidence addresses the four aspects of quantification (reference data, estimation, mapping, and application). 2. Describe the validation testing and analysis conducted to evaluate developmental evidence. 3. Determine whether the organization's risk rating and quantification policies provide for a review of developmental evidence to ensure material changes in the risk rating system or quantification process are supported. 4. Determine whether the organization updates developmental evidence when significant changes in methodologies, data, or implementation occur. 5. Evaluate the validation of developmental evidence. Establish whether the organization could reasonably conclude that • the advanced systems meet the advanced approaches rule requirements. • the quantification process can be expected to accurately estimate PDs, LGDs, and EADs.		1. 2. 3. 4. 5.	

13.03	Work program question	Overall assessment	Reference
Does validation include an adequate ongoing monitoring process that includes verification of processes and benchmarking?			122(i)(4)(ii)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Determine whether the organization conducts ongoing process verification on the risk rating and quantification processes to ensure proper implementation and operation, including whether		1. 2.	

• risk rating and quantification processes are used, monitored, and updated as designed. • correct data are used to categorize exposures, segment the portfolio, and quantify the risk parameters. • ongoing monitoring activities are conducted. 2. Evaluate the internal reports used by management to oversee and monitor the wholesale IRB system. 3. Assess the organization's benchmarking of its risk rating and quantification estimates. • Describe the benchmarking that the organization does, comparing results to both internal and external measures. • Does benchmarking of quantification involve a comparison of different choices made in each of the four stages of quantification? • Does the benchmarking of risk rating include a comparison of a chosen risk rating approach to alternate methodologies? • Does the benchmarking of low default segments and/or portfolios with limited defaults use methods that validate reliance on external data, pooled data, or factors based on proxies from "related portfolios" and is this justified, documented, and reasonable? • Does the organization take timely, appropriate actions when benchmarking reveals unexpected or inconsistent results in risk rating or quantification? • Is benchmarking conducted as described in the organization's documentation and consistent with supervisory expectations? Where there are shortfalls, inconsistencies, or unexpected results, have they been addressed?	3.

13.04	**Work program question**	**Overall assessment**	**Reference**
Does validation include an adequate outcomes analysis process that includes backtesting?			122(i)(4)(iii)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Determine whether the organization conducts backtesting exercises to ensure model performance and support model redevelopment. 2. Describe the statistical methods used to backtest the quantification process. 3. Determine whether the organization compares actual outcomes to expected ranges around the estimated values of the risk parameters for each rating grade. • Assess the organization's support for establishing those expected ranges and compare realized outcomes to predicted estimates (e.g., compare the actual long-run average default frequency for each rating grade with the PD assigned, the actual downturn conditioned loss rates experienced on defaulted exposures with the LGD estimates assigned, and downturn conditioned draw rates on defaulted exposures with the EAD estimates). 4. Determine whether the organization has established parameters around performance expectations (tolerance limits) and appropriate responses when actual and expected performance differ. 5. Assess whether performance analysis is at a detailed enough level to support analysis of cause factors for performance or non-performance. 6. Determine whether performance thresholds are appropriately considered and model improvement appropriately acted on to improve model accuracy. 7. Establish whether the organization's validation policy specifies the type and		1. 2. 3. 4. 5. 6. 7. 8.	

timing of remedial actions when backtesting tolerance limits are exceeded. 8. Assess whether backtesting is conducted as described in the organization's documentation and consistent with supervisory expectations. Where there are shortfalls or inconsistencies, have they been addressed?	

13.05	Work program question	Overall assessment	Reference
Is the organization's validation process either independent of the advanced systems' development, implementation, and operation, or subjected to an independent review of its adequacy and effectiveness?			122(i)(4)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Establish that validation activities were performed or reviewed and verified independently. • Identify the unit/position responsible for performing independent review or validation activities. 2. Have validations effectively challenged the model and/or process development? • Consider any internal or external independent reviews of validation activities. Are the reviews complete? • Evaluate the sufficiency of the testing and analysis performed to test the model development process and the modelers' support for the accuracy and reliability of the models. • Determine whether the depth of coverage is adequate. 3. Assess the process the organization uses to independently review the risk rating systems and parameter quantification processes to ensure that established policies and procedures are followed and are appropriately designed to provide reasonable assurance that the advanced approaches rule requirements are met. 4. Determine whether recommendations for corrective action have been adequately addressed. 5. Determine whether the results of the independent review or validation process are incorporated into the risk rating system and risk quantification process reviews.		1. 2. 3. 4. 5.	

13.06	Work program question	Overall assessment	Reference
Does the organization periodically stress test its wholesale risk rating and parameter quantification systems, including consideration of how economic cycles, especially downturns, affect risk-based capital requirements?			122(i)(6)
Review questions and procedures		**Supervisor comments (with references) by subcategory or portfolio, as appropriate**	
1. Determine whether the organization has well-documented stress testing policies, procedures, and practices that encompass key stress scenarios and describe • the stress testing process and the timetable for stress testing activities. • the documentation requirements for stress testing. • the assigned responsibilities. • the tests and analyses to be performed. 2. Determine the appropriateness of the stress testing conducted by the organization by comparing the results of the organization's stress testing to the organization's realized PD, LGD, EAD, and loss rates over an economic cycle. 3. Does the analysis include a range of plausible but severe scenarios? 4. Describe the scenarios analysis (historical, hypothetical, or model based) and whether this analysis is appropriate given the organization's risk profile.		1. 2. 3. 4. 5. 6. 7. 8.	

5. Does the stress test consider the effects of migration across segments? 6. Is the scope of the stress testing analysis broad and does it include all material wholesale portfolios? 7. Is the time horizon of the analysis consistent with the specifics of the scenario and long enough to measure the material effects of the scenario on key performance measures? 8. Determine whether the stress testing of the advanced systems utilizes stressed parameter estimates reasonably calibrated to simulate the effects of downturn conditions on the wholesale portfolios. • Do stress tests consider the impact of downturn conditions on expected default rates and assess the impact on capital requirements from such default rates? • Do stress tests consider the impact of downturn conditions on the severity of losses in the event of default, including the realization of collateral value, selling of distressed debt, and other loss limiting actions taken by the organization to mitigate LGD? • Do stress tests consider whether downturn conditions result in additional draw of unused portions of commitments, the degree to which the organization can limit such additional exposure, and generally how the exposure profile is affected by the stress scenario?	