

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM
DIVISION OF BANKING SUPERVISION AND REGULATION

Date: July 3, 2003
To: Board of Governors of the Federal Reserve System
From: Federal Reserve Staff¹
Subject: Implementation of the New Basel Capital Accord in the United States

ACTION REQUESTED: Board approval to issue for public comment three interagency documents relating to the implementation of the new Basel Capital Accord (the New Accord) in the United States: 1) an Advance Notice of Proposed Rulemaking (ANPR); 2) “Supervisory Guidance on Internal Ratings-Based Systems for Corporate Credit”; and 3) “Supervisory Guidance on Operational Risk Advanced Measurement Approaches for Regulatory Capital.” Staff also requests Board approval to continue to make non-substantive edits to the documents to accommodate further interagency discussions.

The latter two documents containing draft supervisory guidance are intended to serve as complementary material to the ANPR. They set forth supervisory expectations for banking organizations implementing the Advanced Internal Ratings-Based (A-IRB) approach for credit risk and the Advanced Measurement Approaches (AMA) for operational risk (together, the advanced approaches). If the Board and the other banking agencies approve this package, the documents will be submitted to the *Federal Register* for publication. Current drafts of each of the documents are attached.²

¹ Rich Spillenkothen, Roger Cole, Steve Hoffman, Barbara Bouchard, Division of Banking Supervision and Regulation; Ed Ettin and David Jones, Division of Research and Statistics; Mark Van Der Weide, Legal Division; Darryll Hendricks, Federal Reserve Bank of New York.

² Staff notes that the other banking agencies will not be finished with their internal review procedures of the ANPR until next week. In the event that substantive issues come to light, staff will circulate to the Board any revised sections of the ANPR as soon as possible.

BACKGROUND: Over the past several years, the Basel Committee on Banking Supervision (BSC) has been developing a new international agreement to enhance the Basel Accord agreed to in 1988. The Basel Accord sets forth the framework for capital adequacy standards for large, internationally active banks and serves as a basis for the risk-based capital adequacy standards now in place for all U.S. banks and bank holding companies.

As part of the New Accord development process, the BSC released a third Consultative Paper (CP 3) in April 2003, with public comments due by July 31, 2003. The New Accord is intended to strengthen the regulatory capital framework for large internationally active banking organizations through minimum capital requirements that are more sensitive to an institution's risk profile and that reinforce incentives for strong risk management. The framework is based upon modern risk measurement and management methodologies, robust supervisory review and capital adequacy assessment, and enhanced disclosure requirements.

The U.S. Federal banking agencies are coordinating closely their efforts to implement the New Accord. Together, they have identified a number of steps they must take and prerequisites that supervised organizations must meet before the fundamental changes implicit in the New Accord can be adopted for depository institutions in the United States. A first step is issuing the attached ANPR and supervisory guidance for public comment, followed by a full analysis of all public comments received on these documents, as well as on CP 3. Based on the comments, the agencies would develop a unified U.S. position on further appropriate modifications to the New Accord.

The New Accord agreed by the BSC would serve as the basis for the next step in our domestic process, namely developing for public comment a Notice of Proposed Rulemaking (NPR) in 2004. As with prior Basel capital agreements, we have made clear to the BSC that adoption of a final capital rule in the United States would be contingent on the results of the

comments received on the NPR, as well as other quantitative analyses of the potential impact of the proposed framework. Further, based on subsequent impact reviews and other information developed in future years, the agencies will continue to reserve the right to revise the final U.S. capital rule.

The ANPR presents an overview of the New Accord as well as details of the proposed U.S. implementation of the advanced approaches to determining minimum capital requirements. Specifically, the ANPR:

- Outlines the scope of application for the advanced approaches; i.e., large, internationally active banking organizations that meet certain size or foreign exposure thresholds (core banks) would be required to meet rigorous infrastructure requirements and to implement the advanced approaches. Other institutions could choose to apply voluntarily the advanced approaches (opt-in banks), after meeting the same infrastructure requirements that core banks must satisfy. Institutions not applying the advanced approaches (general banks) would continue to apply the agencies' existing risk-based capital rules.
- Describes, in detail, the A-IRB approach to credit risk and its application to particular portfolios of credit exposures (wholesale, retail, and equity), including minimum qualifying criteria that an institution would have to meet.
- Describes the A-IRB approach to credit risk mitigation.
- Describes the A-IRB approach for securitization exposures.
- Provides guidance and qualifying criteria for the AMA to operational risk.
- Outlines the proposed approaches for supervisory review and disclosure (pillars 2 and 3 in the New Accord).
- Raises certain competitive considerations.

To assist the agencies in eliciting useful comments on particular issues, the ANPR contains a series of specific questions in appropriate sections of the document.

High standards and clear guidance for implementing and validating systems are critical to the success of both the A-IRB framework and the AMA. These are necessary because the advanced approaches would rely on an banking organization's own internal risk measurement capabilities for estimates of important risk factors that would be used in the calculation of its regulatory capital requirement.

The second document – “Supervisory Guidance on Internal Ratings-Based Systems for Corporate Credit” – is intended to set forth the agencies' expectations for banking organizations that use the A-IRB framework for their corporate credit. The guidance sets forth A-IRB supervisory standards, many of which are principle-based so as to allow institutions to implement the framework in a flexible manner. Other standards are more specific in order to address prudential concerns or consistency issues. It should be noted that the draft supervisory guidance is not intended to dictate the precise manner in which institutions must meet supervisory expectations or to provide a technical roadmap for developing such a framework. Rather, it describes supervisory expectations regarding the four principal, interdependent components of an acceptable A-IRB system, which are:

- a system that assigns ratings and validates the accuracy of those ratings;
- a quantification process that translates risk ratings into A-IRB parameters;
- a data maintenance system that supports the A-IRB system; and
- oversight and control mechanisms that ensure the system is functioning as intended and generating accurate ratings.

While supervisors would evaluate banking organizations' compliance with the A-IRB supervisory standards for each of these four components, the simple evaluation of compliance

with each of the standards individually would not be sufficient to determine an institution's overall compliance. A supervisory evaluation also would have to be made of the adequacy and effectiveness of the interaction of each of the components with one another to achieve the overall objective of the accurate measurement of risk.

The final document is entitled "Supervisory Guidance on Operational Risk Advanced Measurement Approaches for Regulatory Capital." This guidance sets forth supervisory expectations for banking organizations that would use the AMA for calculating operational risk exposure under the proposed capital framework. The AMA requires each banking organization to use its own internal measurement systems to calculate its exposure to operational risk, taking into account operational risk mitigants such as insurance and the quality of controls. Accordingly, the supervisory guidance is designed to provide assurance that banking organizations have developed credible infrastructures for the governance, measurement, monitoring, and control of operational risk.

Staff is recommending that the Board approve issuance of this package for public comment. If approved by the U.S. banking agencies, the ANPR and the two supervisory guidance documents will be submitted to the *Federal Register* for simultaneous publication, and a 90-day comment period will be provided.

Attachments

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ATTACHMENT 1

DEPARTMENT OF THE TREASURY
Office of the Comptroller of the Currency
12 CFR Part 3
[Docket No. 03-XX]
RIN Number 1557-AB14

FEDERAL RESERVE SYSTEM
12 CFR Parts 208 and 225
[Regulations H and Y; Docket No.]

FEDERAL DEPOSIT INSURANCE CORPORATION
12 CFR Part 325
RIN

DEPARTMENT OF THE TREASURY
Office of Thrift Supervision
12 CFR Part 567
[Docket No.]
RIN

Risk-Based Capital Guidelines; Implementation of New Basel Capital Accord

AGENCIES: Office of the Comptroller of the Currency, Treasury; Board of Governors of the Federal Reserve System; Federal Deposit Insurance Corporation; and Office of Thrift Supervision, Treasury.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: The Office of the Comptroller of the Currency (OCC), the Board of Governors of the Federal Reserve System (Board), the Federal Deposit Insurance Corporation (FDIC), and the Office of Thrift Supervision (OTS) (collectively, the Agencies) are setting forth for industry comment their current views on a proposed framework for implementing the New Basel Capital

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Accord in the United States. In particular, this advance notice of proposed rulemaking (ANPR) describes significant elements of the Advanced Internal Ratings-Based approach for credit risk and the Advanced Measurement Approaches for operational risk (together, the advanced approaches). The ANPR specifies criteria that would be used to determine banking organizations that would be required to use the advanced approaches, subject to meeting certain qualifying criteria, supervisory standards, and disclosure requirements. Other banking organizations that meet the criteria, standards, and requirements also would be eligible to use the advanced approaches. Under the advanced approaches, banking organizations would use internal estimates of certain risk components as key inputs in the determination of their regulatory capital requirements.

DATES: Comments must be received no later than [INSERT DATE 90 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Comments should be directed to:

OCC: Written comments may be submitted electronically to regs.comments@occ.treas.gov or by mail to Docket No. 03- , Communications Division, Third Floor, Office of the Comptroller of the Currency, 250 E Street, SW, Washington D.C., 20219. Comments will be available for inspection and photocopying at that address.

Board: Comments should refer to Docket No. R- and may be mailed to Ms. Jennifer J. Johnson, Secretary, Board of Governors of the Federal Reserve System, 20th Street and Constitution Avenue, NW, Washington, D.C., 20551. However, because paper mail in the Washington area and at the Board of Governors is subject to delay, please consider submitted

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your comments by e:mail to regs.comments@federalreserve.gov, or faxing them to the Office of the Secretary at 202-452-3819 or 202/452-3102. Members of the public may inspect comments in Room MP-500 of the Martin Building between 9:00 a.m. and 5:00 p.m. weekdays pursuant to § 261.12, except as provided by § 261.14 of the Board's Rules Regarding Availability of Information, 12 CFR 261.12 and 261.14.

FDIC: Written comments should be addressed to Robert E. Feldman, Executive Secretary, Attention: Comments, Federal Deposit Insurance Corporation, 550 17th Street, NW, Washington, D.C., 20429. Commenters are encouraged to submit comments by facsimile transmission to (202) 898-3838 or by electronic mail to Comments@FDIC.gov. Comments also may be hand-delivered to the guard station at the rear of the 550 17th Street Building (located on F Street) on business days between 8:30 a.m. and 5 p.m. Comments may be inspected and photocopied at the FDIC's Public Information Center, Room 100, 801 17th Street, NW, Washington, D.C. between 9 a.m. and 4:30 p.m. on business days.

OTS: Send comments to Regulation Comments, Chief Counsel's Office, Office of Thrift Supervision, 1700 G Street, NW, Washington, D.C. 20552, Attention 2003- . Delivery: Hand deliver comments to the Guard's desk, east Lobby entrance, 1700 G Street, NW, from 9:00 a.m. to 4:00 p.m. on business days, Attention: Regulation Comments, Chief Counsel's Office, Attention: No 2003- . Facsimiles: Send facsimile transmissions to FAX Number (202) 906-6518, Attention No: 2003- . E:Mail: Send e-mails to regs.comments@ots.treas.gov, Attention: No. 2003- and include your name and telephone number. Due to temporary disruptions in mail service in the Washington, D.C. area, commenters are encouraged to send comments by fax or e-mail, if possible.

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FOR FURTHER INFORMATION CONTACT:

OCC: Roger Tufts, Senior Economic Advisor (202-874-4925 or roger.tufts@occ.treas.gov), Tanya Smith, Senior International Advisor (202-874-4735 or tanya.smith@occ.treas.gov), or Ron Shimabukuro, Counsel (202/874-5090 or ron.shimabukuro@occ.treas.gov).

Board: Barbara Bouchard, Assistant Director (202/452-3072 or barbara.bouchard@frb.gov), David Adkins, Supervisory Financial Analyst (202/452-5259 or david.adkins@frb.gov), Division of Banking Supervision and Regulation, or Mark Van Der Weide, Counsel (202/452-2263 or mark.vanderweide@frb.gov), Legal Division. For users of Telecommunications Device for the Deaf (“TDD”) only, contact 202/263-4869.

FDIC: Keith Ligon, Chief (202/898-3618 or kligon@fdic.gov), Jason Cave, Chief (202/898-3548 or jcave@fdic.gov), Division of Supervision and Consumer Protection, or Michael Phillips, Counsel (202/898-3581 or mphillips@fdic.gov).

OTS: Michael D. Solomon, Senior Program Manager for Capital Policy (202/906-5654); David W. Riley, Project Manager (202/906-6669), Supervision Policy; or Teresa A. Scott, Counsel (Banking and Finance) (202/906-6478), Regulations and Legislation Division, Office of the Chief Counsel, Office of Thrift Supervision, 1700 G Street, NW, Washington, D.C. 20552.

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I. Executive Summary

A. Introduction

In the United States, banks, thrifts, and bank holding companies (banking organizations or institutions) are subject to minimum regulatory capital requirements. Specifically, U.S. banking organizations must maintain a minimum leverage ratio and two minimum risk-based ratios.¹ The current U.S. risk-based capital requirements are based on an internationally agreed framework for capital measurement that was developed by the Basel Committee on Banking Supervision (Basel Supervisors Committee or BSC) and endorsed by the G-10 Governors in 1988.² The international framework (1988 Accord) accomplished several important objectives. It strengthened capital levels at large, internationally active banks and fostered international consistency and coordination. The 1988 Accord also reduced disincentives for banks to hold liquid, low-risk assets. Moreover, by requiring banks to hold capital against off-balance-sheet exposures, the 1988 Accord represented a significant step forward for regulatory capital measurement.

While the 1988 Accord has been a stabilizing force for the international banking system, the world financial system has become increasingly more complex over the past fifteen years. The BSC has been working for several years to develop a new regulatory capital framework that recognizes new developments in financial products, incorporates advances in risk measurement

¹ The leverage ratio measures regulatory capital as a percentage of total on-balance-sheet assets as reported in accordance with generally accepted accounting principles (GAAP) (with certain adjustments). The risk-based ratios measure regulatory capital as a percentage of both on- and off-balance-sheet credit exposures with some gross differentiation based on perceived credit risk. The Agencies' capital rules may be found at 12 CFR Part 3 (OCC), 12 CFR Parts 208 and 225 (Board), 12 CFR Part 325 (FDIC), and 12 CFR Part 567 (OTS).

² The BSC was established in 1974 by the central-bank governors of the Group of Ten (G-10) countries. Countries are represented on the BSC by their central bank and also by authorities with banking supervisory responsibilities. Current member countries are Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The 1988 Accord is described in a document entitled "International Convergence of Capital Measurement and Capital Standards." This document and other documents issued by the BSC are available through the Bank for International Settlements website at www.bis.org.

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and management practices, and more precisely assesses capital charges in relation to risk. On April 29, 2003, the BSC released for public consultation a document entitled “The New Basel Capital Accord” (New Accord) that sets forth proposed revisions to the 1988 Accord. The BSC will accept industry comment on the New Accord through July 31, 2003 and expects to issue a final revised Accord by the end of 2003. The BSC expects that the New Accord would have an effective date for implementation of December 31, 2006.

Accordingly, the Agencies are soliciting comment on all aspects of this ANPR, which is based on certain proposals in the New Accord. Comments will assist the Agencies in reaching a determination on a number of issues related to how the New Accord would be proposed to be implemented in the United States. In addition, in light of the public comments submitted on the ANPR, the Agencies will seek appropriate modifications to the New Accord.

B. Overview of the New Accord

The New Accord encompasses three pillars: minimum regulatory capital requirements; supervisory review; and market discipline. Under the first pillar, a banking organization must calculate capital requirements for exposure to both credit risk and operational risk (and market risk for institutions with significant trading activity). The New Accord does not change the definition of what qualifies as regulatory capital, the minimum risk-based capital ratio, or the methodology for determining capital charges for market risk. The New Accord provides several methodologies for determining capital requirements for both credit and operational risk. For credit risk there are two general approaches: the standardized approach (essentially a package of modifications to the 1988 Accord) and the internal ratings-based (IRB) approach (which uses an institution’s internal estimates of key risk drivers to derive capital requirements). Within the IRB approach there is a foundation methodology, in which certain risk component inputs are

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provided by supervisors and others are supplied by the institutions, and an advanced methodology (A-IRB), where institutions themselves provide more risk inputs.

The New Accord provides three methodologies for determining capital requirements for operational risk: the basic indicator approach, the standardized approach, and the advanced measurement approaches (AMA). Under the first two methodologies, capital requirements for operational risk are fixed percentages of specified risk measures (for example, gross income). The AMA provides the flexibility for an institution to develop its own individualized approach for measuring operational risk, subject to supervisory oversight.

The second pillar of the New Accord, supervisory review, highlights the need for banking organizations to assess their capital adequacy positions relative to risk (rather than solely to the minimum capital requirement), and the need for supervisors to review and take appropriate actions in response to those assessments. The third pillar of the New Accord imposes public disclosure requirements on institutions that are intended to allow market participants to assess key information about an institution's risk profile and its associated level of capital.

The Agencies do not expect the implementation of the New Accord to result in a significant decrease in aggregate capital requirements for the U.S. banking system. Individual banking organizations may, however, face increases or decreases in their minimum risk-based capital requirements because the New Accord is more risk sensitive than the 1988 Accord and the general risk-based capital rules. The Agencies will continue to analyze the potential impact of the New Accord on both systemic and individual capital levels.

C. Overview of U.S. Implementation

The Agencies believe that the advanced risk and capital measurement methodologies of the New Accord are the most appropriate approaches for large, internationally active banking

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organizations. As a result, large, internationally active banking organizations in the United States would be required to use the A-IRB approach to credit risk and the AMA to operational risk. The Agencies are proposing to identify three types of banking organizations: institutions subject to the advanced approaches on a mandatory basis (core banks); institutions not subject to the advanced approaches on a mandatory basis, but that choose voluntarily to apply those approaches (opt-in banks); and institutions that are not mandatorily subject to and do not apply the advanced approaches (general banks). Core banks would be those with total banking assets of \$250 billion or more or total on-balance-sheet foreign exposure of \$10 billion or more. Both core banks and opt-in banks (advanced approach banks) would be required to meet certain infrastructure requirements (including complying with specified supervisory standards for credit risk and operational risk) and make specified public disclosures before being able to use the advanced approaches for risk-based regulatory capital calculation purposes.³

General banks would continue to apply the Agencies' existing risk-based capital rules (general risk-based capital rules). Because the general risk-based capital rules include a buffer for risks not easily quantified (for example, operational risk and concentration risk), general banks would not be subject to an additional direct capital charge for operational risk.

Under this proposal, some U.S. banking organizations would use the advanced approaches while others would apply the general risk-based capital rules. As a result, the United States would have a bifurcated regulatory capital framework. That is, U.S. capital rules would provide two distinct methodologies for institutions to calculate risk-weighted assets (the denominator of the risk-based capital ratios). Under the proposed framework, all U.S. institutions would continue to calculate regulatory capital, the numerator of the risk-based capital

³ The Agencies continue to reserve the right to require higher minimum capital levels for individual institutions, on a case-by-case basis, if necessary to address particular circumstances.

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ratios, as they do now. Importantly, U.S. banking organizations would continue to be subject to a leverage ratio requirement under existing regulations, and Prompt Corrective Action (PCA) legislation and implementing regulations would remain in effect.⁴ It is recognized that in some cases, under the proposed framework, the leverage ratio would serve as the most binding regulatory constraint.

Implementing the capital framework described in this ANPR would raise a number of significant practical and conceptual issues about the role of economic capital calculations relative to regulatory capital requirements. The capital formulas described in this proposal, as well as the economic capital models used by banking organizations, assume the ability to precisely assign probabilities to future credit and operational losses that might occur. The term "economic capital" is often used to refer to the amount of capital that should be allocated to an activity according to the results of such an exercise. For example, a banking organization might compute the amount of income, reserves, and capital that it would need to cover the 99.9th percentile of possible credit losses associated with a given type of lending. The desired degree of certainty of covering losses is related to several factors including, for example, the banking organization's target credit rating. The higher the loss percentile the institution wishes to provide protection against, the less likely the capital held would be insufficient, and the higher the credit rating.

While the Agencies intend to move to a framework where regulatory capital is more closely aligned to the economic capital substance of risk, the Agencies do not intend to place sole reliance on the results of economic capital calculations for purposes of computing minimum regulatory capital requirements. Banking organizations face other risks than credit and operational risks, and the assumed loss distributions underlying banking organization's economic

⁴ Thus, for example, to be in the well-capitalized PCA category a bank must have at least a 10 percent total risk-based capital ratio, a 6 percent Tier 1 risk-based capital ratio, and a 5 percent leverage ratio. The other PCA

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capital calculations are subject to the risk of error. Consequently, the Agencies continue to view the leverage ratio tripwires contained in existing PCA regulations as important components of the regulatory capital framework.

The A-IRB Approach for Credit Risk

Under the A-IRB approach for credit risk, an institution's internal assessment of key risk drivers for a particular exposure (or pool of exposures) would serve as the primary inputs in the calculation of the institution's minimum risk-based capital requirements. Formulas, or risk weight functions, specified by supervisors would use the banking organization's estimated inputs to derive a specific dollar amount capital requirement for each exposure (or pool of exposures). This dollar capital requirement would be converted into a risk-weighted assets equivalent by multiplying the dollar amount of the capital requirement by 12.5 – the reciprocal of the 8 percent minimum capital requirement. Generally, banking organizations using the A-IRB approach would assign assets and off-balance-sheet exposures into one of three portfolios: wholesale (corporate, interbank, and sovereign), retail (residential mortgages, qualifying revolving, and other), and equities. There also would be specific treatments for securitization exposures and purchased receivables. Certain assets that do not constitute a direct credit exposure (for example, premises, equipment, or mortgage servicing rights) would continue to be subject to the general risk-based capital rules and risk weighted at 100 percent. A brief overview of each A-IRB portfolio follows.

Wholesale (corporate, interbank, and sovereign) exposures

Wholesale credit exposures comprise three types of exposures: corporate, interbank, and sovereign. Generally, the meaning of interbank and sovereign would be consistent with the general risk-based capital rules. Sovereign exposures are those to central governments, central

categories also would not change.

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banks, and certain other public-sector entities (PSEs); interbank exposures are primarily exposures to banks and securities firms; and corporate exposures are exposures to private-sector companies. Within the wholesale exposure category, in addition to the treatment for general corporate lending, there would be four sub-categories of specialized lending (SL). These are project finance (PF), object finance (OF), commodities finance (CF), and commercial real estate (CRE). CRE is further subdivided into low asset correlation CRE, and high-volatility CRE (HVCRE).

For each wholesale exposure, an institution would assign four quantitative risk drivers (inputs): (1) probability of default (PD), which measures the likelihood that the borrower will default over a given time horizon; (2) loss given default (LGD), which measures the proportion of the exposure that will be lost if a default occurs; (3) exposure at default (EAD), which is the estimated amount owed to the institution at the time of default; and (4) maturity (M), which measures the remaining economic maturity of the exposure. Institutions generally would be able to take into account credit risk mitigation techniques (CRM), such as collateral and guarantees (subject to certain criteria), by adjusting their estimates for PD or LGD. The wholesale A-IRB risk weight function would use all four risk inputs to produce a specific capital requirement for each wholesale exposure. There would be a separate, more conservative risk weight function for certain acquisition, development, and construction loans (ADC) in the HVCRE category.

Retail exposures

Within the retail category three distinct risk weight functions are proposed for three product areas that exhibit different historical loss experiences and different asset correlations.⁵ The three retail sub-categories would be: (1) exposures secured by residential mortgages and

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related exposures; (2) qualifying revolving exposures (QRE); and (3) other retail exposures. QRE would include unsecured revolving credits (such as credit cards and overdraft lines) and other retail would include most other types of exposures to individuals, as well as certain exposures to small businesses. The key inputs to the three retail risk weight functions would be a banking organization's estimates of PD, LGD, and EAD. There would be no explicit M component to the retail A-IRB risk weight functions. Unlike wholesale exposures, for retail exposures, an institution would assign a common set of inputs (PD, LGD, and EAD) to predetermined pools of exposures, which are typically referred to as segments, rather than for individual exposures.⁶ The inputs would be used in the risk weight functions to produce a capital charge for the associated pool of exposures.

Equity exposures

Banking organizations would use a market-based internal model for determining capital requirements for equity exposures in the banking book. The internal model approach would assess capital based on an estimate of loss under extreme market conditions. Some equity exposures, such as holdings in entities whose debt obligations qualify for a zero percent risk weight, would continue to receive a zero percent risk weight under the A-IRB approach to equities. Certain other equity exposures, such as those made through a small business investment company (SBIC) under the Small Business Investment Act or a community and economic development entity (CEDE), generally would continue to be risk weighted at 100 percent under the A-IRB approach to equities. Banking organizations that are subject to the Agencies' market risk capital rules would continue to apply those rules to assess capital against

⁵ Asset correlation is a measure of the tendency for the financial condition of a borrower in a banking organization's portfolio to improve or degrade at the same time as the financial condition of other borrowers in the portfolio improve or degrade.

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equity positions held in the trading book.⁷ Banking organizations that are not subject to the market risk capital rules would treat equity positions in the trading account as if they were in the banking book.

Securitization exposures

Under the A-IRB treatment for securitization exposures, a banking organization that originates a securitization would first calculate the amount of capital it would have to hold against the pool as if it were not securitized (referred to as KIRB). If an originating banking organization retains a position in a securitization that obligates the banking organization to absorb losses up to or less than KIRB, the banking organization would deduct the retained position from capital as is currently required under the general risk-based capital rules. The general risk-based capital rules require a dollar-for-dollar risk-based capital deduction for certain residual interests retained by originating banking organizations in asset securitization transactions regardless of amount. The A-IRB framework would no longer require automatic deduction of residual interests as currently defined. The amount to be deducted would be capped at KIRB for most exposures except those specified in the securitization section. For a position in excess of the KIRB threshold, the banking organization would use an external-ratings-based approach (if the position has been rated by an external rating agency or a rating can be inferred) or a supervisory formula to determine the capital charge for the position.

Non-originating banking organizations that invest in a securitization exposure generally would use an external-ratings-based approach (if the exposure has been rated by an external

⁶ When the PD, LGD, and EAD parameters are assigned separately to individual exposures, it may be referred to as a “bottom-up” approach. When those parameters are assigned to predetermined sets of exposures (pools or segments), it may be referred to as a “top-down” approach.

⁷ The market risk capital rules were implemented by the banking agencies in 1996. The market risk capital rules apply to banking organizations whose trading activity (on a consolidated worldwide basis) equals 10 percent or more of total assets, or \$1 billion or more. The market risk capital rules are found at 12 CFR Part 3, Appendix B

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rating agency or a rating can be inferred). For unrated liquidity facilities that banking organizations provide to securitizations, capital requirements would be based on several factors, including the asset quality of the underlying pool and the degree to which other credit enhancements are available. These factors would be used as inputs to a supervisory formula. Under the A-IRB approach to securitization exposures, banking organizations also would be required in some cases to hold regulatory capital against securitizations of revolving exposures that have early amortization features.

Purchased receivables

Purchased receivables, that is, those that are purchased from another institution either through a one-off transaction or as part of an ongoing program, would be subject to a two-part capital charge: one part is for the credit risk arising from the underlying receivables and the second part is for dilution risk. Dilution risk refers to the possibility that contractual amounts payable by the underlying obligors on the receivables may be reduced through future cash payments or other credits to the accounts made by the seller of the receivables. The framework for determining the capital charge for credit risk permits a purchasing organization to use a top-down (pool) approach to estimating PDs and LGDs when the purchasing organization is unable to assign an internal risk rating to each of the purchased accounts. The capital charge for dilution risk would be calculated using the wholesale risk weight function with some additional specified risk inputs.

The AMA for Operational Risk

Under the A-IRB approach, capital charges for credit risk would be directly calibrated solely for such risk and, thus, unlike the 1988 Accord, would not implicitly include a charge for

(OCC), 12 CFR Parts 208 and 225, Appendix E (Board), and 12 CFR Part 325, Appendix C (FDIC). The OTS, to date, has not adopted the market risk capital rules.

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operational risk. As a result, the Agencies are proposing that banking organizations operating under A-IRB also would have to hold capital for exposure to operational risk. The Agencies are proposing to define operational risk as the risk of losses resulting from inadequate or failed internal processes, people, and systems, or external events. Under the AMA, each banking organization would be able to use its own methodology for assessing exposure to operational risk provided the methodology is comprehensive and results in a capital charge that is reflective of the operational risk experience of the organization. The operational risk exposure would be multiplied by 12.5 to determine a risk-weighted assets equivalent, which would be added to the comparable amounts for credit and market risk in the denominator of the risk-based capital ratios. The Agencies will be working closely with institutions over the next few years as operational risk measurement and management techniques continue to evolve.

Other Considerations

Boundary issues

With the introduction of an explicit regulatory capital charge for operational risk, an issue arises about the proper treatment of losses that can be attributed to more than one risk factor. For example, where a loan defaults and the banking organization discovers that the collateral for the loan was not properly secured, the banking organization's resulting losses would be attributable to both credit and operational risk. The Agencies recognize that these types of boundary issues are important and have significant implications for how banking organizations would compile loss data sets and compute the regulatory capital charge.

The Agencies are proposing the following standard to govern the boundary between credit and operational risk: A loss event that has characteristics of credit risk would be incorporated into the credit risk calculations for regulatory capital. This would include credit-

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related fraud losses. Thus, in the above example, the loss from the loan would be attributed to credit risk for regulatory capital purposes. This separation between credit and operational risk is supported by current U.S. accounting standards for the treatment of credit risks.

With regard to the boundary between the trading book and the banking book, for institutions subject to the market risk rules, positions currently subject to those rules include all positions held in the trading account consistent with GAAP. The New Accord proposed additional criteria for positions includable in the trading book for purposes of market risk capital requirements. The Agencies encourage comment on these additional criteria and whether the Agencies should consider adopting such criteria (in addition to the GAAP criteria) in defining the trading book under the Agencies' market risk capital rules. The Agencies are seeking comment on the proposed treatment of the boundaries between credit, operational, and market risk.

Supervisory considerations

The advanced approaches introduce greater complexity to the regulatory capital framework and would require a high level of sophistication in the banking organizations that implement the advanced approaches. As a result, the Agencies propose to require core and opt-in banks to meet certain infrastructure requirements and comply with specific supervisory standards for credit risk and supervisory criteria for operational risk. In addition, banking organizations would have to satisfy a set of public disclosure requirements as a prerequisite for approval to using the advanced approaches. Supervisory guidance for each credit risk portfolio type, as well as for operational risk is being developed to ensure a sufficient degree of consistency within the supervisory framework, while also recognizing that internal systems will differ between banking organizations. The goal is to establish a supervisory framework within

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which all institutions must develop their internal systems, leaving exact details to each institution. In the case of operational risk in particular, the Agencies recognize that measurement methodologies are still evolving and flexibility is needed.

It is important to note that supervisors would not look at compliance with requirements, or standards alone. Supervisors also would evaluate whether the components of an institution's advanced approaches are consistent with the overall objective of sound risk management and measurement. An institution would have to appropriately use the advanced approaches across all material business lines, portfolios, and geographic regions. Exposures in non-significant business units as well as asset classes that are immaterial in terms of size and perceived risk profile may be exempted from the advanced approaches with supervisory approval. These immaterial portfolios would be subject to the general risk-based capital rules.

Proposed supervisory guidance for corporate credit exposures and for operational risk is provided separately from this ANPR in today's Federal Register. The draft supervisory guidance for corporate credit exposures is entitled "Supervisory Guidance on Internal-Ratings-Based Systems for Corporate Credit." The guidance includes specified supervisory standards that an institution's internal rating system for corporate exposures would have to satisfy for the institution to be eligible to use the A-IRB for credit risk. The draft operational risk guidance is entitled "Supervisory Guidance on Operational Risk Advanced Measurement Approaches for Regulatory Capital." The operational risk guidance includes identified supervisory standards for an institution's AMA framework for operational risk. The Agencies encourage commenters to review and comment on the draft guidance pieces in conjunction with this ANPR. The Agencies intend to issue for public comment supervisory guidance on retail credit exposures, equity exposures, and securitization exposures over the next several months.

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Supervisory review

As mentioned above, the second pillar of the New Accord focuses on supervisory review to ensure that an institution holds sufficient capital given its risk profile. The concepts of Pillar 2 are not new to U.S. banking organizations. U.S. institutions already are required to hold capital sufficient to meet their risk profiles, and supervisors may require that an institution hold more capital if its current levels are deficient or some element of its business practices suggest the need for more capital. The Agencies also have the right to intervene when capital levels fall to an unacceptable level. Given these long-standing elements of the U.S. supervisory framework, the Agencies are not proposing to introduce specific requirements or guidelines to implement Pillar 2. Instead, existing guidance, rules, and regulations would continue to be enforced and supplemented as necessary as part of this proposed new regulatory capital framework. However, all institutions operating under the advanced approaches would be expected by supervisors to address specific assumptions embedded in the advanced approaches (such as diversification in credit portfolios), and would be evaluated for their ability to account for deviations from the underlying assumptions in their own portfolios.

Disclosure

An integral part of the advanced approaches is enhanced public disclosure practices, and thereby, improved transparency. Under the Agencies' proposal, specific disclosure requirements would be applicable to all institutions using the advanced approaches. These disclosure requirements would encompass capital, credit risk, credit risk mitigation, securitization, market risk, operational risk, and interest rate risk in the banking book.

D. Competitive Considerations

It is essential that the Agencies gain a full appreciation of the possible competitive equity concerns that may be presented by the establishment of a new capital framework. The creation of a bifurcated capital framework in the United States -- one set of capital standards applicable to large, internationally active banking organizations (and those that choose to apply the advanced approaches), and another set of standards applicable to all other institutions -- has created concerns among some parties about the potential impact on competitive equity between the two sets of banking organizations. Similarly, differences in supervisory application of the advanced approaches (both within the United States and abroad) among large, internationally active institutions may pose competitive equity issues among such institutions.

The New Accord relies upon compliance with certain minimum operational and supervisory requirements to promote consistent interpretation and uniformity in application of the advanced approaches. Nevertheless, independent supervisory judgment will be applied on a case-by-case basis. These processes, albeit subject to detailed and explicit supervisory guidance, contain an inherent amount of subjectivity and must be assessed by supervisors on an ongoing basis. This supervisory assessment of the internal processes and controls leading to an institution's internal ratings must maintain the high level of internal risk measurement and management processes contemplated in this ANPR.

The BSC's Accord Implementation Group (AIG), on which the Agencies play an active role, will seek to ensure that all jurisdictions will uniformly apply the same high qualitative and quantitative standards to internationally active banking institutions. However, to the extent that different supervisory regimes implement these standards differently, there may be competitive dislocations. One concern is that the U.S. supervisory regime will impose greater scrutiny in its

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implementation standards, particularly given the extensive on-site presence of bank examiners in the United States.

Quite distinct from the need for a level playing field among internationally active institutions are the competitive concerns of those institutions that do not elect to adopt or may not qualify for the advanced approaches. Some banking organizations have expressed concerns that small or regional banks would become more likely to be acquired by larger organizations seeking to lever capital efficiencies. There also is a qualitative concern about the impact of being considered a “second tier” institution (one that does not implement the advanced approaches) by the market, rating agencies, or sophisticated customers such as government or municipal depositors and borrowers. Finally, there is the question of what, if any, competitive distortions might be introduced by differences in regulatory capital minimums for loans or securities with otherwise similar risk characteristics, and the extent to which such distortions may be mitigated in an environment in which well-managed banking organizations continue to hold excess capital.⁸

Because the advanced framework in the ANPR is more risk-sensitive than the 1988 Accord and the general risk-based capital rules, banking organizations under the advanced approaches would face increases in their minimum risk-based capital charges on some assets and decreases on others. The results of a Quantitative Impact Study (QIS3) the BSC conducted in late 2002 indicated the potential for the advanced approaches described in this document to produce significant changes in risk-based capital requirements for specific activities; the results

⁸ The Agencies note that under the general risk-based capital rules some institutions currently are able to hold less capital than others on some types of assets (for example, through innovative financing structures or use of credit risk mitigation techniques). In addition, some institutions may hold lower amounts of capital because the market perceives them as highly diversified, while others hold higher amounts of capital because of concentrations of credit risk or other factors.

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also varied on an institution-by-institution basis. The results of QIS3 can be found at www.bis.org and some references to various results are noted at pertinent places in this ANPR.

The Agencies do not believe the results of QIS3 are sufficiently reliable to form the basis of a competitive impact analysis, both because the inputs to the study were provided on a best-efforts basis and because the proposals in this ANPR are in some cases different than those that formed the basis of QIS3. The Agencies are nevertheless interested in views on how the changes in regulatory capital (for the total of credit and operational risk) of the magnitude described in QIS3, if such changes were in fact realized, would affect the competitive landscape for domestic banking organizations.

The Agencies plan to conduct at least one more QIS, and potentially other economic impact analyses, to better understand the potential impact of the proposed framework on the capital requirements for individual U.S. banking organizations and U.S. banking organizations as a whole. This may impact the Agencies' further proposals through recalibrating the A-IRB risk weight formulas and making other modifications to the proposed approaches if the capital requirements do not seem consistent with the overall risk profiles of banking organizations or safe and sound banking practices.

If competitive effects of the New Accord are determined to be significant, the Agencies would need to consider potential ways to address those effects while continuing to seek to achieve the objectives of the current proposal. Alternatives could potentially include modifications to the proposed approaches, as well as fundamentally different approaches. The Agencies recognize that an optimal capital system must strike a balance between the objectives of simplicity and regulatory consistency across banking organizations on the one hand, and the degree of risk sensitivity of the regulation on the other. There are many criteria that must be

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evaluated in achieving this balance including the resulting incentives for improving risk measurement and management practices, the ease of supervisory and regulatory enforcement, the degree to which the overall level of regulatory capital in the banking system is broadly preserved, and the effects on domestic and international competition. The Agencies are interested in commenters' views on alternatives to the advanced approaches that could achieve this balance, and in particular on alternatives that could do so without a bifurcated approach.⁹

The Agencies are committed to investigate the full scope of possible competitive impact and welcome all comments in this regard. Some questions are suggested below that may serve to focus commenters' general reactions. More specific questions also are suggested throughout the ANPR. These questions should not be viewed as limiting the Agencies' areas of interest or commenters' submissions on the proposals. The Agencies encourage commenters to provide supporting data and analysis, if available.

What are commenters' views on the relative pros and cons of a bifurcated regulatory framework versus a single regulatory framework? Would a bifurcated approach lead to an increase in industry consolidation? Why or why not? What are the competitive implications for community and mid-size regional banks? Would institutions outside of the core group be compelled for competitive reasons to opt-in to the advanced approaches? Under what circumstances might this occur and what are the implications? What are the competitive implications of continuing to operate under a regulatory capital framework that is not risk sensitive?

If regulatory minimum capital requirements declined under the advanced approaches, would the dollar amount of capital these banking organizations hold also be expected to decline? To the extent that advanced approach institutions have lower capital charges on certain assets, how probable and significant are concerns that those institutions would realize competitive benefits in terms of pricing credit, enhanced returns on equity, and potentially higher risk-based capital ratios? To what extent do similar effects already exist under the current general risk-based capital rules (e.g., through securitization or other techniques

⁹ In this regard, alternative approaches would take time to develop, but might present fewer implementation challenges. Additional work would be necessary to advance the goal of competitive equity among internationally active banking organizations. If consensus on alternative approaches could not be reached at the BSC, a departure from the Basel framework also could raise significant international and domestic issues.

that lower relative capital charges on particular assets for only some institutions)? If they do exist now, what is the evidence of competitive harm?

Apart from the approaches described in this ANPR, are there other regulatory capital approaches that are capable of ameliorating competitive concerns while at the same time achieving the goal of better matching regulatory capital to economic risks? Are there specific modifications to the proposed approaches or to the general risk-based capital rules that the Agencies should consider?

II. Application of the Advanced Approaches in the United States

By its terms, the 1988 Accord applied only to internationally active banks. Under the New Accord, the scope of application has been broadened also to encompass bank holding companies that are parents of internationally active “banking groups.”

A. Threshold Criteria for Mandatory Advanced Approach Organizations

The Agencies believe that for large, internationally active U.S. institutions only the advanced approaches are appropriate. Accordingly, the Agencies intend to identify three groups of banking organizations: (1) large, internationally active banking organizations that would be subject to the A-IRB and AMA on a mandatory basis (core banks); (2) organizations not subject to the advanced approaches on a mandatory basis, but that voluntarily choose to adopt those approaches (opt-in banks); and all remaining organizations that are not mandatorily subject to and do not apply the advanced approaches (general banks).

For purposes of identifying core banks, the Agencies are proposing a set of objective criteria for industry consideration. Specifically, the Agencies are proposing to treat as a core bank any banking organization that has (1) total commercial bank assets of \$250 billion or more, as reported on year-end regulatory reports (with banking assets of consolidated groups aggregated at the U.S. bank holding company level);¹⁰ or (2) total on-balance-sheet foreign exposure of \$10 billion or more, as reported on the year-end Country Exposure Report (FFIEC

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009) (with foreign exposure of consolidated groups aggregated at the U.S. bank holding company level). These threshold criteria are independent; meeting either condition would mean an institution is a core bank.

Once an institution becomes a core bank it would remain subject to the advanced approaches on a going forward basis. If, in subsequent years, such an institution were to drop below both threshold levels it would continue to be a core bank unless it could demonstrate to its primary Federal supervisor that it has substantially and permanently downsized and should no longer be a core bank. The Agencies are proposing an annual test for assessing banking organizations in reference to the threshold levels. However, as a banking organization approaches either of the threshold levels the Agencies would expect to have ongoing dialogue with that organization to ensure that appropriate practices are in place or are actively being developed to prepare the organization for implementation of the advanced approaches. Institutions that by expansion or merger meet the threshold criteria must qualify for use of the advanced approaches and would be subject to the same implementation plan requirements and minimum risk-based capital floors applicable to core and opt-in banks as described below. Institutions that seek to become opt-in banks would be expected to notify their primary Federal supervisors well in advance of the date by which they expect to qualify for the advanced approaches. Based on the aforementioned threshold levels, the Agencies anticipate at this time that approximately ten U.S. institutions would be core banks.

Application of Advanced Approaches at Individual Bank/Thrift Levels

The Agencies are aware that some institutions might, on a consolidated basis, exceed one of the threshold levels for mandatory application of the A-IRB and AMA and, yet, might be

¹⁰ For banks this means the December Consolidated Report of Condition and Income (Call Report). For thrifts this means the December Thrift Financial Report.

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comprised of distinct bank and thrift charters whose respective sizes fall well below the thresholds. In those cases, the Agencies believe that all bank and thrift institutions that are members of a consolidated group that is itself a core bank or an opt-in bank should calculate and report their risk-based capital requirements under the advanced approaches. However, recognizing that separate bank and thrift charters may, to a large extent, be independently managed and have different systems and portfolios, the Agencies are interested in comment on the efficacy and burden of a framework that requires the advanced approaches to be implemented by (or pushed down to) each of the separate subsidiary banks and thrifts that make up the consolidated group.

U.S. Banking Subsidiaries of Foreign Banking Organizations

Any U.S. bank or thrift that is a subsidiary of a foreign bank would have to comply with the prevailing U.S. regulatory capital requirements applied to U.S. banks. Thus, if a U.S. bank or thrift that is owned by a foreign bank meets the U.S. threshold criteria for mandatory application of the advanced approaches, it would be a core bank. If it does not meet those criteria, it would have the choice to opt-in to the advanced approaches (and be subject to the same supervisory framework as other U.S. banking organizations) or to remain a general bank. A top-tier U.S. bank holding company that is owned by a foreign bank also would be subject to the same criteria for core bank determination and would be subject to the applicable U.S. bank holding company capital rules. However, Federal Reserve SR Letter 01-1 (January 5, 2001) would remain in effect. Thus, subject to the conditions in that SR Letter, a top-tier U.S. bank holding company that is owned or controlled by a foreign bank that is a qualifying financial holding company generally would not be required to comply with the Board's capital adequacy guidelines.

The Agencies are interested in comment on the extent to which alternative approaches to regulatory capital are implemented across national boundaries

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might create burdensome implementation costs for the U.S. subsidiaries of foreign banks.

B. Implementation for Advanced Approach Organizations

As noted earlier, U.S. banking organizations that apply the advanced approaches would be required to comply with supervisory standards prior to use.

The BSC has targeted December 31, 2006 as the effective date for the international capital rules based on the New Accord. The Agencies are proposing an implementation date of January 1, 2007. The establishment of a final effective date in the United States, however, would be contingent on the issuance for public comment of a Notice of Proposed Rulemaking, and subsequent finalization of any changes in capital regulations the Agencies ultimately decide to adopt.

Because of the need to pre-qualify for the advanced approaches, banking organizations would need to take a number of steps upon the finalization of any changes to the capital regulations. These steps would include developing detailed written implementation plans for A-IRB and AMA and keeping their primary supervisors advised of these implementation plans and schedules. Implementation plans would need to address all supervisory standards for A-IRB and AMA, include objectively measurable milestones, and demonstrate that adequate resources would be realistically budgeted and made available. An institution's board of directors would need to approve its implementation plans.

The Agencies expect core banks to make every effort to meet the supervisory standards as soon as practicable. In this regard, it is possible that some core banks would not qualify to use the advanced approaches in time to meet the effective date that is ultimately established. For those banking organizations, the implementation plan would need to identify when the supervisory standards would be met and when the institution would be ready for implementation.

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The Agencies note that developing an appropriate infrastructure to support the advanced approaches for regulatory capital that fully complies with supervisory conditions and expectations and the associated supervisory guidance will be challenging. The Agencies believe, however, that institutions would need to be fully prepared before moving to the advanced approaches.

Use of the advanced approaches would require the primary Federal supervisor's approval. Core banks unable to qualify for the advanced approaches in time to meet the effective date would remain subject to the Agencies' general risk-based capital rules existing at that time. The Agencies would consider the effort and progress made to meet the qualifying standards and would consider whether, under the circumstances, supervisory action should be taken against or penalties imposed on individual core banks that have not adhered to the schedule outlined in the implementation plan they submitted to their primary Federal supervisor.

Opt-in banks meeting the supervisory standards could seek to qualify for the advanced approaches in time to meet the ultimate final effective date or any time thereafter. Institutions contemplating opting-in to the advanced approaches would need to provide notice to, and submit an implementation plan and schedule to be approved by, their primary Federal supervisor. As is true of core banks, opt-in banks would need to allow ample time for developing and executing implementation plans.

An institution's primary Federal supervisor would have responsibility for determining its readiness for an advanced approach and would be ultimately responsible, after consultation with other relevant supervisors, for determining whether the institution satisfies the supervisory expectations for the advanced approaches. The Agencies recognize that a consistent and transparent process to oversee implementation of the advanced approaches would be crucial.

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The Agencies would intend to develop interagency validation standards and procedures to help ensure consistency. The Agencies would consult with each other on significant issues raised during the validation process and ongoing implementation.

C. Other Considerations

General Banks

The Agencies expect that the vast majority of U.S. institutions would be neither core banks nor opt-in banks. Most institutions would remain subject to the general risk-based capital rules. However, as has been the case since the 1988 Accord was initially implemented in the United States, the Agencies will continue to make necessary modifications to the general risk-based capital rules as deemed appropriate. In the event changes are warranted the Agencies could implement through notice and comment procedures necessary revisions prior to the proposed effective date of the advanced approaches in 2007.

The Agencies seek comment on whether changes should be made to the existing general risk-based capital rules to enhance the risk-sensitivity or to reflect changes in the business lines or activities of banking organizations without imposing undue regulatory burden or complication. In particular, the Agencies seek comment on whether any changes to the general risk-based capital rules are necessary or warranted to address any competitive equity concerns associated with the bifurcated framework.

Majority-Owned or Controlled Subsidiaries

The New Accord generally applies to internationally active banking organizations on a fully consolidated basis. Thus, consistent with the Agencies' general risk-based capital rules, subsidiaries that are consolidated under U.S. generally accepted accounting principles (GAAP) typically should be consolidated for regulatory capital calculation purposes under the advanced

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approaches as well.¹¹ With regard to investments in consolidated insurance underwriting subsidiaries, the New Accord notes that deconsolidation of assets and deduction of capital is an appropriate approach. The Federal Reserve is actively considering several approaches with regard to the capital treatment for investments by bank holding companies in insurance underwriting subsidiaries. For example, the Federal Reserve is currently assessing the merits and weaknesses of an approach that would consolidate an insurance underwriting subsidiary's assets at the holding company level and permit excess capital of the subsidiary to be included in the consolidated regulatory capital of the holding company. A deduction would be required for capital that is not readily available at the holding company level for general use throughout the organization.

The Federal Reserve specifically seeks comment on the appropriate regulatory capital treatment for investments by bank holding companies in insurance underwriting subsidiaries as well as other nonbank subsidiaries that are subject to minimum regulatory capital requirements.

Transitional Arrangements

Core and opt-in banks would be required to calculate their capital ratios using the A-IRB and AMA methodologies, as well as the general risk-based capital rules, for one year prior to using the advanced approaches on a stand-alone basis. In order to begin this parallel-run year, however, the institution would have to demonstrate to its supervisor that it meets the supervisory standards and criteria. Therefore, banking organizations planning to meet the January 1, 2007 target effective date for implementation of the advanced approaches would have to receive approval from their primary Federal supervisor before year-end 2005. Banking organizations

¹¹ One notable exception exists at the bank level where there is an investment in a financial subsidiary as defined in the Gramm-Leach-Bliley Act of 1999. For such a subsidiary, assets would continue to be deconsolidated from the bank's on-balance-sheet assets and capital at the subsidiary level would be deducted from the bank's capital.

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that later adopt the advanced approaches also would have a one-year dual calculation period prior to moving to stand-alone usage of the advanced approaches.

An institution would be subject to a minimum risk-based capital floor for two years following moving to the advanced approaches on a stand-alone basis. Specifically, in the first year of stand-alone usage of the advanced approaches, an institution's calculated risk-weighted assets could not be less than 90 percent of risk-weighted assets calculated under the general risk-based capital rules. In the following year, an institution's minimum calculated risk-weighted assets could not be less than 80 percent of risk-weighted assets calculated under the general risk-based capital rules.¹² Importantly, the minimum capital requirement and PCA thresholds would not be changed.

As a consequence, banking organizations would need to conduct two sets of capital calculations for at least three years. The pre-implementation calculation of A-IRB and AMA capital would not need to be made public, but the banking organization would be required to disclose risk-based capital ratios calculated under both approaches during the two-year post-implementation period. The Agencies would not propose to eliminate the floors after the two-year transition period for any institution applying the advanced approaches until fully satisfied that the institution's systems are sound and accurately assess risk and that resulting capital levels are prudent.

¹² The Agencies note that the text above differs from the floor text in the New Accord, which is based on 90 percent of the minimum capital requirement under the 1988 Accord, rather than on risk-weighted assets. The Agencies expect that the final language of the New Accord would need to be consistent with this approach. The following example reflects how the floor in the first year would be applied by a U.S. banking organization. If the banking organization's general risk-based capital calculation produced risk-weighted assets of \$100 billion in its first year of implementation of the advanced approaches, then its risk weighted assets in that year could not be less than \$90 billion. If the advanced approach calculation produced risk-weighted assets of \$75 billion (a decrease of one quarter compared to the general risk-based capital rules), it would not calculate risk-based capital ratios on the basis of that \$75 billion; rather, its risk-weighted assets would be \$90 billion. Consequently, its minimum total risk-based capital charge would be \$7.2 billion, and it would need \$9 billion to satisfy PCA well-capitalized criteria.

These transitional arrangements and the floors established above relate only to risk-based capital ratios and do not affect the continued applicability to all advanced banking organizations of the leverage ratio and associated PCA regulations for banks and thrifts. Furthermore, during the implementation period and before removal of the floors the Agencies intend to closely monitor the effect that the advanced approaches would have on capital levels at the individual institution and industry-wide levels. Once the results of this monitoring process are assessed, the Agencies may consider modifications to the advanced approaches to ensure that capital levels remain prudent.

Given the general principle that the advanced approaches are expected to be implemented at the same time across all material portfolios, business lines, and geographic regions, to what degree should the Agencies be concerned that, for example, data may not be available for key portfolios, business lines, or regions? Is there a need for further transitional arrangements? Please be specific, including suggested durations for such transitions.

Do the projected dates provide an adequate timeframe for core banks to be ready to implement the advanced approaches? What other options should the Agencies consider?

The Agencies seek comment on appropriate thresholds for determining whether a portfolio, business line, or geographic exposure would be material. Considerations should include relative asset size, percentages of capital, and associated levels of risk for a given portfolio, business line, or geographic region.

III. Advanced Internal Ratings-Based Approach (A-IRB)

This section describes the proposed A-IRB framework for the measurement of capital requirements for credit risk. Under this framework, banking organizations that meet the A-IRB infrastructure requirements and supervisory standards would incorporate internal estimates of risk inputs into supervisor-provided capital formulas for the various debt and equity portfolios to calculate the capital requirements for each portfolio. The discussion below provides background on the conceptual basis of the A-IRB approach and then describes the specific details of the

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capital formulas for two of the main exposure categories, wholesale and retail. Separate sections follow that describe the A-IRB treatments of loan loss reserves, partial charge-offs, and loans purchased at a discount, the A-IRB treatment of purchased receivables, the A-IRB approach to equity exposures, and the A-IRB treatment of securitization exposures. The A-IRB supervisory criteria and credit risk mitigation techniques also are discussed in separate sections.

A. Conceptual Overview

The A-IRB framework has as its conceptual foundation the belief that any range of possible losses on a portfolio of credit exposures can be represented by a probability density function (PDF) of possible losses over a one-year time horizon. If known, the parameters of a PDF can be used to specify a particular level of capital that will lower the probability of the institution's insolvency due to adverse credit risk outcomes to a stated confidence level. With a known or estimated PDF, the probability of insolvency can be measured or estimated directly, based on the level of reserves and capital available to an institution.

The A-IRB framework builds off this concept and reflects an effort to develop a common set of risk-sensitive formulas for the calculation of capital for credit risk. To a large extent, this framework resembles more systematic quantitative approaches to the measurement of credit risk that many banking organizations have been developing. The approaches being developed by banking organizations generally rely on a statistical or probability-based assessment of credit risk and use inputs broadly similar to those required under the A-IRB approach. Like the value-at-risk (VaR) model that forms the basis for the market risk capital rules, the output of these statistical approaches to credit risk is typically an estimate of loss threshold on a credit exposure or pool of credit exposures that is highly unlikely to be exceeded by actual credit-related losses on the exposures or pool.

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

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

The specific A-IRB formulas require the banking organization first to estimate certain risk inputs, which the organization may do using a variety of techniques. The formulas themselves, into which the estimated risk inputs are inserted, are broadly consistent with the most common statistical approaches for measuring credit risk, but also are more straightforward to calculate than those typically employed by banking organizations (which often require

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computer simulations). In particular, an important property of the A-IRB formulas is portfolio invariance. That is, the A-IRB capital requirement for a particular exposure generally does not depend on the other exposures held by the banking organization; as with the general risk-based capital rules, the total credit risk capital requirement for a banking organization is simply the sum of the credit risk capital requirements on individual exposures or pools of exposures.¹³

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

¹³ The theoretical underpinnings for obtaining portfolio-invariant capital charges within credit VaR models are provided in the paper "A Risk-Factor Model Foundation for Ratings-Based Bank Capital Rules," by Michael Gordy, forthcoming in the *Journal of Financial Intermediation*. The A-IRB formulas are derived as an application of these results to a single-factor CreditMetrics-style model. For mathematical details on this model,

Expected Losses versus Unexpected Losses

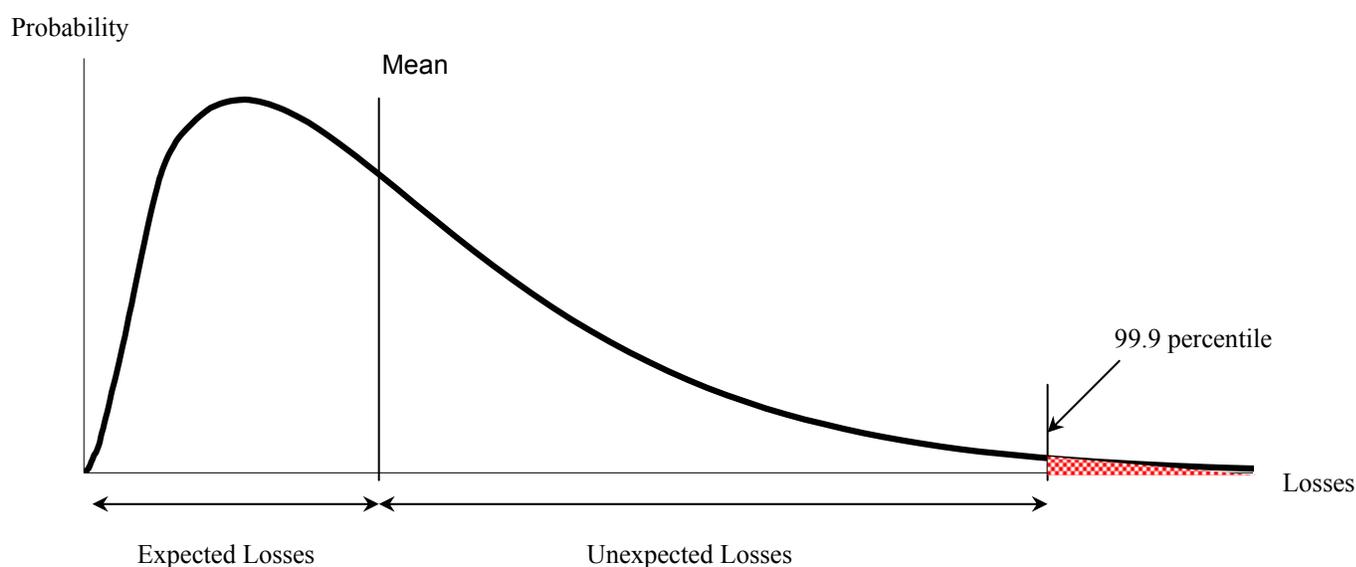
The diagram below shows a hypothetical loss distribution for a portfolio of credit exposures over a one-year horizon. The loss distribution is represented by the curve, and is drawn in such a way that it depicts a higher proportion of losses falling below the mean value than falling above the mean. The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

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

see M. Gordy, "A Comparative Anatomy of Credit Risk Models." Journal of Banking and Finance, January 2000, or H.U. Koyluoglu and A. Hickman, "Reconcilable Differences." Risk, October 1998.

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

Probability Density Function of Credit Losses



The framework described in this ANPR calibrates the risk-based capital requirements to the sum of EL plus UL, which raises significant calibration issues. Those calibration issues would be treated differently if the calibration were based only on the estimate of UL. That is, decisions with respect to significant policy variables that are described below hinge crucially on the initial decision to base the calibration on EL plus UL, rather than UL only. These issues include, for example, the appropriate mechanism for incorporating any future margin income

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(FMI) that is associated with particular business lines, as well as the appropriate method for incorporating general and specific reserves into the risk-based ratios.

A final overarching assumption of the A-IRB framework is the role of asset correlations. Within the A-IRB capital formulas (as in the credit VaR models of many banking organizations), asset correlation parameters provide a measure of the extent to which changes in the economic value of separate exposures are presumed to move together. A higher asset correlation between a particular asset and other assets in the same portfolio implies a greater likelihood that the asset will decline in value at the same time as the portfolio as a whole declines in value. Because this means a greater chance that the asset will be a contributor to high loss scenarios, its capital requirement under the A-IRB framework also is higher.

Specifically, the A-IRB capital formulas described in detail below are based on the assumption that correlation in defaults across borrowers is attributable to their common dependence on one or more systematic risk factors. The basis for this assumption is the observation that a banking organization's borrowers are generally susceptible to adverse changes in the global economy. These systematic factors are distinct from the borrower-specific, or idiosyncratic, risk factors that determine the probability that a specific loan will be repaid. Like other risk-factor models, the A-IRB framework assumes that these borrower-specific factors represent idiosyncratic sources of risk, and thus (unlike the systematic risk-factors) are diversified in a large lending portfolio.

The A-IRB approach allows for much improved sensitivity to many of the loan-level determinants of economic capital (such as PD and LGD), but does not explicitly address how an exposure's economic capital might vary with the degree of concentration in the overall portfolio to specific industries or regions, or even to specific borrowers. That is, it neither rewards nor

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penalizes differences across banking organizations in diversification or concentration across industry, geography and names. To introduce such rewards and penalties in an appropriate manner would necessarily entail far greater operational complexity for both regulatory and financial institutions.

In contrast, the portfolio models of credit risk employed by many banking organizations are quite sensitive to all forms of diversification. That is, the economic capital charge assigned to a loan within such a model will depend on the portfolio as a whole. In order to apply a portfolio model to the calibration of A-IRB capital charges, it would be necessary to identify the assumptions needed so that a portfolio model would yield economic capital charges that do not depend on portfolio characteristics. Recent advances in the finance literature demonstrate that economic capital charges are portfolio-invariant if (and only if) two assumptions are imposed.¹⁴ First, the portfolio must be infinitely fine-grained. Second, there must be only a single systematic risk factor.

Infinite granularity, while never literally attained, is satisfied in an approximate sense by the portfolios of large, internationally active banks. Analysis of data provided by such institutions shows that taking account of single-name concentrations in such portfolios would lead to only trivial changes in the total capital requirement. The single risk-factor assumption would appear, at first glance, more troublesome. As an empirical matter, there undoubtedly are distinct cyclical factors for different industries and different geographic regions. From a substantive perspective, however, the relevant question is whether portfolios at large financial institutions are all diversified across the various sub-sectors of the economy in a reasonably similar manner. If so, then the portfolio can be modeled as if there were only a single factor, namely, the credit cycle as a whole.

The Agencies seek comment on the conceptual basis of the A-IRB approach, including all of the aspects just described. What are the advantages and disadvantages of the A-IRB approach relative to alternatives, including those that would allow greater flexibility to use internal models and those that would be more cautious in incorporating statistical techniques (such as greater use of credit ratings by external rating agencies)? The Agencies also encourage comment on the extent to which the model's necessary conditions of the conceptual justification for the A-IRB approach are reasonably met, and if not, what adjustments or alternative approach would be warranted.

Should the A-IRB capital regime be based on a framework that allocates capital to EL plus UL, or to UL only? Which approach would more closely align the regulatory framework to the internal capital allocation techniques currently used by large institutions? If the framework were recalibrated solely to UL, modifications to the rest of the A-IRB framework would be required. The Agencies seek commenters' views on issues that would arise as a result of such recalibration.

B. A-IRB Capital Calculations

A common characteristic of the A-IRB capital formulas is that they calculate the actual dollar value of the minimum capital requirement associated with an exposure (or, in the case of retail exposures, a pool of exposures). This capital requirement must be converted to an equivalent amount of risk-weighted assets in order to be inserted into the denominator of a banking organization's risk-based capital ratios. Because the minimum risk-based capital ratio in the United States is 8 percent, the minimum capital requirement on any asset would be equal to 8 percent of the risk-weighted asset amount associated with that asset. Therefore, in order to determine the amount of risk-weighted assets to associate with a given minimum capital requirement, it would be necessary to multiply the dollar capital requirement generated by the A-IRB formulas by the reciprocal of 8 percent, or 12.5.

The following subsections of the ANPR detail the specific features of the A-IRB capital formulas for two principal categories of credit exposure: wholesale and retail. Both of these subsections include a proposed definition of the exposure category, a description of the banking

¹⁴ See forthcoming paper by M. Gordy referenced in footnote number 12 above.

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organization-estimated inputs required to complete the capital calculations, a description of the specific calculations required to determine the A-IRB capital requirement, and tables depicting a range of representative results.

Wholesale Exposures: Definitions and Inputs

The Agencies propose that a single credit exposure category – wholesale exposures – would encompass most non-retail credit exposures in the A-IRB framework. The wholesale category would include the sub-categories of corporate, sovereign, and interbank exposures as well as all types of specialized lending exposures. Wholesale exposures would include debt obligations of corporations, partnerships, limited liability companies, proprietorships, and special-purpose entities (including those created specifically to finance and/or operate physical assets). Wholesale exposures also would include debt obligations of banks and securities firms (interbank exposures), and exposures to central governments, central banks, and certain public-sector entities (sovereign exposures). The wholesale exposure category would not include securitization exposures, or certain small-business exposures that are eligible to be treated as retail exposures.

The Agencies propose that banking organizations applying the advanced approaches would use the same A-IRB capital formula to compute capital requirements on all wholesale exposures with two exceptions. First, wholesale exposures to small- and medium-sized enterprises (businesses) (SMEs) would use a downward adjustment to the wholesale A-IRB capital formula typically based on borrower size. Second, the A-IRB capital formula for HVCRE loans (generally encompassing certain speculative ADC loans) would use a higher asset correlation assumption than other wholesale exposures.

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The proposed A-IRB capital calculations for wholesale exposures would require banking organizations to assign four key risk inputs for each individual wholesale exposure: (1) probability of default (PD); (2) loss given default (LGD); (3) exposure at default (EAD); and (4) effective remaining maturity (M). In addition, to use the proposed downward adjustment for wholesale SMEs described in more detail below, banking organizations would be required to provide an additional input for borrower size (S).

Probability of default

The first principal input to the wholesale A-IRB calculation is the measure of PD. Under the A-IRB approach, a banking organization would assign an internal rating to each of its wholesale obligors (or in other words, assign each wholesale exposure to an internal rating grade applicable to the obligor). The internal rating (rating grade) would have to be produced by a rating system that meets the A-IRB infrastructure requirements and supervisory standards for wholesale exposures, which are intended to ensure (among other things) that the rating system results in a meaningful differentiation of risk among exposures. For each internal rating (or rating grade), the banking organization must associate a specific one-year PD value. Various approaches may be used to develop estimates of PDs; however, regardless of the specific approach, banking organizations would be expected to satisfy the supervisory standards. The minimum PD that may be assigned to most wholesale exposures is 3 basis points (0.03 percent). Certain wholesale exposures are exempt from this floor, including exposures to sovereign governments, their central banks, the BIS, IMF, European Central Bank, and other multilateral development banks (MDBs) that are high quality MDBs with strong shareholder support.

The Agencies intend to apply standards to the PD quantification process that are consistent with the broad guidance outlined in the New Accord. More detailed discussion of

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those points is provided in the draft supervisory guidance on IRB approaches for corporate exposures published elsewhere in today's Federal Register.

Loss given default

The second principal input to the A-IRB capital formula for wholesale exposures is LGD. Under the A-IRB approach, banking organizations would estimate an LGD for each wholesale exposure. An LGD estimate for a wholesale exposure should provide an assessment of the expected loss in the event of default of the obligor, expressed as a percentage of the institution's estimated total exposure at default. The LGD for a defaulted loan would be estimated as the expected economic loss rate on that exposure taking into account, where appropriate, recoveries, workout costs, and the time value of money. Banking organizations would estimate LGDs as the loss severities expected to prevail when default rates are high, unless they have information indicating that recoveries on a particular class of exposure are unlikely to be affected to an appreciable extent by cyclical factors. As with estimates of other A-IRB inputs, banking organizations would be expected to be conservative in assigning LGDs.

Although estimated LGDs should be grounded in historical recovery rates, the A-IRB approach is structured to allow banking organizations to assess the differential impact of various factors, including, for example, the presence of collateral or differences in loan terms and covenants. The Agencies expect to impose limitations on the use of guarantees and credit derivatives in a banking organization's LGD estimates. These limitations are discussed in the separate section on the A-IRB treatment of credit risk mitigation techniques.

Exposure at default

The third principal input to the wholesale A-IRB capital formula is EAD. The Agencies are proposing that banking organizations would provide their own estimate of EAD for each

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exposure. The EAD for an exposure would be defined as the amount legally owed to the banking organization (net of any charge-offs) in the event that the borrower defaults on the exposure. For on-balance-sheet items, banking organizations would estimate EAD as no less than the current drawn amount. For off-balance-sheet items, except over-the-counter (OTC) derivative transactions, banking organizations would assign an EAD equal to an estimate of the long-run default-weighted average EAD for similar facilities and borrowers or, if EADs are highly cyclical, the EAD expected to prevail when default rates are high. The EAD associated with OTC derivative transactions would continue to be estimated using the “add-on” approach contained in the general risk-based capital rules.¹⁵ In addition, there would be a specific EAD calculation for the recognition of collateral in the context of repo-style transactions subject to a master netting agreement, the features of which are outlined below in the section on the A-IRB treatment of credit risk mitigation techniques.¹⁶

Definition of default and loss

A banking organization would estimate inputs relative to the following definition of default and loss. A default is considered to have occurred with respect to a particular borrower when either or both of the following two events has taken place: (1) the banking organization determines that the borrower is unlikely to pay its obligations to the organization in full, without recourse to actions by the organization such as the realization of collateral; or (2) the borrower is more than 90 days past due on principal or interest on *any* material obligation to the organization. The Agencies believe that the definition of unlikely to pay is largely consistent

¹⁵ Under the add-on approach an institution would determine its EAD for an OTC derivative contract by adding the current value of the contract (zero if the current value is negative) and an estimate of potential future exposure (PFE) on the contract. The estimated PFE would be equal to the notional amount of the derivative multiplied by a supervisor-provided add-on factor that takes into account the type of instrument and its maturity.

¹⁶ Repo-style transactions include reverse repurchase agreements and repurchase agreements and securities lending and borrowing.

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with the practice of U.S. banking organizations in assessing whether a loan is on non-accrual status.

Maturity

The fourth principal input to the A-IRB capital formula is effective remaining maturity (M), measured in years. If a wholesale exposure is subject to a determinable cash flow schedule, the banking organization would calculate M as the weighted-average remaining maturity of the expected cash flows, using the amounts of the cash flows as the relevant weights. The banking organization also would be able to use the nominal remaining maturity of the exposure if the weighted-average remaining maturity of the exposure cannot be calculated. For OTC derivatives and repo-style transactions subject to master netting agreements, the institution would set M equal to the weighted-average remaining maturity of the individual transactions, using the notional amounts of the individual transactions as the relevant weights.

In all cases, M would be set no greater than 5 years and, with few exceptions, M would be set no lower than one year. The exceptions apply to certain transactions that are not part of a banking organization's ongoing financing of a borrower. For wholesale exposures that have an original maturity of less than three months including repo-style transactions, money market transactions, trade finance-related transactions, and exposures arising from payment and settlement processes M may be set as low as one day. For OTC derivatives and repo-style transactions subject to a master netting agreement, M would be set at no less than five days.

As with the assignment of PD estimates, the Agencies propose to apply supervisory standards for the estimation of LGD, EAD, and M that are consistent with the broad guidance contained in the New Accord. More detailed discussion of these issues is provided in the draft

supervisory guidance on IRB approaches for corporate exposures published elsewhere in today's Federal Register.

The Agencies seek comment on the proposed definition of wholesale exposures and on the proposed inputs to the wholesale A-IRB capital formulas. What are views on the proposed definitions of default, PD, LGD, EAD, and M? Are there specific issues with the standards for the quantification of PD, LGD, EAD, or M on which the Agencies should focus?

Wholesale Exposures: Formulas

The calculation of the A-IRB capital requirement for a particular wholesale exposure would be accomplished in three steps:

- (1) Calculation of the relevant asset correlation parameter, which would be a function of PD (as well as firm size (S) for SMEs);
- (2) Calculation of a preliminary capital requirement assuming a maturity of one year, which would be a function of PD, LGD, EAD, and the asset correlation parameter calculated in the first step; and
- (3) Application of a maturity adjustment for differences between the actual effective remaining maturity of the exposure and the one-year maturity assumption in the second step, where the adjustment would be a function of both PD and M.

These calculations result in the A-IRB capital requirement, expressed in dollars, for a particular wholesale exposure. As noted earlier, this amount would be converted to a risk-weighted assets equivalent by multiplying the amount by 12.5, and the risk-weighted assets equivalent would be included in the denominator of the risk-based capital ratios.

Asset correlation

The first step in the calculation of the A-IRB capital requirement for a wholesale exposure is the calculation of the asset correlation parameter, which is denoted by the letter "R"

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in the formulas below. This asset correlation parameter is not a fixed amount; rather, the parameter varies as an inverse function of PD. For all wholesale exposures except HVCRE exposures, the asset correlation parameter approaches an upper bound value of 24 percent for very low PD values and approaches a lower bound value of 12 percent for very high PD values. This reflects the Agencies' view that borrowers with lower credit quality (that is, higher PDs) are likely to be more idiosyncratic in the factors affecting their likelihood of default than borrowers with higher credit quality (lower PDs). Therefore, the higher PD borrowers are proportionately less influenced by systematic (sector-wide or economy-wide) factors common to all borrowers.¹⁷

An important practical impact of having asset correlation decline with increases in PD is to reduce the speed with which capital requirements increase as PDs increase, and to increase the speed with which EL dominates the total capital charge thereby tending to reduce procyclicality in the application of these capital formulas. The specific formula for determining the asset correlation parameter for all wholesale exposures except HVCRE exposures is as follows:

$$R = 0.12 * (1 - \text{EXP}(-50 * \text{PD})) + 0.24 * [1 - (1 - \text{EXP}(-50 * \text{PD}))]$$

Where:

R denotes asset correlation;

EXP(x) denotes the natural exponential function; and

PD denotes probability of default.

Capital requirement with assumed one-year maturity adjustment

The second step in the calculation of the A-IRB capital requirement for a particular wholesale exposure is the calculation of the capital requirement that would apply to the exposure

¹⁷ See Jose Lopez, "The Empirical Relationship between Average Asset Correlation, Firm Probability of Default, and Asset Size." Federal Reserve Bank of San Francisco Working Paper 02-05 (June 2002).

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assuming a one-year effective remaining maturity. The specific formula to calculate this one-year-maturity capital requirement is as follows:

$$K_1 = EAD * LGD * N[(1 - R)^{-0.5} * G(PD) + (R / (1 - R))^{0.5} * G(0.999)]$$

Where:

K_1 denotes the one-year-maturity capital requirement;

EAD denotes exposure at default;

LGD denotes loss given default;

$N(x)$ denotes the standard normal cumulative distribution function;

R denotes asset correlation;

$G(x)$ denotes the inverse of the standard normal cumulative distribution function; and¹⁸

PD denotes probability of default.

There are several important aspects of this formula. First, it rises in a straight-line fashion with increases in EAD, meaning that a doubling of the exposure amount would result in a doubling of the capital requirement. It also rises in a straight-line fashion with increases in LGD, which similarly implies that a loan with an LGD estimate twice that of an otherwise identical loan would have twice the capital requirement of the other loan. This also implies that as LGD or EAD estimates approach zero, the capital requirement would likewise approach zero. The remainder of the formula is a function of PD, R (asset correlation, which is itself a function of PD), and the target loss percentile amount of 99.9 percent discussed earlier.

Maturity adjustment

The third stage in the calculation of the A-IRB capital requirement for a particular wholesale exposure is the application of a maturity adjustment to reflect the exposure's actual

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effective remaining maturity (M). The A-IRB maturity adjustment multiplies the one-year-maturity capital requirement (K_1) by a factor that depends on both M and PD. The fact that the A-IRB maturity adjustment depends on PD reflects the Agencies' view that there is a greater proportional need for maturity adjustments for high-quality exposures (those with low PDs) because there is a greater potential for such exposures to deteriorate in credit quality than for those exposures whose credit quality is lower. The specific formula for applying the maturity adjustment and generating the A-IRB capital requirement is as follows:

$$K = K_1 * [(M - 2.5) * (1 + b)] / [(-1.5 * (1 + b))], \text{ where}$$

$$b = (0.08451 - 0.05898 * \text{LN}(\text{PD}))^2$$

Where:

K denotes the A-IRB capital requirement;

K_1 denotes the one-year-maturity capital requirement;

M denotes effective remaining maturity;

$\text{LN}(x)$ denotes the natural logarithm; and

PD denotes probability of default.

In this formula, the value “b” effectively determines the slope of the maturity adjustment and is itself a function of PD. Note that if M is set equal to one, the maturity adjustment also equals one and K will therefore equal K_1 .

To provide a more concrete sense of the range of capital requirements under the wholesale A-IRB framework, the following table presents the A-IRB capital requirements (K) for a range of values of both PD and M. In this table LGD is assumed to equal 45 percent. For

¹⁸ The $N(x)$ and $G(x)$ functions are widely used in statistics and are commonly available in computer spreadsheet programs. A description of these functions may be found in the Help function of most spreadsheet programs or in basic statistical textbooks.

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comparison purposes, the general risk-based capital rules assign a capital requirement of 8 percent for most commercial loans.

Capital Requirements (in percentage points)

PD	Effective Remaining Maturity (M)			
	1 month	1 year	3 years	5 years
0.05 percent	0.50	0.92	1.83	2.74
0.10 percent	1.00	1.54	2.71	3.88
0.25 percent	2.17	2.89	4.44	5.99
0.50 percent	3.57	4.40	6.21	8.03
1.00 percent	5.41	6.31	8.29	10.27
2.00 percent	7.65	8.56	10.56	12.56
5.00 percent	11.91	12.80	14.75	16.69
10.00 percent	17.67	18.56	20.50	22.45
20.00 percent	26.01	26.84	28.65	30.47

The impact of the A-IRB capital formulas on minimum risk-based capital requirements for wholesale exposures would, of course, depend on the actual values of PD, LGD, EAD, and M that banking organizations would use as inputs to the wholesale formulas. Subject to the caveats noted earlier, evidence from QIS3 suggested an average reduction in capital requirements for corporate exposures of about 26 percent for twenty large U.S. banking organizations.

SME adjustment

For loans to SMEs not eligible for retail A-IRB treatment, the proposed calculation of the A-IRB capital requirement has one additional element – a downward adjustment based on borrower size (S). This adjustment would effectively lower the A-IRB capital requirement on wholesale exposures to SMEs with annual sales (or total assets) of less than \$50 million. The Agencies believe the measure of borrower size should be based on annual sales (rather than total assets), unless the banking organization can demonstrate that it would be more appropriate for the banking organization to use the total assets of the borrower as its measure of borrower size.

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The borrower size adjustment would be made to the asset correlation parameter (R), as shown in the following formula:

$$R_{SME} = R - 0.04 * [1 - (S - 5)/45]$$

Where

R_{SME} denotes the size-adjusted asset correlation value;

R denotes asset correlation; and

S denotes borrower size (expressed in millions of dollars).

The maximum reduction in the asset correlation parameter based on this formula is 4 percent, and is achieved when borrower size is \$5 million. For all borrower sizes below \$5 million, borrower size would be set equal to \$5 million. The adjustment shrinks to zero as borrower size approaches \$50 million. The broad rationale for this adjustment is the view that the credit condition of SMEs will be influenced relatively more by idiosyncratic factors than is the case for larger firms, and, thus, SMEs would be less likely to deteriorate simultaneously with other exposures. This greater susceptibility to idiosyncratic factors would imply lower asset correlation. The evidence in favor of this view is mixed, particularly after considering that the A-IRB framework already incorporates a negative relationship between asset correlation and PD. The following table illustrates the practical effect of the SME adjustment by depicting the capital requirements (K) across a range of PDs and borrower sizes. As in the previous table, LGD is assumed to equal 45 percent. For this table, M is assumed to be equal to three years. Note that the last column is identical to the three-year maturity column in the preceding table because the SME adjustment is phased out for borrowers of \$50 million or more in size.

Capital Requirements (in percentage points)

	Borrower Size (S)			
PD	\$5 million	\$20 million	\$35 million	≥ \$50 million

0.05 percent	1.44	1.57	1.70	1.83
0.10 percent	2.14	2.33	2.51	2.71
0.25 percent	3.54	3.83	4.13	4.44
0.50 percent	4.97	5.37	5.79	6.21
1.00 percent	6.63	7.17	7.72	8.29
2.00 percent	8.40	9.11	9.83	10.56
5.00 percent	11.70	12.73	13.74	14.75
10.00 percent	16.76	18.05	19.30	20.50
20.00 percent	24.67	26.08	27.40	28.65

Subject to the caveats mentioned above, evidence from QIS3 suggested an average reduction in risk-based capital requirements for corporate SME exposure of about 39 percent for the 20 large U.S. banking organizations that participated in QIS3.

If the Agencies include a SME adjustment, are the \$50 million threshold and the proposed approach to measurement of borrower size appropriate? What standards should be applied to the borrower size measurement (for example, frequency of measurement, use of size buckets rather than precise measurements)?

Does the proposed borrower size adjustment add a meaningful element of risk sensitivity sufficient to balance the costs associated with its computation? The Agencies are interested in comments on whether it is necessary to include an SME adjustment in the A-IRB approach. Data supporting views is encouraged.

Wholesale Exposures: Other Considerations

Specialized lending

The specialized lending (SL) asset class encompasses exposures for which the primary source of repayment is the income generated by the specific asset(s) being financed, rather than the financial capacity of a broader commercial enterprise. The SL category encompasses four broad exposure types:

- *Project finance* (PF) exposures finance large, complex, expensive installations that produce goods or services for sale, such as power plants, chemical processing plants, mines, or transportation infrastructure, where the source of repayment is primarily the revenues

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generated by sale of the goods or services by the installations.

- *Object finance* (OF) exposures finance the acquisition of (typically moveable) physical assets, such as ships or aircraft, where the source of repayment is primarily the revenues generated by the assets being financed, often through rental or lease contracts with third parties.
- *Commodities finance* (CF) exposures are structured short-term financings of reserves, inventories, or receivables of exchange-traded commodities, such as crude oil, metals, or agricultural commodities, where the source of repayment is the proceeds of the sale of the commodity.
- *Commercial real estate* (CRE) exposures finance the construction or acquisition of real estate (including land as well as improvements) where the prospects for repayment and recovery depend primarily on the cash flows generated by the lease, rental, or sale of the real estate.¹⁹ The broad CRE category is further divided into two groups: low asset correlation CRE and HVCRE.²⁰

Most of the issues raised below for comment are described in substantially greater detail, in the context of CRE exposures, in a white paper entitled “Loss Characteristics of CRE Loan Portfolios,” released by the Federal Reserve Board on June 10, 2003. Commenters are

¹⁹ CRE exposures are typically non-recourse exposures, often to special purpose vehicles, and are distinguishable from corporate exposures that are collateralized by real estate for which the prospects for repayment and recovery depend primarily on the financial performance of the broader commercial enterprise that is the obligor.

²⁰ To describe a loan portfolio as having a relatively high asset correlation means that any defaults that occur in that portfolio are relatively likely to occur at the same time, and for this reason the portfolio is likely to exhibit greater variability in aggregate default rates. For two portfolios with the same EL, the portfolio with more highly variable aggregate default rates warrants higher capital to cover UL (“bad-tail events”) with the same level of confidence. Describing a portfolio as having a relatively high asset correlation does *not* imply that loans in that portfolio have relatively high PD, LGD, or EL. In particular, loans in high asset correlation portfolios may well have very low PDs and LGDs (and therefore ELs); conversely, loans in low asset correlation portfolios may have very high PDs and LGDs (and ELs). For any two loans from a portfolio with a given asset correlation (or from two different portfolios with the same asset correlation), the loan with the lower EL should be assigned a lower risk weight. For any two loans with the same EL, the loan from the portfolio with the lower asset correlation should incur a lower capital charge, because bad-tail events are less likely to occur in that portfolio.

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encouraged to read the white paper in conjunction with this section.

A defining characteristic of SL exposures (including CRE) is that the risk factors influencing actual default rates are likely to influence LGDs as well. This is because *both* the borrower's ability to repay an exposure *and* the banking organization's recovery on an exposure in the event of default are likely to depend on the same underlying factors, such as the net cash flows of the property being financed. This suggests a positive correlation between observed default frequencies and observed loss rates on defaulted loans, with both declining during periods of favorable economic conditions and both increasing during unfavorable economic periods. While cyclicalities in LGDs may be significant for a number of lending activities, the Agencies believe that cyclicalities are likely to be the norm for SL portfolios, and that a banking organization's procedures for estimating LGD inputs for SL exposures should assess and quantify this cyclicalities in a comprehensive and systematic fashion.

The Agencies invite comment on ways to deal with cyclicalities in LGDs. How can risk sensitivity be achieved without creating undue burden?

For core and opt-in banks that may not be able to provide sufficiently reliable estimates of PD, LGD, and M for each SL exposure, the New Accord offers a Supervisory Slotting Criteria (SSC) approach. Under this approach, rather than estimating the loan-level risk parameters, banking organizations would use slotting criteria to map their internal risk rating grades to one of five supervisory rating grades: Strong, Good, Satisfactory, Weak, and Default. In addition, supervisory risk weights would be assigned to each of these supervisory rating grades. To assist banking organizations in implementing these supervisory rating grades, for reference purposes the New Accord associates each with an explicit range of external rating grades. If the SSC approach were allowed in the United States, the Agencies would have to develop slotting criteria that would take into account factors such as market conditions; financial ratios such as debt

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service coverage or loan-to-value ratios; cash flow predictability; strength of sponsor or developer; and other factors likely to affect the PD and/or LGD of each loan.

The Agencies invite comment on the merits of the SSC approach in the United States. The Agencies also invite comment on the specific slotting criteria and associated risk weights that should be used by organizations to map their internal risk rating grades to supervisory rating grades if the SSC approach were to be adopted in the United States.

Under the A-IRB approach, a banking organization would estimate the risk parameters for each SL exposure and then calculate the A-IRB capital charge for the estimated EAD by substituting the estimated PD, LGD, and M into one of two risk weight functions. The first risk weight function is the wholesale risk weight function and applies to all PF, OF, and CF exposures, as well as to all low asset correlation CRE exposures (including in-place commercial properties). The second risk weight function applies to all HVCRE exposures. It also is the same as the wholesale risk weight function, except that it incorporates a higher asset correlation parameter. The asset correlation equation for HVCRE is as follows:

$$R = 0.12 \times (1 - \text{EXP}(-50 \times \text{PD})) + 0.30 \times [\text{EXP}(-50 \times \text{PD})]$$

Where

R denotes asset correlation;

EXP denotes the natural exponential function; and

PD denotes probability of default.

The following table presents the A-IRB capital requirement (K) for a range of values of both PD and M. In this table, EAD is assumed to equal \$100 and LGD is assumed to equal 45 percent. This LGD is used for consistency with the similar table for wholesale exposures and should not be construed as an indication that 45 percent is a typical LGD for HVCRE exposures.

HVCRE Capital Requirements (in percentage points)

Effective Remaining Maturity

PD	1 year	3 years	5 years
0.05 percent	1.24	2.46	3.68
0.10 percent	2.05	3.61	5.16
0.25 percent	3.74	5.76	7.77
0.50 percent	5.52	7.79	10.07
1.00 percent	7.53	9.89	12.25
2.00 percent	9.55	11.79	14.02
5.00 percent	13.12	15.12	17.11
10.00 percent	18.59	20.54	22.49
20.00 percent	26.84	28.65	30.47

All ADC loans would be treated as HVCRE loans, unless the borrower has “substantial equity” at risk or the property is pre-sold or sufficiently pre-leased. In part, this reflects some empirical evidence suggesting that most ADC loans have relatively high asset correlations. It also, however, reflects a longstanding supervisory concern that CRE lending to finance speculative construction and development is vulnerable to, and may worsen, speculative swings in CRE markets, especially when there is little borrower equity at risk. Such lending was a major factor causing the stress experienced by many banks in the early 1990s, not only in the United States but in other countries as well.

Under the New Accord SL loans financing the construction of one- to four-family residential properties (single or in subdivisions) are included with other ADC loans in the high asset correlation category. However, loans financing the construction of pre-sold one- to four-family residential properties would be eligible to be treated under the low asset correlation treatment. In some cases the loans may finance the construction of subdivisions or other groups of houses, some of which are pre-sold while others are not.

Under the New Accord, each national supervisory authority is directed to recognize and incorporate into its implementation of the New Accord the high asset correlation determinations

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of other national supervisory authorities for loans made in their respective jurisdictions. Thus, when the Agencies designate certain CRE properties as HVCRE, foreign banking organizations making extensions of credit to those properties also would be expected to treat them as HVCRE. Similarly, when non-U.S. supervisory authorities designate certain CRE as HVCRE, U.S. banking organizations that extend credit to those properties would be expected to treat them as HVCRE.

The Agencies invite the submission of empirical evidence regarding the (relative or absolute) asset correlations characterizing portfolios of land ADC loans, as well as comments regarding the circumstances under which such loans would appropriately be categorized as HVCRE.

The Agencies also invite comment on the appropriateness of exempting from the high asset correlation category ADC loans with substantial equity or that are pre-sold or sufficiently pre-leased. The Agencies invite comment on what standard should be used in determining whether a property is sufficiently pre-leased when prevailing occupancy rates are unusually low.

The Agencies invite comment on whether high asset correlation treatment for one-to four-family residential construction loans is appropriate, or whether they should be included in the low asset correlation category. In cases where loans finance the construction of a subdivision or other group of houses, some of which are pre-sold while others are not, the Agencies invite comment regarding how the “pre-sold” exception should be interpreted.

The Agencies invite comment on the competitive impact of treating defined classes of CRE differently. What are commenters’ views on an alternative approach where there is only one risk weight function for all CRE? If a single asset correlation treatment were considered, what would be the appropriate asset correlations to employ within a single risk-weight function applied to all CRE exposures?

Lease financings

Under the wholesale A-IRB framework, some lease financings require special consideration. A distinction is made for leases that expose the lessor to residual value risk, namely the risk of the fair value of the assets declining below the banking organization’s estimate of residual risk at lease inception. If a banking organization has exposure to residual

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value risk, it would assign a 100 percent risk weight to the residual value amount and determine a risk-weighted asset equivalent for the lease's remaining net investment (net of residual amount) using the same methodology as any other wholesale exposure. The sum of these components would be the risk-weighted asset amount for a particular lease. Where a banking organization does not have exposure to residual value risk, the lease net investment would be subject to a capital charge using the same methodology applied to any other wholesale exposure.

This approach would be used regardless of accounting classification as a direct finance, operating or leveraged lease. For leveraged leases, when the banking organization is the equity participant it would net the balance of the non-recourse debt against the discounted lease payment stream prior to applying the risk weight. If the bank is the debt participant, the exposure would be treated as any other wholesale credit exposure.

The Agencies are seeking comment on the wholesale A-IRB capital formulas and the resulting capital requirements. Would this approach provide a meaningful and appropriate increase in risk sensitivity in the sense that the results are consistent with alternative assessments of the credit risks associated with such exposures or the capital needed to support them? If not, where are there material inconsistencies?

Does the proposed A-IRB maturity adjustment appropriately address the risk differences between loans with differing maturities?

Retail Exposures: Definitions and Inputs

The second major exposure category in the A-IRB framework is the retail exposure category. This category encompasses the vast majority of credit exposures to individual consumers. The Agencies also are considering whether certain SME exposures should be eligible for retail A-IRB treatment. The retail exposure category has three distinct sub-categories: (1) residential mortgages (and related exposures); (2) qualifying revolving exposures

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(QREs); and (3) other retail exposures. There are separate A-IRB capital formulas for each of these three sub-categories to reflect different levels of associated risk.

The Agencies propose that the residential mortgage exposure sub-category be defined to include loans secured by first or subsequent liens on one- to four-family residential properties, including term loans and revolving lines of credit secured by home equity. There would be no upper limit on the size of the exposure that could be included in the residential mortgage exposure sub-category, but the borrower would have to be an individual and the banking organization should generally manage the exposure as part of a pool of similar exposures. Residential mortgage exposures that are individually internally rated and managed similarly to commercial exposures, rather than managed and internally rated as pools, would be treated under the wholesale A-IRB framework.

The second sub-category of retail exposures is qualifying revolving exposures (QREs). The Agencies propose to define QREs as exposures to individuals that are revolving, unsecured, uncommitted, less than \$100,000, and managed as part of a pool of similar exposures. In practice, QREs will include primarily exposures where customers' outstanding borrowings are permitted to fluctuate based on their own decisions to borrow and repay, up to a limit established by the banking organization. Most credit card exposures to individuals and overdraft lines on individual checking accounts would be QREs.

The third sub-category of retail exposures, other retail, includes two types of exposures. First, it encompasses all exposures to individuals for non-business purposes that are generally managed as part of a pool of similar exposures and that do not meet the conditions for inclusion in the first two sub-categories of retail exposures. The Agencies are not proposing to establish a fixed upper limit on the size of exposures to individuals that are eligible for the other retail

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treatment. In addition, the Agencies are proposing that the other retail sub-category include certain SME exposures that are managed on a pool basis similar to retail exposures. These exposures could be to a company or to an individual. The Agencies are considering an individual borrower exposure threshold of \$1 million for such exposures. For the purpose of assessing compliance with the individual borrower exposure threshold, the banking organization would aggregate all exposures to the individual borrower on a fully consolidated basis. Credit card accounts with balances between \$100,000 and \$1 million would be considered other retail rather than QRE, even if the accounts are extended to or guaranteed by an individual and used exclusively for small business purposes.

The Agencies are interested in comment on whether the proposed \$1 million threshold provides the appropriate dividing line between those SME exposures that banking organizations should be allowed to treat on a pooled basis under the retail A-IRB framework and those SME exposures that should be rated individually and treated under the wholesale A-IRB framework.

One of the most significant differences between the wholesale and retail A-IRB categories is that the risk inputs for retail exposures do not have to be assigned at the level of an individual exposure. The Agencies recognize that banking organizations typically manage retail exposures on a portfolio or pool basis, where each portfolio or pool contains exposures with similar risk characteristics. Therefore, a key characteristic of the retail A-IRB framework is that the risk inputs for retail exposures would be assigned to portfolios or pools of exposures rather than to individual exposures.

It is important to highlight that within each of the three sub-categories of retail exposures, the retail A-IRB framework is intended to provide banking organizations with substantial flexibility to use the retail portfolio segmentation that they believe is most appropriate for their activities. In determining how to group their retail exposures within each sub-category into

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portfolio segments for the purpose of assigning A-IRB risk inputs, the Agencies believe that banking organizations should use a segmentation approach that is consistent with their approach for internal risk assessment purposes and that classifies exposures according to predominant risk characteristics.

As general principles for segmentation, banking organizations would group exposures in each of the three retail sub-categories into portfolios or pools according to the sub-category's principal risk drivers, and would have to be able to demonstrate that the resultant segmentation effectively differentiates and rank orders risk and provides reasonably accurate and consistent quantitative estimates of PD, LGD, and EAD. With the exceptions noted below, the Agencies are not proposing that institutions must consider any particular risk drivers or employ any minimum number of portfolios or pools in any of the three retail sub-categories. The only specific limitations that the Agencies would propose in regard to the portfolio segmentation of retail exposures are (1) banking organizations generally would not be permitted to combine retail exposures from multiple countries into the same portfolio segment (because of differences in national legal systems and bankruptcy regimes), and (2) banking organizations would need to separately segment delinquent retail exposures.

The inputs to the retail A-IRB capital formulas differ slightly from the inputs to the wholesale A-IRB capital formulas. Measures of PD, LGD, and EAD remain important elements, but there is no M input to the retail A-IRB capital formulas. Rather, the retail A-IRB capital formulas implicitly incorporate average maturity effects in general, such as in the residential mortgage sub-category.

Aside from the applicable definition of default, the definitions of PD, LGD, and EAD for retail exposures are generally equivalent to those for wholesale exposures. One additional

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element of potential flexibility for banking organizations in the retail context needs to be highlighted. The Agencies recognize that certain banking organizations that may qualify for the advanced approaches segment their retail portfolios for management purposes by EL, rather than by separately measuring PD and LGD, as required under the A-IRB framework. Therefore, the Agencies propose that banking organizations be permitted substantial flexibility in translating measures of EL into the requisite PD and LGD inputs. For non-revolving portfolio segments, EL generally would equal the product of PD and LGD, so that if a banking organization has an estimate of EL and either PD or LGD, it would be able to infer an estimate of the other required input.

In addition, the Agencies are proposing that if one or the other of PD and LGD did not tend to vary significantly across portfolio segments, the banking organization would be permitted to apply a general estimate of that input to multiple segments and to use that general estimate, together with segment-specific estimates of EL, to infer segment-specific estimates of the other required input. The Agencies note, however, that this proposal offers substantial flexibility to institutions and may, in fact, be overly flexible (for example, because LGDs on residential mortgages tend to be quite cyclical). For these loans, the above method of inferring PDs or LGDs from a long-run average EL would not necessarily result in PD being estimated as a long-run average, and LGD would not necessarily reflect the loss rate expected to prevail when default rates are high. Banking organizations using an EL approach would have to ensure that the A-IRB capital requirement under this method is at least as conservative as a PD/LGD method in order to minimize any potential divergences between capital requirements computed under the PD/LGD approach versus an EL approach.

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As in the wholesale A-IRB framework, a floor of 3 basis points (0.03 percent) applies to the PD estimates for all retail exposures (that is, the minimum PD is 3 basis points). In addition, for residential mortgage exposures other than those guaranteed by a sovereign government, a floor of 10 percent on the LGD estimate would apply, based on the view that LGDs during periods of high default rates are unlikely to fall below this level if measured appropriately. Along with the overall monitoring of the implementation of the advanced approaches and the determination whether to generally relax the floors established during the initial implementation phases (that is, the 90 and 80 percent floors), the Agencies intend to review the need to retain PD and LGD floors for retail exposures following the first two years of implementation of the A-IRB framework.

The Agencies are proposing the following data requirements for retail A-IRB. Banking organizations would have to have a minimum of five years of data history for PD, LGD, and EAD, and preferably longer periods so as to include a complete economic cycle. Banking organizations would not have to give equal weight to all historical factors if they can demonstrate that the more recent data are better predictors of the risk inputs. Also, banking organizations would have to have a minimum of three years of experience with their segmentation and risk management systems.

Definition of default and loss

The retail definition of default and loss being proposed by the Agencies differs significantly from that proposed for the wholesale portfolio. Specifically, the Agencies propose to use the definitions of loss recognition embodied in the Federal Financial Institutions Examination Council (FFIEC) Uniform Retail Credit Classification and Account Management

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Policy.²¹ All residential mortgages and all revolving credits would be charged off, or charged down to the value of the property, after a maximum of 180 days past due; other credits would be charged off after a maximum of 120 days past due.

In addition, the Agencies are proposing to define a retail default to include the occurrence of any one of the three following events if it occurs prior to the respective 120- or 180-day FFIEC policy trigger: (1) a full or partial charge-off resulting from a significant decline in credit quality of the exposure; (2) a distressed restructuring or workout involving forbearance and loan modification; or (3) a notification that the obligor has sought or been placed in bankruptcy. Finally, for retail exposures (as opposed to wholesale) the definition of default could be applied to a particular facility, rather than to the obligor. That is, default on one obligation would not require a banking organization to treat all other obligations of the same obligor as defaulted.

Undrawn lines

The treatment of undrawn lines of credit, in particular those associated with credit cards, merits specific discussion. Banking organizations would be permitted to incorporate undrawn retail lines in one of two ways. First, banking organizations could incorporate them into their EAD estimates directly, by assessing the likelihood that undrawn balances would be drawn at the time of an event of default. Second, banking organizations could incorporate them into LGD estimates by assessing the size of potential losses in default (including those arising from both currently drawn and undrawn balances) as a proportion of the current drawn balance. In the latter case, it is possible that the relevant LGD estimates would exceed 100 percent. While the proposed EAD approach for undrawn wholesale and retail lines is the same, the Agencies are aware that the sheer volume of credit card undrawn lines and the ratio of undrawn lines to

²¹ The FFIEC Uniform Retail Credit Classification and Account Management Policy was issued on June 12, 2000. It is available on the FFIEC website at www.FFIEC.gov.

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outstanding balances create issues for undrawn retail lines that differ from undrawn wholesale lines not only in degree but also in kind.

An additional issue arises in connection with the undrawn lines associated with credit card accounts whose drawn balances (but not undrawn balances) have been securitized. To the extent that banking organizations remain exposed to the risk that such undrawn lines will be drawn, but these undrawn lines are not themselves securitized, then there is a need for institutions to hold regulatory capital against such undrawn lines. The Agencies propose that a banking organization would be required to hold capital against the full amount of any undrawn lines regardless of whether drawn amounts are securitized. This presumes that the institution itself is exposed to the credit risk associated with future draws.

The Agencies are interested in comments and specific proposals concerning methods for incorporating undrawn credit card lines that are consistent with the risk characteristics and loss and default histories of this line of business.

The Agencies are interested in further information on market practices in this regard, in particular the extent to which banking organizations remain exposed to risks associated with such accounts. More broadly, the Agencies recognize that undrawn credit card lines are significant in both of the contexts discussed above, and are particularly interested in views on the appropriate retail IRB treatment of such exposures.

Future margin income

In the New Accord, the retail A-IRB treatment of QREs includes a unique additional input that arises because of the large amount of expected losses typically associated with QREs. As noted above, the A-IRB approach would require banking organizations to hold regulatory capital against both EL and UL. Banking organizations may typically seek to cover expected losses through interest income and fees for all of their business activities and the Agencies recognize that this practice is a particularly important aspect of the business model for QREs.

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The Agencies are including in this proposal for the QRE sub-category only, that future margin income (FMI) be permitted to offset a portion of the A-IRB retail capital charge relating to EL. For this purpose, the Agencies propose to define the amount of eligible FMI for the QRE sub-category as the amount of income anticipated to be generated by the relevant exposures over the next twelve months that can reasonably be assumed to be available to cover potential credit losses on the exposures after covering expected business expenses, and after subtracting a cushion to account for potential volatility in credit losses (UL). FMI would not be permitted to include anticipated income from new accounts and would have to incorporate assumptions about income from existing accounts that are in line with the banking organization's historical experience. The amount of the cushion to account for potential volatility in credit losses would be set equal to two standard deviations of the banking organization's annualized loss rate on the exposures. The Agencies would expect banking organizations to be able to support their estimates of eligible FMI on the basis of historical data and would disallow the use of FMI in the QRE capital formula if this is not the case. The step needed to recognize eligible FMI is discussed below.

Permitting a FMI offset to the A-IRB capital requirement for QREs could have a significant impact on the level of minimum regulatory capital at institutions adopting the advanced approaches. The Agencies would need to fully assess and analyze the impact of such an FMI offset on institutions' risk-based capital ratios prior to final implementation of the A-IRB approach. Furthermore, the Agencies anticipate the need to issue additional guidance setting out more specific expectations in this regard.

For the QRE sub-category of retail exposures only, the Agencies are seeking comment on whether or not to allow banking organizations to offset a portion of the A-IRB capital requirement relating to expected losses by demonstrating that

their anticipated FMI for this sub-category is likely to more than sufficiently cover expected losses over the next year.

The Agencies are seeking comment on the proposed definitions of the retail A-IRB exposure category and sub-categories. Do the proposed categories provide a reasonable balance between the need for differential treatment to achieve risk-sensitivity and the desire to avoid excessive complexity in the retail A-IRB framework? What are views on the proposed approach to inclusion of small-business exposures in the other retail category?

The Agencies are also seeking views on the proposed approach to defining the risk inputs for the retail A-IRB framework. Is the proposed degree of flexibility in their calculation, including the application of specific floors, appropriate? What are views on the issues associated with undrawn retail lines of credit described here and on the proposed incorporation of FMI in the QRE capital determination process?

The Agencies are seeking comment on the minimum time requirements for data history and experience with segmentation and risk management systems: Are these time requirements appropriate during the transition period? Describe any reasons for not being able to meet the time requirements.

Retail Exposures: Formulas

The retail A-IRB capital formulas are very similar to the wholesale A-IRB formulas, and are based on the same underlying concepts. However, because there is no M adjustment associated with the retail A-IRB framework, the retail A-IRB capital calculations generally involve fewer steps than the wholesale A-IRB capital calculations. As with the wholesale A-IRB framework, the output of the retail A-IRB formulas is a minimum capital requirement, expressed in dollars, for the relevant set of exposures. The capital requirement would be converted into an equivalent amount of risk-weighted assets by multiplying the capital requirement by 12.5. The two key steps in implementing the retail A-IRB capital formulas are (1) assessing the relevant asset correlation parameter, and (2) calculating the minimum capital requirement for the relevant pool of exposures.

Residential mortgages and related exposures

For residential mortgage and related exposures, the retail A-IRB capital formula requires only one step. This is because the asset correlation parameter for such exposures is fixed at 15 percent, regardless of the PD. The fixed asset correlation parameter reflects the Agencies' view that the arguments for linking the asset correlation to PD, as occurs in the wholesale A-IRB framework and in the other two sub-categories of retail exposures, are not as relevant for residential mortgage-related exposures, whose performance is significantly influenced by broader trends in the housing market for borrowers of all credit qualities. The assumed asset correlation of 15 percent also seeks implicitly to reflect the higher average maturity associated with residential mortgage exposures and is therefore higher than would likely be the case if a specific maturity adjustment were also included in the framework. The proposed retail A-IRB capital formula for residential mortgage and related exposures is as follows:

$$K = EAD * LGD * N[1.08465 * G(PD) + 0.4201 * G(0.999)]$$

Where

K denotes the capital requirement;

EAD denotes exposure at default;

LGD denotes loss given default;

N(x) denotes the standard normal cumulative distribution function;

G(x) denotes the inverse of the standard normal cumulative distribution function; and

PD denotes probability of default.

The following table depicts a range of representative capital requirements (K) for residential mortgage and related exposures based on this formula. The EAD is assumed to be equal to \$100. Three different illustrative LGD assumptions are shown: 15 percent, 35 percent,

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and 55 percent. For comparison purposes, the current capital requirement on most first mortgage loans is 4 percent and on most home equity loans is 8 percent.

Capital Requirements (in percentage points)

PD	LGD		
	15 percent	35 percent	55 percent
0.05 percent	0.17	0.41	0.64
0.10 percent	0.30	0.70	1.10
0.25 percent	0.61	1.41	2.22
0.50 percent	1.01	2.36	3.70
1.00 percent	1.65	3.86	6.06
2.00 percent	2.64	6.17	9.70
5.00 percent	4.70	10.97	17.24
10.00 percent	6.95	16.22	25.49
20.00 percent	9.75	22.75	35.75

Subject to the caveats noted earlier, evidence from QIS3 suggested that advanced approach banking organizations would experience a reduction in capital requirements for mortgage exposures of about 56 percent.

Private mortgage insurance

The Agencies wish to highlight one issue associated with the A-IRB capital requirements for the residential mortgage sub-category relating to the treatment of private mortgage insurance (PMI). Most PMI arrangements effectively provide partial compensation to the banking organization in the event of a mortgage default. Accordingly, the Agencies consider that it may be appropriate for banking organizations to recognize such effects in the LGD estimates for individual portfolio segments, consistent with the historical loss experience on those segments during periods of high default rates. Such an approach would avoid requiring banking organizations to quantify specifically the effect of PMI on a loan-by-loan basis; rather, they could estimate the effect of PMI on an average basis for each segment. This approach effectively ignores the risk that the mortgage insurers themselves could default.

The Agencies also seek comment on the competitive implications of allowing PMI recognition for banking organizations using the A-IRB approach but not allowing such recognition for general banks. In addition, the Agencies are interested in data on the relationship between PMI and LGD to help assess whether it may be appropriate to exclude residential mortgages covered by PMI from the proposed 10 percent LGD floor. The Agencies request comment on whether or the extent to which it might be appropriate to recognize PMI in LGD estimates.

More broadly, the Agencies are interested in information regarding the risks of each major type of residential mortgage exposure, including prime first mortgages, sub-prime mortgages, home equity term loans, and home equity lines of credit. The Agencies are aware of various views on the resulting capital requirements for several of these product areas, and wish to ensure that all appropriate evidence and views are considered in evaluating the A-IRB treatment of these important exposures.

The risk-based capital requirements for credit risk of prime mortgages could well be less than one percent of their face value under this proposal. The Agencies are interested in evidence on the capital required by private market participants to hold mortgages outside of the federally insured institution and GSE environment. The Agencies also are interested in views on whether the reductions in mortgage capital requirements contemplated here would unduly extend the federal safety net and risk contributing to a credit-induced bubble in housing prices. In addition, the Agencies are also interested in views on whether there has been any shortage of mortgage credit under general risk-based capital rules that would be alleviated by the proposed changes.

Qualifying revolving exposures

The second sub-category of retail exposures is QREs. The calculation of capital requirements for QREs would require three steps: (1) calculation of the relevant asset correlation, (2) calculation of the minimum capital requirement assuming no offset for eligible FMI, and (3) application of the offset for eligible FMI. These steps would be performed for each QRE portfolio segment individually.

As in the case of wholesale exposures, it is assumed that the asset correlation for QREs declines as PD rises. This reflects the view that pools of borrowers with lower credit quality (high PD) are less likely to experience simultaneous defaults than pools of higher credit quality (low PD) borrowers, because with high PD borrowers defaults are more likely to result from

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borrower-specific or idiosyncratic factors. In the case of QREs, the asset correlation approaches an upper bound value of 11 percent for very low PD values and approaches a lower bound value of 2 percent for very high PD values. The specific formula for determining the asset correlation parameter for QREs is as follows:

$$R = 0.02 * (1 - \text{EXP}(-50 * \text{PD})) + 0.11 * [1 - (1 - \text{EXP}(-50 * \text{PD}))]$$

Where

R denotes correlation;

EXP denotes the natural exponential function; and

PD denotes probability of default.

The second step in the A-IRB capital calculation for QREs would be the calculation of the capital requirement assuming no FMI offset. The specific formula to calculate this amount is as follows:

$$K_{\text{No FMI}} = \text{EAD} * \text{LGD} * N[(1 - R)^{-0.5} * G(\text{PD}) + (R / (1 - R))^{0.5} * G(0.999)]$$

Where

K_{NoFMI} denotes capital requirement assuming no FMI offset;

EAD denotes exposure at default;

LGD denotes loss given default;

$N(x)$ denotes the standard normal cumulative distribution function;

R denotes asset correlation;

$G(x)$ denotes the inverse of the standard normal cumulative distribution function; and

PD denotes probability of default.

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Future margin income adjustment

The result of this calculation effectively includes both an EL and a UL component. As already discussed, for QREs only, the Agencies are considering the possibility of allowing institutions to offset a portion of the EL portion of the capital requirement using eligible FMI, as defined above. Up to 75 percent of the EL portion of the capital requirement could potentially be offset in this fashion. The specific calculation for determining the capital requirement (K) after application of the potential offset for eligible FMI is as follows.

$$K = K_{\text{No FMI}} - \text{eligible FMI offset}$$

Where

K denotes the capital requirement after application of an offset for eligible FMI;

K_{noFMI} denotes the capital requirement assuming no FMI offset;

Eligible FMI offset equals:

0.75 * EL if estimated FMI equals or exceeds the expected 12-month loss amount plus two standard deviations of the annualized loss rate, or zero otherwise;

EL denotes expected loss (EL = EAD * PD * LGD);

FMI denotes future margin income;

EAD denotes exposure at default;

PD denotes probability of default; and

LGD denotes loss given default.

If eligible FMI did not exceed the required minimum, then recognition of eligible FMI would be disallowed.

The Agencies are interested in views on whether partial recognition of FMI should be permitted in cases where the amount of eligible FMI fails to meet the

required minimum. The Agencies are also interested in views on the level of portfolio segmentation at which it would be appropriate to perform the FMI calculation. Would a requirement that FMI eligibility calculations be performed separately for each portfolio segment effectively allow FMI to offset EL capital requirements for QRE exposures?

The following table depicts a range of representative capital requirements (K) for QREs based on these formulas. In each case, it is assumed that the maximum offset for eligible FMI has been applied. The LGD is assumed to equal 90 percent, consistent with recovery rates for credit card portfolios. The table shows capital requirements with recognition of FMI and without recognition of FMI but using the same formula in other respects. As PDs increase, the proportion of total required capital held against EL after deducting the 75 percent offset rises at an increasing rate and the proportion held against UL declines at an increasing rate. Offsets from EL, as considered in this ANPR, would therefore have a proportionally greater impact on reducing required capital charges as default probabilities increase. For comparison purposes, the current capital requirement on drawn credit card exposures is 8 percent and is zero for undrawn credit lines.

Capital Requirement (in percentage points)

PD	With FMI Capital 8%	Without FMI Capital 8%
0.05	0.68	0.72
0.10	1.17	1.23
0.25	2.24	2.41
0.50	3.44	3.78
1.00	4.87	5.55
2.00	6.21	7.56
5.00	7.89	11.27
10.0	11.12	17.87
20.0	17.23	30.73

Subject to the same qualifications mentioned earlier, the QIS3 results estimated an increase in capital requirements for QRE of about 16 percent.

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Other retail

The third and final sub-category of retail A-IRB exposures is other retail. This sub-category encompasses a wide variety of different exposures including auto loans, student loans, consumer installment loans, and some SME loans. Two steps would be required to calculate the A-IRB capital requirement for other retail exposures: (1) calculating the relevant asset correlation parameter, and (2) calculating the capital requirement. Both of these steps would be done separately for each portfolio segment included within the other retail sub-category.

As for wholesale exposures and QREs, it would be assumed that the asset correlation for other retail exposures declines as PD rises. In the case of other retail exposures, the asset correlation parameter approaches an upper bound value of 17 percent for very low PD values and approaches a lower bound value of 2 percent for very high PD values. The specific formula for determining the asset correlation for other retail exposures is as follows:

$$R = 0.02 * (1 - \text{EXP}(-35 * \text{PD})) + 0.17 * [1 - (1 - \text{EXP}(-35 * \text{PD}))]$$

Where

R denotes asset correlation;

EXP denotes the natural exponential function; and

PD denotes probability of default.

The second step in the A-IRB capital calculation for other retail exposures would be the calculation of the capital requirement (K). The specific formula to calculate this amount is as follows:

$$K = \text{EAD} * \text{LGD} * N[(1 - R)^{-0.5} * G(\text{PD}) + (R / (1 - R))^{0.5} * G(0.999)]$$

Where

K denotes the capital requirement;

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EAD denotes exposure at default;

LGD denotes loss given default;

PD denotes probability of default;

$N(x)$ denotes the standard normal cumulative distribution function;

$G(x)$ denotes the inverse of the standard normal cumulative distribution function; and

R denotes asset correlation.

The following table depicts a range of representative capital requirements (K) for other retail exposures based on this formula. Three different LGD assumptions are shown: 25 percent, 50 percent, and 75 percent, in order to depict a range of potential outcomes depending on the characteristics of the underlying retail exposure. For comparison purposes, the current capital requirement on most of the exposures likely to be included in the other retail sub-category is 8 percent.

Capital Requirements (in percentage points)

PD	LGD		
	25 percent	50 percent	75 percent
0.05 percent	0.33	0.66	0.99
0.10 percent	0.56	1.11	1.67
0.25 percent	1.06	2.13	3.19
0.50 percent	1.64	3.28	4.92
1.00 percent	2.35	4.70	7.05
2.00 percent	3.08	6.15	9.23
5.00 percent	3.94	7.87	11.81
10.00 percent	5.24	10.48	15.73
20.00 percent	8.55	17.10	25.64

Subject to the qualifications described earlier, QIS3 estimated a 25 percent reduction in risk-based capital requirements for the other retail category.

The Agencies are seeking comment on the retail A-IRB capital formulas and the resulting capital requirements, including the specific issues mentioned. Are there particular retail product lines or retail activities for which the resulting A-IRB

capital requirements would not be appropriate, either because of a misalignment with underlying risks or because of other potential consequences?

A-IRB: Other Considerations

As described earlier, the A-IRB capital requirement includes components to cover both EL and UL. Because banking organizations have other resources to cover expected losses, the Agencies proposes to recognize certain of these measures as potential offsets to the A-IRB capital requirement, subject to the limitations set forth below. The use of eligible FMI for QREs is one such potential mechanism that has already been discussed.

Loan loss reserves

A second important mechanism involves the allowance for loan and lease losses (ALLL), also referred to as general loan loss reserves. Under the general risk-based capital rules, an amount of the ALLL is eligible for inclusion as an element of Tier 2 capital, up to a limit equal to 1.25 percent of gross risk-weighted assets. Loan loss reserves above this limit are deducted from risk-weighted assets, on a dollar-for-dollar basis. The New Accord proposes to retain the 1.25 percent limit on the eligibility of loan loss reserves as an element of Tier 2 capital. However, the proposal also contains, and the Agencies are proposing for comment, a feature that would allow the amount of the ALLL (net of associated deferred tax) above this 1.25 percent limit to be used to offset the EL portion of A-IRB capital requirements in certain circumstances.

The offset would be limited to that amount of EL that exceeds the 1.25 percent limit. For example, if the 1.25 percent limit equals \$100, the ALLL equals \$125, and the EL portion of the A-IRB capital requirement equals \$110, then \$10 of the capital requirement may be directly offset ($\$110 - \100). The additional amount of the ALLL not included in Tier 2 capital and not included as a direct offset against the A-IRB capital requirement ($\$125 - \$110 = \$15$ in the example) would continue to be deducted from risk-weighted assets.

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It is important to recognize that this treatment would likely result in a significantly more favorable treatment of such excess ALLL amounts than simply deducting them from risk-weighted assets. Under the proposal, banking organizations would be allowed to multiply the eligible excess ALLL by a factor of 12.5 because the minimum total capital requirement is 8 percent of risk-weighted assets. In effect, this treatment is 12.5 times more favorable than the general risk-based capital rules, which allow only a deduction against risk-weighted assets on a dollar-for-dollar basis. In addition, it is important to note that a dollar-for-dollar offset against the A-IRB capital requirement is also more favorable than the inclusion of ALLL below the 1.25 percent limit in Tier 2 capital, since the latter has no impact on Tier 1 capital ratios, while the former does.

The Agencies recognize the existence of various issues in regard to the proposed treatment of ALLL amounts in excess of the 1.25 percent limit and are interested in views on these subjects, as well as related issues concerning the incorporation of expected losses in the A-IRB framework and the treatment of the ALLL generally. Specifically, the Agencies invite comment on the domestic competitive impact of the potential difference in the treatment of reserves described.

Another issue the Agencies wish to highlight is the inclusion within the New Accord of the ability for banking organizations to make use of “general specific” provisions as a direct offset against EL capital requirements. Such provisions are not specific to particular exposures but are specific to particular categories of exposures and are not allowed as an element of Tier 2 capital. While several other countries make use of such provisions, the Agencies do not believe existing elements of the ALLL in the United States qualify for such treatment.

The Agencies seek views on this issue, including whether the proposed U.S. treatment has significant competitive implications. Feedback also is sought on whether there is an inconsistency in the treatment of general specific provisions (all of which may be used as an offset against the EL portion of the A-IRB capital requirement) in comparison to the treatment of the ALLL (for which only those amounts of general reserves exceeding the 1.25 percent limit may be used to offset the EL capital charge).

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Charge-offs

Another potential offset to the EL portion of the A-IRB capital requirements is the use of partial charge-offs, where a portion of an individual exposure is written off. Given the A-IRB definition of default, a partial charge-off would cause an exposure to be classified as a defaulted exposure (that is, PD=100%), in which case the A-IRB capital formulas ensure that the resulting capital requirement on the defaulted exposure is equal to EAD * LGD, where EAD is defined as the gross exposure amount prior to the partial charge-off. All of this capital requirement can be considered to be covering EL.

The New Accord proposes that for such partially charged off exposures, the banking organization be allowed to use the amount of the partial charge-off to offset the EL component of that asset's capital charge on a dollar-for-dollar basis. In addition, to the extent that the partial charge-off on a defaulted exposure exceeds the EL capital charge on that exposure, the amount of this surplus could be used to offset the EL capital charges on other defaulted assets in the same portfolio (for example, corporates, banks, residential mortgages, etc.), but not for any other purpose.

An implication of the New Accord is that if a defaulted loan's charge-off were at least equal to its expected loss, no additional capital requirement would be incurred on that exposure. For example, consider a \$100 exposure having an LGD of 40 percent, implying an expected loss of \$40, equal to the IRB capital charge. If the charge off were equal to \$40, under the New Accord approach, there would be no additional capital required against the resultant \$60 net position. The Agencies do not believe this is a prudent or acceptable outcome, since this position is not riskless and a banking organization could be forced to recognize additional charge-offs if the recoveries turn out to be less than expected.

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To preclude this possibility, the Agencies propose that, for defaulted exposures, the A-IRB capital charge (inclusive of any EL offsets for charge-offs) be calculated as the sum of (a) $EAD * LGD$ less any charge-offs and (b) 8 percent of the carrying value of the loan (i.e., the gross exposure amount (EAD) less any charge-offs)

Also, the charged off amounts in excess of the $EAD * LGD$ product would not be permitted to offset the EL capital requirements for other exposures. In effect, the proposed A-IRB capital charge on a defaulted exposure adds a buffer for defaulted assets and results in a floor equal to 8 percent against the remaining book value if the banking organization has taken a charge-off equal to or greater than the $EAD * LGD$. Importantly, this treatment would not apply to a defaulted exposure that has been restructured and where the obligor has not yet defaulted on the restructured credit. Upon any restructuring, whether associated with a default or otherwise, the A-IRB capital charge would be based on the EAD, PD, LGD, and M applicable to the exposure after it has been restructured. The existence of any partial charge-offs associated with the pre-restructured credit would affect the A-IRB capital charge on the restructured exposure only through its impact on the post-restructured exposure's EAD, PD, and/or LGD.

Purchased Receivables

This section describes the A-IRB treatment for wholesale and retail credit exposures acquired from another institution (purchased receivables). The purchase of such exposures may expose the acquiring banking organisation to potential losses from two sources: credit losses attributable to defaults by the underlying receivables obligors, and losses attributable to *dilution* of the underlying receivables.²² The total A-IRB capital requirement for purchased credit

²² Dilution refers to the possibility that the contractual amounts payable by the receivables obligors may be reduced through future cash or non-cash credits to the accounts of these obligors. Examples include offsets or allowances arising from returns of goods sold, disputes regarding product quality, possible debts of the

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exposures would be the sum of (a) a capital charge for credit risk, and (b) a separate capital charge for dilution risk, when dilution is a material factor.

Capital charge for credit risk

The New Accord's proposed treatment of purchased loans would treat a purchase discount as equivalent to a partial charge-off, and for this reason it could imply a zero capital charge against certain exposures. In general, a zero capital charge would emerge whenever the difference between a loan's face value and purchase price (the purchase discount) exceeded its LGD, as might be the case with a secondary market purchase of deeply distressed debt. Again, the Agencies believe that a zero capital charge in such a circumstance is unwarranted because the position is not riskless.

The Agencies propose that for a credit exposure that is purchased or acquired from another party, the A-IRB capital charge would be calculated as if the exposure was a direct loan to the underlying obligor in the amount of the loan's carrying value to the purchasing bank (that is, its amortized purchase price) with other attributes of the loan agreement (for example, maturity, collateral, covenants) and, hence, LGD, remaining unchanged. This treatment would apply regardless of whether the carrying value to the purchasing bank was less than, equal to, or greater than the underlying instrument's face value. Thus, if a loan having a principal amount equal to \$100 and associated PD and LGD of 10 percent and 40 percent was purchased for \$80, the capital charge against the purchased loan would be calculated as if that loan had an EAD equal to \$80, PD equal to 10 percent, and LGD equal to 40 percent.

In general, the same treatment would apply to pools of purchased receivables. However, under the conditions detailed below, an alternative 'top-down' approach (similar to that used for

originator/seller to a receivables obligor, and any payment or promotional discounts offered by the originator/seller (e.g., a credit for cash payments within 30 days).

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retail exposures) may be applied to pools of purchased receivables if the purchasing banking organization can only estimate inputs to the capital function (PD, LGD, EAD, and M) on a pool or aggregate basis.

Top-down method for pools of purchased receivables

Under the top-down approach, required capital would be determined using the appropriate A-IRB capital formula (that is, for wholesale exposures, the wholesale capital function, and for retail exposures, the appropriate retail capital function) in combination with estimates of PD, LGD, EAD and M developed for pools of receivables. In estimating the pool parameters, the banking organization first would determine EL for the purchased receivables pool, expressed (in decimal form) at an annual rate relative to the amount currently owed to the banking organization by the obligors in the receivables pool. The estimated EL would not take into account any assumptions of recourse or guarantees from the seller or other parties. If the banking organization can decompose EL into PD and LGD components, then it would do so and use those components as inputs into the capital function. If the institution cannot decompose EL then it would use the following split: PD would equal the estimated EL, and LGD would be 100 percent. Under the top-down approach, EAD would equal the carrying amount of the receivables and for wholesale exposures, M would equal the exposure-weighted average effective maturity of the receivables in the pool.²³

Treatment of undrawn receivables purchase commitments

Capital charges against any undrawn portions of receivables purchase facilities ('undrawn purchase commitments') also would be calculated using the top-down methodology. The EL (and/or PD and LGD) parameters would be determined on the basis of the current pool of

²³ If a banking organization can estimate the exposure-weighted average size of the pool it also would use the firm-size adjustment (S) in the wholesale framework.

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eligible receivables using the pool-level estimation methods described above. For undrawn commitments under revolving purchase facilities, the New Accord specifies that the EAD would be set at 75 percent of the undrawn line. This treatment reflects a concern that relevant historical data for estimating such EADs reliably is not available at many banking organisations. For other undrawn purchase commitments, EAD would be estimated by the bank providing the facility and would be subject to the same operational standards that are applicable to undrawn wholesale credit lines. The level of M associated with undrawn purchase commitments would be the average effective maturity of receivables eligible for purchase from that seller, so long as the facility contains effective arrangements for protecting the banking organisation against an unanticipated deterioration. In the absence of such protections, the M for an undrawn commitment would be calculated as the sum of (a) the longest-dated potential receivable under the purchase agreement, and (b) the remaining maturity of the facility.

The Agencies seek comment on the proposed methods for calculating credit risk capital charges for purchased exposures. Are the proposals reasonable and practicable?

For committed revolving purchase facilities, is the assumption of a fixed 75 percent conversion factor for undrawn advances reasonable? Do banks have the ability (including relevant data) to develop their own estimate of EADs for such facilities? Should banks be permitted to employ their own estimated EADs, subject to supervisory approval?

A banking organization may only use the top-down approach with approval of its primary Federal supervisor. In addition, the purchased receivables would have to have been purchased from unrelated, third party sellers and the organisation may not have originated the credit exposures either directly or indirectly. The receivables must have been 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 qualify). Also, the receivables may not have a remaining maturity of greater than one year,

unless they are fully secured. The agencies propose that the bottom-up method would have to be used for receivables to any single obligor, or to any group of related obligors, that aggregate to more than \$1 million.

Capital Charge for Dilution Risk

When dilution is a material risk factor,²⁴ purchased receivables would be subject to a separate capital charge for that risk. The capital charge may be calculated at the level of individual receivables and then aggregated, or, for a pool of receivables, at the level of the pool as a whole. The capital charge for dilution risk would be calculated using the wholesale A-IRB formula and the following parameters: EAD would be equal to the gross amount of receivable(s) balance(s); LGD would be 100 percent; M would be the (exposure weighted-average) effective maturity of the exposure(s); and PD would be the expected dilution loss rate, defined as total expected dilution losses over the remaining term of the receivable(s) divided by EAD.²⁵ Expected dilution losses would be computed on a stand-alone basis; that is, under the assumption of no recourse or other support from the seller or third party guarantors.

The following table illustrates the dilution risk capital charges (per dollar of EAD) implied by this approach for a hypothetical pool of purchased receivables having a remaining maturity of one year or less. As can be seen, the proposal implies capital charges for dilution risk that are many multiples of expected dilution losses.

Capital Requirements (in percentage points)

Expected Dilution Loss Rate	Dilution Risk Capital Charge (per dollar of EAD, percent)
0.05 percent	2.05

²⁴ If dilution risk is immaterial there would be no additional capital charge.

²⁵ If the remaining term exceeds one year, the expected dilution loss rate would be specified at an annual rate.

0.10 percent	3.42
0.25 percent	6.41
0.50 percent	9.77
1.00 percent	14.03
2.00 percent	19.03
5.00 percent	28.45
10.00 percent	41.24

The Agencies seek comment on the proposed methods for calculating dilution risk capital requirements. Does this methodology produce capital charges for dilution risk that seem reasonable in light of available historical evidence? Is the corporate A-IRB capital formula appropriate for computing capital charges for dilution risk?

In particular, is it reasonable to attribute the same asset correlations to dilution risk as are used in quantifying the credit risks of corporate exposures within the A-IRB framework? Are there alternative method(s) for determining capital charges for dilution risk that would be superior to that set forth above?

Minimum requirements

The Agencies propose to apply standards for the estimation of risk parameters and expected dilution losses and for the control and risk management systems associated with purchased receivables programs that are consistent with the general guidance contained in the New Accord. These standards will aim to ensure that risk parameter and expected dilution loss estimates are reliable and consistent over time, and reflect all relevant information that is available to the acquiring bank. The minimum operational requirements are intended to ensure that the acquiring bank has a valid legal claim to cash proceeds generated by the exposures pool, that the pool and cash proceeds are closely monitored and controlled, and that systems are in place to identify and address seller, servicer, and other potential risks. A more detailed discussion of these will be provided when the Agencies release draft examination guidance dealing with purchased receivables programs.

The Agencies seek comment on the appropriate eligibility requirements for using the top-down method. Are the proposed eligibility requirements, including the \$1 million limit for any single obligor, reasonable and sufficient?

The Agencies seek comment on the appropriate requirements for estimating expected dilution losses. Is the guidance set forth in the New Accord reasonable and sufficient?

Risk mitigation

For purposes of reducing the capital charges for credit risk or dilution risk with respect to purchased receivables, purchase discounts, guarantees, and other risk mitigants may be recognized through the same framework used elsewhere in the A-IRB approach.

Credit Risk Mitigation Techniques

The New Accord takes account of the risk-mitigating effects of both financial and nonfinancial collateral, as well as guarantees, including credit derivatives. For these risk mitigants to be recognized for regulatory capital purposes, the banking organization must have in place operational procedures and risk management processes that ensure that all documentation used in collateralizing or guaranteeing a transaction is binding on all parties and legally enforceable in all relevant jurisdictions. The banking organization must have conducted sufficient legal review to verify this conclusion, must have a well-founded legal basis for the conclusion, and must reconduct such a review as necessary to ensure continuing enforceability.

Adjusting LGD for the effects of collateral

A banking organization would be able to take into account the risk-mitigating effect of collateral in its internal estimates of LGD, provided the organization has established internal requirements for collateral management, operational procedures, legal certainty, and risk management processes that ensure that:

- 1) the legal mechanism under which the collateral is pledged or transferred ensures that the banking organization has the right to liquidate or take legal possession of the collateral in a timely manner in the event of the default, insolvency, or bankruptcy (or

other defined credit event) of the obligor and, where applicable, the custodian holding the collateral;

- 2) the banking organization has taken all steps necessary to fulfill legal requirements to secure the organization's interest in the collateral so that it has and maintains an enforceable security interest;
- 3) the banking organization has clear and robust procedures for the timely liquidation of collateral to ensure observation of any legal conditions required for declaring the default of the borrower and prompt liquidation of the collateral in the event of default;
- 4) the banking organization has established procedures and practices for (i) conservatively estimating, on a regular ongoing basis, the market value of the collateral, taking into account factors that could affect that value (for example, the liquidity of the market for the collateral and obsolescence or deterioration of the collateral), and (ii) where applicable, for periodically verifying the collateral (for example, through physical inspection of collateral such as inventory and equipment); and
- 5) the banking organization has in place systems for requesting and receiving promptly additional collateral for transactions whose terms require maintenance of collateral values at specified thresholds.

In reflecting collateral in the LGD estimate, the banking organization would need to consider the extent of any dependence between the risk of the borrower and that of the collateral or collateral provider. The banking organization's assessment of LGD would have to address in a conservative way any significant degrees of dependence, as well as any currency mismatch between the underlying obligation and the collateral. The LGD estimates would have to be

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grounded in historical recovery rates on the collateral and could not be based solely upon the collateral's estimated market value.

Repo-style transactions subject to master netting agreements

Repo-style transactions include reverse repurchase agreements and repurchase agreements and securities lending and borrowing transactions, including those executed on an indemnified agency basis.²⁶ Many of these transactions are conducted under a bilateral master netting agreement or equivalent arrangement. The effects of netting arrangements generally would be recognized where the banking organization takes into account the risk-mitigating effect of collateral through an adjustment to EAD. To qualify for the EAD adjustment treatment, the repo-style transaction would have to be marked-to-market daily and be subject to a daily margin maintenance requirement. Further, the repo-style transaction would have to be documented under a qualifying master netting agreement that would have to:

- 1) provide the non-defaulting party the right to terminate and close out promptly all transactions under the agreement upon an event of default, including in the event of insolvency or bankruptcy of the counterparty;
- 2) provide for the netting of gains and losses on transactions (including the value of any collateral) terminated and closed out under the agreement so that a single net amount is owed by one party to the other;
- 3) allow for the prompt liquidation or setoff of collateral upon the occurrence of an event of default; and

²⁶ Some banking organizations, particularly those that are custodians, lend, as agent, their customers' securities on a collateralized basis. Typically, the agent banking organization indemnifies the customer against risk of loss in the event the borrowing counterparty defaults. Where such indemnities are extended, the agent banking organization has the same risks it would have if it had entered into the transaction as principal.

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- 4) be, together with the rights arising from the provisions required in 1) to 3) above, legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of the counterparty's insolvency or bankruptcy.

Where a banking organization's repo-style transactions do not meet these requirements, it would not be able to use the EAD adjustment method. Rather, for each individual repo-style transaction it would estimate an LGD that takes into account the collateral received. It would use the notional amount of the transaction for EAD; it would not take into account netting effects for purposes of determining either EAD or LGD.

The method for determining EAD for repo-style transactions, described below, is essentially the determination of an unsecured loan equivalent exposure amount to the counterparty. Thus, no collateral effects for these transactions would be recognized through LGD; rather, the applicable LGD would be the one the banking organization would estimate for an unsecured exposure to the counterparty.

To determine EAD, the banking organization would add together its current exposure to the counterparty under the master netting arrangement and a measure for PFE to the counterparty under the master netting arrangement. The current exposure would be the sum of the market values of all securities and cash lent, sold subject to repurchase, or pledged as collateral to the counterparty under the master netting agreement, less the sum of the market values of all securities and cash lent, sold subject to repurchase, or pledged as collateral by the counterparty. The PFE calculation would be based on the market price volatilities of the securities delivered to, and the securities received from, the counterparty, as well as any foreign exchange rate volatilities associated with any cash or securities delivered or received.

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Banking organizations would use a VaR-type measure for determining PFE for repo-style transactions subject to master netting agreements. Banking organizations would be required to use a 99th percentile, one-tailed confidence interval for a five-day holding period using a minimum one-year historical observation period of price data. Banking organizations would have to update their data sets no less frequently than once every three months and reassess them whenever market prices are subject to material changes. The illiquidity of lower-quality instruments would have to be taken into account through an upward adjustment in the holding period where the five-day holding period would be inappropriate given the instrument's liquidity. No particular model would be prescribed for the VaR-based measure, but the model would have to capture all material risks for included transactions.

Banking organizations using a VaR-based approach to measuring PFE would be permitted to take into account correlations in the price volatilities among instruments delivered to the counterparty and among instruments received from the counterparty, as well as between the two sets of instruments. The VaR-based approach for calculating PFE for repo-style transactions would be available to all banking organizations that received supervisory approval for an internal market risk model under the market risk capital rules. Other banking organizations could apply separately for supervisory approval to use their internal VaR models for calculation of PFE for repo-style transactions.

A banking organization would use the following formula to determine EAD for each counterparty with which it has a master netting agreement for repo-style transactions.

$$\text{EAD} = \max \{0, [(\Sigma E - \Sigma C) + (\text{VaR output from internal market risk model} \times \text{multiplier})]\}$$

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Where:

E denotes the current value of the exposure (that is, all securities and cash delivered to the counterparty); and

C denotes the current value of the collateral received (that is, all securities and cash received from the counterparty).

The multiplier in the above formula would be determined based on the results of the banking organization's backtesting of the VaR output. To backtest the output, the banking organization would be required to identify on an annual basis twenty counterparties that include the ten largest as determined by the banking organization's own exposure measurement approach and ten others selected at random. For each day and for each of the twenty counterparties, the banking organization would compare the previous day's VaR estimate for the counterparty portfolio to the change in the current exposure of the previous day's portfolio. This change represents the difference between the net value of the previous day's portfolio using today's market prices and the net value of that portfolio using the previous day's market prices. Where this difference exceeds the previous day's VaR estimate, an exception would have occurred.

At the end of each quarter, the banking organization would identify the number of exceptions it has observed for its twenty counterparties over the most recent 250 business days, that is, the number of exceptions in the most recent 5000 observations. Depending on the number of exceptions, the output of the VaR model would be scaled up using a multiplier as provided in the table below.

Zone	Number of Exceptions	Multiplier
Green Zone	0-99	None (=1)
Yellow Zone	100-119	2.0
	120-139	2.2
	140-159	2.4
	160-179	2.6

	180-199	2.8
Red Zone	200 or more	3.0

The Agencies seek comments on the methods set forth above for determining EAD, as well as on the proposed backtesting regime and possible alternatives banking organizations might find more consistent with their internal risk management processes for these transactions. The Agencies also request comment on whether banking organizations should be permitted to use the standard supervisory haircuts or own estimates haircuts methodologies that are proposed in the New Accord.

Guarantees and credit derivatives

The Agencies are proposing that banking organizations reflect the credit risk mitigating effects of guarantees and credit derivatives through adjusting the PD or the LGD estimate (but not both) of the underlying obligation that is protected. The banking organization would be required to assign the borrower and guarantor to an internal rating in accordance with the minimum requirements set out for unguaranteed (unhedged) exposures, both prior to the adjustments and on an ongoing basis. The organization also would be required to monitor regularly the guarantor's condition and ability and willingness to honor its obligation. For guarantees on retail exposures, these requirements would also apply to the assignment of an exposure to a pool and the estimation of the PD of the pool.

For purposes of reflecting the effect of guarantees in regulatory capital requirements, the Agencies are proposing that a banking organization have clearly specified criteria for adjusting internal ratings or LGD estimates -- or, in the case of retail exposures, for allocating exposures to pools to reflect use of guarantees and credit derivatives -- that take account of all relevant information. The adjustment criteria would have to require a banking organization to (i) meet all minimum requirements for an unhedged exposure when assigning borrower or facility ratings to guaranteed/hedged exposures; (ii) be plausible and intuitive; (iii) consider the guarantor's ability

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and willingness to perform under the guarantee; (iv) consider the extent to which the guarantor's ability and willingness to perform and the borrower's ability to repay may be correlated (that is, the degree of wrong-way risk); and (v) consider the payout structure of the credit protection and conservatively assess its effect on the level and timing of recoveries. The banking organization also would be required to consider any residual risk to the borrower that may remain -- for example, a currency mismatch between the credit protection and the underlying exposure.

Banking organizations would be required to make adjustments to alter PD or LGD estimates in a consistent way for a given type of guarantee or credit derivative. In all cases, the adjusted risk weight for the hedged obligation could not be less than the risk weight associated with a comparable direct exposure on the protection provider. As a practical matter, this guarantor risk weight floor on the risk weight of the hedged obligation would require a banking organization first to determine the risk weight on the hedged obligation using the adjustment it has made to the PD or LGD estimate to reflect the hedge. The banking organization would then compare that risk weight to the risk weight assigned to a direct obligation of the guarantor. The higher of the two risk weights would then be used to determine the risk-weighted asset amount of the hedged obligation.

Notwithstanding the guarantor risk weight floor, the proposed approach gives institutions a great deal of flexibility in their methodology for recognizing the risk-reducing effects of guarantees and credit derivatives. At the same time, the approach does not differentiate between various types of guarantee structures, which may have widely varying characteristics, that a banking organization may use. For example, a company to company guarantee, such as a company's guarantee of an affiliate or a supplier, is fundamentally different from a guarantee obtained from an unrelated third party that is in the business of extending financial guarantees.

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Examples of the latter type of guarantee include standby letters of credit, financial guarantee insurance, and credit derivatives. These products tend to be standardized across institutions and, thus, arguably should be recognized for capital purposes in a consistent fashion across institutions. The problem of inconsistent treatment could be exacerbated in the case of protection in the form of credit derivatives, which are tradable and which further can be distinguished by their characteristic of allowing a banking organization to have a recovery claim on two parties, the obligor and the counterparty, rather than just one.

Industry comment is sought on whether a more uniform method of adjusting PD or LGD estimates should be adopted for various types of guarantees to minimize inconsistencies in treatment across institutions and, if so, views on what methods would best reflect industry practices. In this regard, the Agencies would be particularly interested in information on how banking organizations are currently treating various forms of guarantees within their economic capital allocation systems and the methods used to adjust PD, LGD, EAD, and any combination thereof.

Double default effects

The Agencies are proposing that neither the banking organization's criteria nor rating process for guaranteed/hedged exposures be allowed to take into account so-called "double default" effects, that is, joint probability of default of the borrower and guarantor. As a result of not being able to recognize double default probabilities, the adjusted risk weight for the hedged obligation could not be less than the risk weight associated with a direct exposure on the protection provider. The Agencies are seeking comment on the proposed nonrecognition of double default effects. On June 10, 2003, the Federal Reserve released a white paper entitled, Treatment of Double Default and Double Recovery Effects for Hedged Exposures Under Pillar I of the Proposed New Basel Capital Accord, discussing this issue. Commenters are encouraged to take into account the white paper in formulating their responses to the ANPR.

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The Agencies also are interested in obtaining commenters' views on alternative methods for giving recognition to double default effects in a manner that is operationally feasible and consistent with safety and soundness. With regard to the latter, commenters are requested to bear in mind the concerns outlined in the double default white paper, particularly in connection with concentrations, wrong-way risk (especially in stress periods), and the potential for regulatory capital arbitrage. In this regard, information is solicited on how banking organizations consider double default effects on credit protection arrangements in their economic capital calculations and for which types of credit protection arrangements they consider these effects.

Requirements for recognized guarantees and credit derivatives

The Agencies are not proposing any restrictions on the types of eligible guarantors or credit derivative providers. Rather, a banking organization would be required to have clearly specified criteria for those guarantors they will accept as eligible for regulatory capital purposes. It is proposed that guarantees and credit derivatives recognized for regulatory capital purposes: (1) be required to represent a direct claim on the protection provider; (2) explicitly reference specific exposures or classes thereof; (3) be evidenced in writing through a contract that is irrevocable by the guarantor; (4) not have a clause that would (i) allow the protection provider unilaterally to cancel the credit protection (other than in the event of nonpayment or other default by the protection buying banking organization) or (ii) increase the effective cost of credit protection as the credit quality of the hedged exposure deteriorates; (5) be in force until the underlying obligation is satisfied in full (to the amount and tenor of the guarantee); and (6) be legally enforceable against the guarantor in a jurisdiction where the guarantor has assets to attach and enforce a judgement.

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The Agencies view the risk mitigating benefits of conditional guarantees -- that is, guarantees that prescribe certain conditions under which the guarantor would not be obliged to perform -- as particularly difficult to quantify. The Agencies are proposing that as a general matter such guarantees would not be recognized under the A-IRB approach. In certain circumstances, however, conditional guarantees could be recognized where the banking organization can demonstrate that its assignment criteria fully reflect the reduction in credit risk mitigation arising from the conditionality and that the guarantee provides a meaningful degree of credit protection.

Additional requirements for recognized credit derivatives

The Agencies are proposing that credit derivatives, whether in the form of credit default swaps or total return swaps, recognized for A-IRB risk-based capital purposes meet additional criteria. The credit events specified by the contracting parties would be required to include at a minimum: (i) failure to pay amounts due under the terms of the underlying obligation; (ii) bankruptcy, insolvency, or inability of the obligor to pay its debt; and (iii) restructuring of the underlying obligation that involves forgiveness or postponement of principal, interest, or fees that results in a credit loss.

With regard to restructuring events, the Agencies note that the New Accord suggests that a banking organization may not need to include restructuring credit events when it has complete control over the decision of whether or not there will be a restructuring of the underlying obligation. This would occur, for example, where the hedged obligation requires unanimous consent of the creditors for a restructuring. The Agencies have concerns that this approach could have the incidental effect of dictating terms in underlying obligations in ways that over time could diverge from creditors' business needs. The Agencies also question whether such clauses

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actually eliminate restructuring risk on the underlying obligation, particularly as many credit derivatives hedge only a small portion of a banking organization's exposure to the underlying obligation.

The Agencies invite comment on this issue, as well as consideration of an alternative approach whereby the notional amount of a credit derivative that does not include restructuring as a credit event would be discounted. Comment is sought on the appropriate level of discount and whether the level of discount should vary on the basis of, for example, whether the underlying obligor has publicly outstanding rated debt or whether the underlying is an entity whose obligations have a relatively high likelihood of restructuring relative to default (for example, a sovereign or PSE). Another alternative that commenters may wish to discuss is elimination of the restructuring requirement for credit derivatives with a maturity that is considerably longer -- for example, two years -- than that of the hedged obligation.

Consistent with the New Accord, the Agencies are proposing not to recognize credit protection on total return swaps where the banking organization records net payments received on the swap as net income, but does not record offsetting deterioration in the value of the hedged obligation either through reduction in fair value or by an addition to reserves. The Agencies are considering imposing similar non-recognition on credit default swaps where mark-to-market gains in value are recognized in income and, thus, in Tier 1 capital, but no offsetting deterioration in the hedged obligation is recorded. (This situation generally would not arise where both the hedged obligation and the credit default swap are recorded in the banking book because under U.S. GAAP increases in the swap's value are recorded in the Other Comprehensive Income account, which is not included in regulatory capital.)

Comment is sought on this matter, as well as on the possible alternative treatment of recognizing the hedge in these two cases for regulatory capital purposes but requiring that mark-to-market gains on the credit derivative that have been taken into income be deducted from Tier 1 capital.

Mismatches in credit derivatives between reference and underlying obligations

The Agencies are proposing to recognize credit derivative hedges for A-IRB capital purposes only where the reference obligation on which the protection is based is the same as the underlying obligation except where: 1) the reference obligation ranks *pari passu* with or is more junior than the underlying obligation, and 2) the underlying obligation and reference obligation share the same obligor and legally enforceable cross-default or cross-acceleration clauses are in place.

Treatment of maturity mismatch

The Agencies are proposing to recognize on a discounted basis guarantees and credit derivatives that have a shorter maturity than the hedged obligation. A hedge with less than one-year residual maturity that does not have a matching maturity to the underlying obligation, however, would not be recognized. The formula for discounting the amount of a maturity-mismatched hedge that is recognized is proposed as follows:

$$P_a = P * t/T$$

Where:

P_a denotes the value of the credit protection adjusted for maturity mismatch;

P denotes the amount of the credit protection;

t denotes the lesser of T and the residual maturity of the hedge arrangement, expressed in years; and

T denotes the lesser of 5 and the residual maturity of the underlying obligation, expressed in years.

The Agencies have concerns that the proposed formulation does not appropriately reflect distinctions between bullet and amortizing underlying obligations. Comment is sought on the best way of making such a distinction, as well as more generally on alternative methods for dealing with the reduced credit risk coverage that results from a maturity mismatch.

Treatment of counterparty risk for credit derivative contracts

The Agencies are proposing that the EAD for derivative contracts included in either the banking book or trading book be determined in accordance with the rules for calculating the credit equivalent amount for such contracts set forth under the general risk-based capital rules. The Agencies are proposing to include in the types of derivative contracts covered under these rules credit derivative contracts recorded in the trading book. Accordingly, where a banking organization buys or sells a credit derivative through its trading book, a counterparty credit risk capital charge would be imposed based on the replacement cost plus the following add-on factors for PFE:

Total Return or Credit Default Swap	Protection Buyer	Protection Seller
Qualifying Reference Obligation*	5%	5%**
Non-Qualifying Reference Obligation*	10%	10%**

* The definition of qualifying would be the same as for the “qualifying” category for the treatment of specific risk for covered debt positions under the market risk capital rules

** The protection seller of a credit default swap would only be subject to the add-on factor where the contract is subject to close-out upon the insolvency of the protection buyer while the underlying obligor is still solvent.

The Agencies also are considering applying a counterparty credit risk charge on all credit derivatives that are marked-to-market, including those recorded in the banking book. Such a treatment would promote consistency with other OTC derivatives, which are assessed the same counterparty credit risk charge regardless of where they are booked.

Further, the Agencies note that, if credit derivatives booked in the banking book are not assessed a counterparty credit charge, banking organizations would be required to exclude these

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derivatives from the net current exposure of their other derivative exposures to a counterparty for purposes of determining regulatory capital requirements. On balance, the Agencies believe a better approach would be to align the net derivative exposure used for capital purposes with that used for internal risk management purposes to manage counterparty risk exposure and collateralization thereof. This approach would suggest imposing a counterparty risk charge on all credit derivative exposures that are marked to market, regardless of where they are booked.

The Agencies are seeking industry views on the PFE add-ons proposed above and their applicability. Comment is also sought on whether different add-ons should apply for different remaining maturity buckets for credit derivatives and, if so, views on the appropriate percentage amounts for the add-ons in each bucket.

Equity Exposures

Banking organizations using an A-IRB approach for any credit exposure would be required to use an internal models market-based approach to calculate regulatory capital charges for equity exposures. Minimum quantitative and qualitative requirements for using an internal model would have to be met on an ongoing basis. A banking organization that is transitioning into an internal models approach to equity exposures or that fails to demonstrate compliance with the minimum operational requirements for using an internal models approach to equity exposures would be required to develop a plan for compliance, obtain approval of the plan from its primary Federal supervisor, and implement the plan in a timely fashion. In addition, a banking organization's primary Federal supervisor would have the authority to impose additional operational requirements on a case-by-case basis. Until it is fully compliant with all applicable requirements, the banking organization would apply a minimum 300 percent risk weight to all publicly traded equity investments (that is, equity investments that are traded on a nationally recognized securities exchange) and a minimum 400 percent risk weight to all other equity investments.

Positions covered

All equity exposures held in the banking book, along with any equity exposures in the trading book that are not currently subject to a market risk capital charge, would be subject to the A-IRB approach for equity exposures. In general, equity exposures are distinguished from other types of exposures based on the economic substance of the exposure. Equity exposures would include both direct and indirect ownership interests, whether voting or non-voting, in the assets or income of a commercial enterprise or financial institution that are not consolidated or deducted for regulatory capital purposes. Holdings in funds containing both equity investments and non-equity investments would be treated either as a single investment based on the majority of the fund's holdings or, where possible, as separate and distinct investments in the fund's component holdings based on a "look-through approach" (that is, based on the individual component holdings).

An instrument generally would be considered to be an equity exposure if it (1) would qualify as Tier 1 capital under the general risk-based capital rules if issued by a banking organization; (2) is irredeemable in the sense that the return of invested funds can be achieved only by the sale of the investment or sale of the rights to the investment or in the event of the liquidation of the issuer; (3) conveys a residual claim on the assets or income of the issuer; and (4) does not embody an obligation on the part of the issuer.

An instrument that embodies an obligation of the issuer is considered an equity exposure if the instrument meets any of the following conditions: (1) the issuer may defer indefinitely the settlement of the obligation; (2) the obligation requires, or permits at the issuer's discretion, settlement by the issuance of a fixed number of the issuer's equity interests; (3) the obligation requires, or permits at the issuer's discretion, settlement by the issuance of a variable

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number of the issuer's equity interests, and all things being equal, any change in the value of the obligation is attributable to, comparable to, and in the same direction as, the change in value of a fixed number of the issuer's equity shares; or (4) the holder has the option to require that the obligation be settled by issuance of the issuer's equity interests, unless the banking organization's primary Federal supervisor has opined in writing that the instrument should be treated as a debt position.

Debt obligations and other securities, derivatives, or other instruments structured with the intent of conveying the economic substance of equity ownership would be considered equity exposures for purposes of the A-IRB capital requirements. For example, options and warrants on equities and short positions in equity securities would be characterized as equity exposures. If a debt instrument is convertible into equity at the option of the holder, it would be deemed equity upon conversion. If such debt is convertible at the option of the issuer or automatically by the terms of the instrument, it would be equity from inception. In addition, instruments with a return directly linked to equities would be characterized as equity investments under most circumstances. A banking organization's primary Federal supervisor would have the discretion to allow a debt characterization of such an equity-linked instrument, however, if the instrument is directly hedged by an equity holding such that the net position does not involve material equity risk to the holder. Equity instruments that are structured with the intent of conveying the economic substance of debt holdings or securitization exposures would not be considered an equity exposure. For example, some issuances of term preferred stock may be more appropriately characterized as debt.

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In all cases, the banking organization's primary Federal supervisor would have the discretion to recharacterize debt holdings as equity exposures or equity holdings as debt or securitization exposures for regulatory capital purposes.

The Agencies encourage comment on whether the definition of an equity exposure is sufficiently clear to allow banking organizations to make an appropriate determination as to the characterization of their assets.

Materiality

As noted above, a banking organization that is required or elects to use the A-IRB approach for one credit portfolio would also use the A-IRB approach for all of its holdings, including equity investments. However, if the aggregate equity holdings of a banking organization are not material in amount, the organization would not be required to use the A-IRB approach to equity exposures. For this purpose, a banking organization's equity exposures generally would be considered material if their aggregate carrying value, including holdings subject to exclusions and transitional provisions (as described below), exceeds ten percent of the organization's Tier 1 and Tier 2 capital on average during the prior calendar year. To address concentration concerns, however, the materiality threshold would be lowered to five percent of the banking organization's Tier 1 and Tier 2 capital if the organization's equity portfolio consists of less than ten individual holdings. Banking organizations would risk weight at 100 percent equity exposures exempted from the A-IRB equity treatment under a materiality threshold. Comment is sought on whether the materiality thresholds set forth above are appropriate.

Exclusions from the equity capital charge

Zero and low risk weight investments

The New Accord provides that national supervisors may exclude from the A-IRB capital charge those equity exposures to entities whose debt obligations qualify for a zero risk weight under the New Accord's standardized approach for credit risk. Entities whose debt

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obligations qualify for a zero risk weight generally include (i) sovereigns rated AAA to AA-; (ii) the BIS; (iii) the IMF; (iv) the European Central Bank; (v) the European Community; and (vi) high-quality multilateral development banks (MDBs) with strong shareholder support.²⁷ The Agencies intend to exclude from the A-IRB equity capital charge equity investments in these entities. Instead, these investments would be risk weighted at zero percent under the A-IRB approach.

In addition, the Agencies are proposing to exempt from the A-IRB equity capital charge investments in non-central government public-sector entities (PSEs) that are not traded publicly and generally are held as a condition of membership. Examples of such holdings include stock of a Federal Home Loan Bank or a Federal Reserve Bank. These investments would be risk-weighted as they would be under the general risk-based capital rules -- 20 percent or zero percent, respectively, in the example.

Comment is sought on whether other types of equity investments in PSEs should be exempted from the capital charge on equity exposures, and if so, the appropriate criteria for determining which PSEs would be exempted.

Nationally legislated programs

Under the New Accord, national supervisors may exclude from the A-IRB capital charge on equity exposures certain equity exposures made under legislated programs that involve government oversight and restrictions on the types or amounts of investments that may be made (legislated program equity exposures). Under the New Accord, a banking organization would be able to exclude from the A-IRB capital charge on equity exposures legislated program equity exposures in an amount up to ten percent of a banking organization's Tier 1 plus Tier 2 capital.

²⁷ These are, at present, the World Bank group comprised of the International Bank for Reconstruction and Development (IBRD) and the International Finance Corporation (IFC), the Asian Development Bank (ADB), the African Development Bank (AfDB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), the European Investment Bank (EIB), the Islamic Development

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The Agencies propose that equity investments by a banking organization in a small business investment company (SBIC) under section 302(b) of the Small Business Investment Act of 1958 would be legislated program equity exposures eligible for the exclusion from the A-IRB equity capital charge in an amount up to ten percent of the banking organization's Tier 1 plus Tier 2 capital. A banking organization would be required to risk weight at 100 percent any amounts of legislated program equity exposures that qualify for this exclusion from the A-IRB equity capital charge.

The Agencies seek comment on what conditions might be appropriate for this partial exclusion from the A-IRB equity capital charge. Such conditions could include limitations on the size and types of businesses in which the banking organization invests, geographical limitations, or maximum limitations on the size of individual investments.

U.S. banking organizations also make investments in community and economic development entities that promote the public welfare under 12 U.S.C. 24 (eleventh). These investments receive favorable tax treatment and investment subsidies that make their risk and return characteristics markedly different (and more favorable to investors) than equity investments in general. Recognizing this more favorable risk-return structure and the importance of these investments to promoting important public welfare goals, the Agencies are proposing the exclusion of all CEDE investments from the A-IRB equity capital charge. Unlike the exclusion for SBIC exposures, the exclusion of CEDE investments would not be subject to a percentage of capital limit. All CEDE equity exposures would receive a 100 percent risk weight.

The Agencies seek comment on whether any conditions relating to the exclusion of CEDE investments from the A-IRB equity capital charge would be appropriate. These conditions could serve to limit the exclusion to investments in CEDEs that meet specific public welfare goals or to limit the amount of CEDE investments that would qualify for the exclusion from the A-IRB equity capital charge. The

Bank, the Nordic Investment Bank (NIB), the Caribbean Development Bank (CDB), and the Council of Europe Development Bank (CEDB).

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Agencies also seek comment on whether any other classes of legislated program equity exposures should be excluded from the A-IRB equity capital charge.

Grandfathered investments

Equity investments held as of the date of adoption of the final capital rule governing equity holdings would be exempt from the A-IRB equity capital charge for a period of ten years from that date. A banking organization would be required to risk weight these holdings during the ten-year period at 100 percent. The investments that would be considered grandfathered would be equal to the number of shares held as of the date of the final rule, plus any shares that the holder acquires directly as a result of owning those shares, provided that any additional shares do not increase the holder's proportional ownership share in the company.

For example, if a banking organization owned 100 shares of a company on the date of adoption of the final rule, and the issuer thereafter declared a pro rata stock dividend of five percent, the entire post-dividend holdings of 105 shares would be exempt from the A-IRB equity capital charge for a period of ten years from the date of the adoption of the final A-IRB capital rule. However, if additional shares are acquired such that the holder's proportional share of ownership increases, the additional shares are not grandfathered. Thus, if a banking organization owned 100 shares of a company on the date of adoption of the final rule and subsequently acquired an additional 50 shares, the original 100 shares would be exempt from the A-IRB equity capital charge for the ten-year period from the date of adoption of the final rule, but the additional 50 shares would be immediately subject to the A-IRB equity capital charge.

Description of quantitative principles

The primary focus of the A-IRB approach to equity exposures is to assess capital based on an internal estimate of loss under extreme market conditions, on an institution's portfolio of equity holdings or, in simpler forms, its individual equity investments. The methodology or

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methodologies used to compute the banking organization's estimated loss should be those used by the institution for internal risk management purposes. The model should be fully integrated into the banking organization's risk management infrastructure.

A banking organization's use of internal models would be subject to supervisory approval and ongoing review by the institution's primary Federal supervisor. Given the unique nature of equity portfolios and differences in modeling techniques, the supervisory model review process would be, in many respects, institution-specific. The sophistication and nature of the modeling technique used for a particular type of equity exposure should correspond to the banking organization's exposure, concentration in individual equity issues of that type, and the particular risk of the holding (including any optionality). Institutions would have to use an internal model that is appropriate for the risk characteristics and complexity of their equity portfolios. The model would have to be able to capture adequately all of the material risks embodied in equity returns, including both general market risk and idiosyncratic (that is, specific) risk of the institution's equity portfolio.

In their evaluations of institutions' internal models, the Agencies would consider, among other factors, (a) the nature of equity holdings, including the number and type of equities (for example, public, private, long, short); (b) the risk characteristics and makeup of institutions' portfolio holdings, including the extent to which publicly available price information is obtainable on the exposures; and (c) the level and degree of concentration. Institutions with equity portfolios containing holdings with values that are highly nonlinear in nature (for example, equity derivatives or convertibles) would have to employ an internal model designed to appropriately capture the risks associated with these instruments.

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The Agencies recognize that the type and sophistication of internal modeling systems will vary across institutions due to differences in the nature and complexity of business lines in general and equity exposures in particular. Although the Agencies intend to use a VaR methodology as a benchmark for the internal model approach, the Agencies recognize that some institutions employ models for internal risk management and capital allocation purposes that, given the nature of their equity holdings, can be more risk-sensitive than some VaR models. For example, some institutions employ rigorous historical scenario analysis and other techniques in assessing the risk of their equity portfolios. It is not the Agencies' intention to dictate the form or operational details of banking organizations' risk measurement and management practices for their equity exposures. Accordingly, the Agencies do not expect to prescribe any particular type of model for computing A-IRB capital charges for equity exposures.

For purposes of evaluating the A-IRB equity capital charges produced by a banking organization's selected methodology, the Agencies would expect to use as a benchmark a VaR methodology using a 99.0 percent (one-tailed) confidence level of estimated maximum loss over a quarterly time horizon using a long-term sample period. Moreover, A-IRB equity capital charges would have to produce risk weights for equity exposures that are at least equal to a 200 percent risk weight for publicly traded equity exposures, and a 300 percent risk weight for all other equity exposures.

VaR-based internal models must use a historical observation period that includes a sufficient amount of data points to ensure statistically reliable and robust loss estimates relevant to the long-term risk profile of the institution's specific holdings. The data used to represent return distributions should reflect the longest sample period for which data are available and should meaningfully represent the risk profile of the banking organization's specific equity

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holdings. The data sample should be long-term in nature and, at a minimum, should encompass at least one complete equity market cycle relevant to the institution's holdings, including both increases and decreases in relevant equity values over a long-term data period. The data used should be sufficient to provide conservative, statistically reliable, and robust loss estimates that are not based purely on subjective or judgmental considerations.

The parameters and assumptions used in a VaR model must be subject to a rigorous and comprehensive regime of stress-testing. Banking organizations utilizing VaR models would be required to subject their internal model and estimation procedures, including volatility computations, to either hypothetical or historical scenarios that reflect worst-case losses given underlying positions in both public and private equities. At a minimum, banking organizations that use a VaR model would be required to employ stress tests to provide information about the effect of tail events beyond the level of confidence assumed in the internal models approach.

Banking organizations using non-VaR internal models that are based on stress tests or scenario analyses would have to estimate losses under worst-case modeled scenarios. These scenarios would have to reflect the composition of the organization's equity portfolio and should produce capital charges at least as large as those that would be required to be held against a representative market index under a VaR approach. For example, for a portfolio consisting primarily of publicly held equity securities that are actively traded, capital charges produced using historical scenario analyses would have to be greater than or equal to capital charges produced by a baseline VaR approach for a major index that is representative of the institution's holdings.

The measure of an equity exposure on which A-IRB capital requirements would be based would be the value of the equity presented in the financial statements. For investments held at

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fair value, the exposure amount would be equal to the fair value presented in the balance sheet. For investments held at the lower of cost or market value, the exposure amount would be equal to the cost or market value presented in the balance sheet.

The loss estimate derived from the internal model would constitute the A-IRB capital charge to be assessed against the equity exposure. The A-IRB equity capital charge would be incorporated into an institution's risk-based capital ratio through the calculation of risk-weighted equivalent assets. To convert the A-IRB equity capital charge into risk-weighted equivalent assets, a banking organization would multiply the capital charge by a factor of 12.5.

Consistent with the general risk-based capital rules, 45 percent of the positive change in value held in the tax-adjusted separate component of equity – that is, 45 percent of revaluation gains on available-for-sale (AFS) equity securities – would be includable in Tier 2 capital under the A-IRB framework.

Comment is specifically sought on whether the measure of an equity exposure under AFS accounting continues to be appropriate or whether a different rule for the inclusion of revaluation gains should be adopted.

C. Supervisory Assessment of A-IRB Framework

A banking organization would have to satisfy all the A-IRB infrastructure requirements and supervisory standards before it would be able to use the A-IRB approach for calculating capital requirements for credit risk. This section describes key elements of the framework on which the Agencies propose to base the A-IRB qualifying requirements for U.S. banking organizations. The Agencies intend to provide more detailed implementation guidance in regard to these issues for wholesale and retail exposures, as well as for equity and securitization exposures. As noted earlier, draft guidance for corporate exposures that identifies associated supervisory standards was published elsewhere in today's Federal Register

Overview of Supervisory Framework

Many of the supervisory standards are focused on requirements for a banking organization's internal risk rating system. Emphasis is placed on a banking organization's ability to rank order and quantify risk in a consistent, reliable and valid manner. In sum, a banking organization's internal risk rating system would have to provide for a meaningful differentiation of the riskiness of borrowers, as well as the risks inherent in individual transactions. To ensure the reliability of these estimates, internal risk rating systems would need to be subject to review by independent control units. Data sources and estimation methods used by banking organizations would need to be sufficiently robust to support the production of consistent quantitative assessments of risk over time. Finally, to ensure that ratings are not derived solely for regulatory capital purposes, internal risk rating systems and quantification methods would need to form an integral part of the management of the institution, as outlined below.

It is important to emphasize that the Agencies believe that meeting the A-IRB infrastructure requirements and supervisory standards will require significant efforts by banking organizations. The A-IRB supervisory standards will effectively "raise the bar" in regard to sound credit risk management practices.

Rating system design

The design of an internal risk rating system is key to its effectiveness. By definition, a rating system comprises all of the processes that support the assessment of credit risk, the assignment of internal risk ratings, and the quantification of default and loss estimates. Banking organizations would be able to rely on one or more systems for assessing their credit risk exposures. When this is the case, the banking organization would have to demonstrate that each system used for A-IRB capital purposes complies with the supervisory standards.

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The Agencies believe that banking organizations' internal rating systems should accurately and consistently differentiate degrees of risk. For wholesale exposures, banking organizations would need to have a two-dimensional rating system that separately assesses the risk of borrower default, as well as transaction-specific factors that focus on the amount that would likely be collected in the event of default. Such factors may include whether an exposure is collateralized, its seniority, and the product type. In contrast to the individual evaluation required for wholesale exposures, retail exposures would be assessed on a pool basis. Banking organizations would need to group their retail exposures into portfolio segments based on the risk characteristics that they consider relevant -- for example borrower characteristics such as credit scores or transaction characteristics such as product or collateral type. Delinquent or defaulted exposures would need to be separated from those that are current.

Banking organizations would be required to define clearly their wholesale rating categories and retail portfolio segments. The clarity and transparency of the ratings criteria are critical to ensuring that ratings are assigned in a consistent and reliable manner. The Agencies believe it is important for banking organizations to document the operating procedures for their internal risk rating system in writing. For example, the documentation should describe which parties within the organization would have the authority to approve exceptions. Further, the documentation would have to clearly specify the frequency of review, as well as describe the oversight to be provided by management of the ratings process.

Banking organizations using the A-IRB approach would need to be able to generate sound measurements of the key risk inputs to the A-IRB capital formulas. Banking organizations would be able to rely on data based either on internal experience or generated by

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an external source, as long as the banking organization can demonstrate the relevance of external data to its own experience.

In assigning a rating to an obligor, a banking organization must assess the risk of default, taking into account possible adverse events that might increase the obligor's likelihood of default. The A-IRB supervisory standards in the supervisory guidance provide banking organizations with a degree of flexibility in determining precisely how to reflect adverse events in obligor ratings. However, banking organizations are required to clearly articulate the approach chosen, and to articulate the implications for capital planning and for capital adequacy during times of systematic economic stress. The Agencies recognize that banking organizations' internal risk rating systems may include a range of statistical models or other methods to assign borrower or facility ratings or to estimate key inputs. The burden of proof would remain on the banking organization as to whether a specific model or procedure satisfies the supervisory standards.

Risk rating system operations

The risk rating system would have to form an integral part of the loan approval process wherein ratings are assigned to all borrowers, guarantors or facilities depending upon whether the extension of credit is wholesale or retail in nature. Any deviations from policies that govern the assignment of ratings must be clearly documented and monitored.

Data maintenance is another key aspect of risk rating system operations. Banking organizations would be expected to collect and store data on key borrower and facility characteristics. The data would have to be sufficiently detailed to allow for future reconsideration of the way in which obligors and facilities have been allocated to grades.

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Furthermore, banking organizations would have to collect, retain and disclose data on aspects of their internal ratings as described under the disclosure section of this proposal.

Banking organizations would be required to have in place sound stress testing processes for use in the assessment of capital adequacy. Stress testing would have to involve identifying possible events or future changes in economic conditions that could have unfavorable effects on a banking organization's credit exposures. Specifically, institutions would need to assess the effect of certain specific conditions on their A-IRB regulatory capital requirements. The choice of test to be employed would remain with the individual banking organization provided the method selected is meaningful and reasonably conservative.

Corporate governance and oversight

The Agencies view the involvement of the board of directors and management as critical to the successful implementation of the A-IRB approach. The board of directors and management would be responsible for maintaining effective internal controls over the banking organization's information systems and processes for assessing adequacy of regulatory capital and determining regulatory capital charges consistent with this ANPR. All significant aspects of the rating and estimation processes must be approved by the banking organization's board of directors or a designated committee thereof and senior management. These parties would need to be fully aware of whether the system complies with the supervisory standards, makes use of the necessary data, and produces reliable quantitative estimates. Ongoing management reports would have to accurately capture the performance of the rating system.

Oversight would also need to involve independent credit risk control units responsible for ensuring the performance of the rating system, the accuracy of the ratings and parameter estimates, and overall compliance with supervisory standards and capital regulations. The

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Agencies believe it is critical that such units remain functionally independent from the personnel and management responsible for originating credit exposures. Among other responsibilities, the control units should be charged with testing and monitoring the appropriateness of the rating scale, verifying the consistent use of ratings for a given exposure type across the organization, and reviewing and documenting any changes to be made to the system.

Use of internal ratings

To qualify to use the A-IRB framework, a banking organization's rating systems would have to form an integral part of its day-to-day credit risk management process. The Agencies expect that banking organizations would rely on their internal risk rating systems when making decisions about whether to extend credit as well as in their ongoing monitoring of credit exposures. For example, ratings information would have to be incorporated into other key processes, such as reserving determinations and when allocating economic capital internally.

Risk quantification

Ratings quantification is the process of assigning values to the key risk components of the A-IRB approach: PD, LGD, EAD and M. With the exception of M, the risk components are unobservable and must be estimated. The estimates would have to be consistent with sound practice and supervisory standards. Banking organizations' rating system review and internal audit functions would need to serve as control mechanisms that ensure the process of rating assignments and quantification are functioning according to policy and that non-compliance or weaknesses are identified.

Validation of internal estimates

An equally important element would be a robust system for validating the accuracy and consistency of a banking organization's rating system, as well as the estimation of risk

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components. The standards in the supervisory guidance require that banking organizations use a broad range of validation tools, including evaluation of developmental evidence, ongoing monitoring of rating and quantification processes, benchmarking against alternative approaches, and comparison of outcomes with estimates. Details of the validation process would have to be consistent with the operation of the banking organization's rating system and data would have to be maintained and updated to support oversight and validation work. Banking organizations would have to have well-articulated standards for situations where deviations of realized values from expectations become significant enough to call the validity of the estimates into question. Rating systems with appropriate data and oversight feedback mechanisms should create an environment that promotes integrity and improvements in the rating system over time.

U.S. Supervisory Review

The primary Federal supervisor would be responsible for evaluating an institution's initial and ongoing compliance with the infrastructure requirements and supervisory standards for approval to use the A-IRB approach for regulatory capital purposes. As noted, the Agencies will be developing and issuing specific implementation guidance describing the supervisory criteria for wholesale, retail, equity and securitization exposures. The Agencies will issue the draft implementation guidance for each portfolio for public comment to ensure that there is an opportunity for banking organizations and others to provide feedback on the Agencies' expectations in regard to A-IRB systems.

The Agencies seek comment on the extent to which an appropriate balance has been struck between flexibility and comparability for the A-IRB requirements. If this balance is not appropriate, what are the specific areas of imbalance, and what is the potential impact of the identified imbalance? Are there alternatives that would provide greater flexibility, while meeting the overall objective of producing accurate and consistent ratings?

The Agencies also seek comment on the supervisory standards contained in the draft guidance. Do the standards cover all of the key elements of an A-IRB framework? Are there specific practices that appear to meet the objectives of accurate and consistent ratings but that would be ruled out by the supervisory standards related to controls and oversight? Are there particular elements from the corporate guidance that should be modified or reconsidered as the Agencies draft guidance for other types of credit?

In addition, the Agencies seek comment on the extent to which these proposed requirements are consistent with the ongoing improvements banking organizations are making in credit-risk management processes.

IV. Securitization

A. General Framework

This section describes the calculation of A-IRB capital requirements for securitization exposures. A securitization exposure is any on- or off-balance-sheet position created by aggregating and then tranching the risks of a pool of assets, commitments, or other instruments (underlying exposures) into multiple financial interests where, typically, the pooled risks are not shared *pro-rata*. The pool may include one or more underlying exposures. Examples include all exposures arising from traditional and synthetic securitizations, as well as partial guarantee arrangements where credit losses are not divided proportionately among the parties (often referred to as tranching cover). Asset- and mortgage-backed securities (including those privately issued and those issued by GSEs such as Fannie Mae and Freddie Mac), credit enhancements, liquidity facilities, and credit derivatives that meet the conditions noted above would be considered securitization exposures.

With ongoing advances in financial engineering, the Agencies recognize that securitization exposures having similar risks can take different legal forms. For this reason, both the designation of positions as securitization exposures and the calculation of A-IRB capital requirements for securitization exposures would be guided by the economic substance of a given transaction, rather than by its legal form.

Operational Criteria

Banking organizations would have to satisfy certain operational criteria to be eligible to use the A-IRB approach to securitization exposures. Moreover, all banking organizations that use the A-IRB approach for the underlying exposures that have been securitized would have to apply the A-IRB treatment for securitization exposures. Minimum operational criteria would apply to traditional and synthetic securitizations, including permissible types of clean-up calls.²⁸ The Agencies propose to establish supervisory criteria for determining when, for risk-based capital purposes, a banking organization may treat exposures that it has originated directly or indirectly as having been securitized and, hence, not subject to the same capital charge as if the banking organization continued to hold the assets. The Agencies anticipate these supervisory criteria will be substantially equivalent to the criteria contained in the New Accord (paragraphs 516-520). Broadly, these criteria are intended to ensure that securitization transactions transfer significant credit risk to third parties and, in the case of traditional securitizations, that each transaction qualifies as a true sale under applicable accounting standards.

The supervisory criteria also would describe the types of clean-up calls that may be incorporated within transactions qualifying for the A-IRB securitization treatment. Specifically, any clean-up call would have to meet the following conditions: (a) its exercise is at the discretion of the originating banking organization; (b) it does not serve as a credit enhancement; and (c) it is only exercisable when 10 percent or less of the original underlying portfolio or reference portfolio value remains. If a clean-up call does not meet all of these criteria, the originating banking organization would have to treat the underlying exposures as if they had not been securitized.

The Agencies seek comment on the proposed operational requirements for securitizations. Are the proposed criteria for risk transference and clean-up calls consistent with existing market practices?

Differences Between General A-IRB Approach and the A-IRB Approach for Securitization Exposures

In contrast to the proposed A-IRB framework for traditional loans and commitments, the A-IRB securitization framework does not rely on a banking organization's own internal assessments of the PD and LGD of a securitization exposure. For pools of multiple assets, such assessments require implicit or explicit estimates of correlations among the losses on those assets. Such correlations are extremely difficult to estimate and validate in an objective manner and on a going-forward basis. For this reason, the A-IRB framework generally would not permit a banking organization to use its internal risk assessments when such assessments depend, implicitly or explicitly, on estimates of correlation effects. The A-IRB treatment of securitization exposures would rely principally on two sources of information, when available: (i) an assessment of the securitization exposure's credit risk made by an external rating agency and (ii) the A-IRB capital charge that would have been assessed against the underlying exposures had the exposures not been securitized (denoted "KIRB"), along with other information about the transaction.

B. Determining Capital Requirements

General Considerations

Because the information available to a banking organization about a securitization exposure often reflects the organization's role in a securitization transaction, the Agencies are proposing that the method of calculating the A-IRB capital requirement for a securitization

²⁸ In general terms, a clean-up call is an option that permits an originating banking organization to call the securitization exposures (for example, asset- or mortgage-backed securities) before all of the underlying exposures have been repaid.

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exposure may depend on whether a banking organization is an originator or a third-party investor in the securitization transaction. In general, a banking organization would be considered an originator of a securitization if the organization directly or indirectly originated the underlying exposures or serves as the sponsor of an asset-backed commercial paper (ABCP) conduit or similar program.²⁹ If a banking organization is not deemed an originator of a securitization transaction, then it would be considered an investor in the securitization.

There are several methods for determining the A-IRB capital requirement for a securitization exposure: the Ratings-Based Approach (RBA), the Alternative RBA, the Supervisory Formula Approach (SFA), the Look-Through Approach, deduction from Tier 1 capital, and deduction from total capital. When a banking organization would apply one of these methods to determine the A-IRB capital requirement for a particular securitization exposure is summarized in the table below.

²⁹ A banking organization is generally considered a sponsor of an ABCP conduit or similar program if, in fact or in substance, it manages or advises the conduit program, places securities into the market for the program, or provides liquidity support or credit enhancements to the program.

Steps for Determining A-IRB Capital Requirements for Securitization Exposures

For an investing banking organization:

1. Deduct from total capital any credit-enhancing interest-only strips
2. When an external or inferred rating exists, apply the RBA
3. When an external or inferred rating does not exist, then do the following:
 - a. Subject to supervisory review and approval, if the investing banking organization can determine KIRB, then calculate required capital as would an originating banking organization using the steps described in 2.a. below
 - b. Otherwise, deduct the securitization exposure from total capital

For an originating banking organization*

1. Deduct from Tier 1 capital any increase in capital resulting from the securitization transaction and deduct from total capital any credit-enhancing interest-only strips (net of deductions from Tier 1 capital due to increases in capital)
2. When an A-IRB approach exists for the underlying exposures then do the following:
 - a. If KIRB can be determined:
 - i. For a securitization exposure (or portion thereof) that is below KIRB, deduct the exposure from total capital
 - ii. For a securitization exposure (or portion thereof) that is above KIRB:
 1. Apply the RBA whenever an external or inferred rating is available
 2. Otherwise, apply the SFA
 - b. If KIRB cannot be determined:
 - i. Apply the Look-Through Approach if the exposure is an eligible liquidity facility, subject to supervisory approval
 - ii. Otherwise, deduct the exposure from total capital
3. When an A-IRB approach does not exist for the underlying exposures then do the following:
 - a. Apply the Look-Through Approach if the exposure is an eligible liquidity facility, subject to supervisory approval
 - b. Otherwise, apply the Alternative RBA

*In addition to the capital treatments delineated, an originating banking organization's total A-IRB capital charge with regard to any single securitization transaction is subject to a maximum or ceiling, as described later in this section.

Deductions of gain on sale or other accounting elements that result in increases in equity capital

Any increase in equity capital resulting from a securitization transaction (for example, a gain resulting from FAS 140 accounting treatment of the sale of assets) would be deducted from Tier 1 capital. Such deductions are intended to offset any gain on sale or other accounting treatments (“gain on sale”) that result in an increase in an originating banking organization’s shareholder’s equity and Tier 1 capital. Over time, as banking organizations, from an accounting perspective, realize the increase in equity that was booked at origination of a securitization transaction through actual receipt of cash flows, the amount of the required deduction would be reduced accordingly.

Banking organizations would have to deduct from total capital any on-balance sheet credit-enhancing interest-only strips (net of any increase in the shareholder’s equity deducted from Tier 1 capital) as described in the previous paragraph.³⁰ Credit-enhancing interest-only strips are defined in the general risk-based capital rules and cover items, such as excess spread, that represent subordinated cash flows of future margin income.

Maximum capital requirement

Where an A-IRB approach exists for the underlying exposures, an originating banking organization's total A-IRB capital charge for exposures associated with a given securitization transaction would be subject to a maximum or ceiling. This maximum A-IRB capital charge would equal the aggregate A-IRB capital charge on the underlying exposures multiplied by the size of the underlying exposure pool (KIRB), *plus* any required deductions, as described in the preceding paragraphs. The aim of this treatment is to ensure that an institution’s effective A-IRB capital charge generally would not be greater after securitization than before, while also

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addressing the Agencies' safety and soundness concerns with respect to credit-enhancing interest-only strips and other capitalized assets.³¹

The proposed maximum A-IRB capital requirement effectively would reverse the general risk-based capital rules for securitization exposures referred to as residual interests. Under the general risk-based capital rules, banking organizations are required to hold a dollar in capital for every dollar in residual interest exposure, regardless of the capital requirement on the underlying assets. One of the reasons the Agencies adopted the "dollar-for-dollar" capital treatment for residual interests is that in many instances the relative size of the exposure retained by the originating banking organization reveals additional market information about the quality of the underlying exposures and deal structure that may not have been captured in the capital requirement on the underlying exposures, had those exposures remained on the banking organization's balance sheet. The Agencies will continue to review the proposal for safety and soundness considerations and may consider retaining the current dollar-for-dollar capital treatment for residual interests, especially in those instances where an originator retains first loss and other deeply subordinated interests in amounts that significantly exceed KIRB plus required deductions.

Comments are invited on the circumstances under which the retention of the treatment in the general risk-based capital rules for residual interests for banking organizations using the A-IRB approach to securitization would be appropriate.

Should the Agencies require originators to hold dollar-for-dollar capital against all retained securitization exposures, even if this treatment would result in an aggregate amount of capital required of the originator that exceeded KIRB plus any applicable deductions? Please provide the underlying rationale.

³⁰ Deductions other than of increases in equity capital are to be taken 50 percent from Tier 1 capital and 50 percent from Tier 2 capital.

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Investors

Third-party investors generally do not have access to detailed, ongoing information about the credit quality of the underlying exposures in a securitization. In such cases, investors often rely upon credit assessments made by external rating agencies. For securitization exposures held by an investing banking organization, and where an A-IRB treatment for the underlying exposures exists, the institution would use the Ratings-Based Approach (RBA) described below if the securitization exposure is externally rated or if an inferred rating is available as defined in the RBA discussion below. When neither an external nor an inferred rating is available, an investing banking organization would compute the A-IRB capital charge using the methodology described below for originating institutions (subject to supervisory review and approval). Otherwise, the securitization exposure would be deducted 50 percent from Tier 1 and 50 percent from Tier 2 capital. The Agencies anticipate that investing banking organizations would apply the RBA in the vast majority of situations.

Originators

This section presumes that an A-IRB approach exists for the underlying exposures. If no A-IRB treatment exists for the underlying exposures, then an originating banking organization (originator) would use the Alternative RBA discussed below. For eligible liquidity facilities (defined below in the Look Through Approach) provided to ABCP programs where a banking organization lacks the information necessary to calculate KIRB, the Look-Through Approach described below would be applied on a temporary basis and subject to supervisory approval.

In contrast to third-party investors, banking organizations that originate securitizations are presumed to have much greater access to information about the current credit quality of the underlying exposures. In general, when an originator retains a securitization exposure, the

³¹ The maximum capital requirement also applies to investing banks that receive approval to use the SFA.

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securitization framework would require the institution to calculate, on an ongoing basis, the underlying exposure pool's A-IRB capital requirement had the underlying exposures not been securitized (the "pool's A-IRB capital charge"), which would be based on the notional dollar amount of underlying exposures (the "size of the pool"). The pool's A-IRB capital charge would be calculated using the "top-down" or "bottom-up" method applicable to the type(s) of underlying exposure(s).³² The pool's A-IRB capital charge divided by the size of the pool would be denoted KIRB. An originator also would be expected to know: (a) its retained securitization exposure's nominal size relative to the size of the pool (the exposure's "thickness," denoted T); and (b) the notional amount of all more junior securitization exposures relative to the size of the pool (the exposure's "credit enhancement level," denoted L). The retained securitization exposure's A-IRB capital requirement depends on the relationship between KIRB, T, and L. If an originator cannot determine KIRB, any retained securitization exposure would be deducted from capital.

Positions below KIRB

An originating banking organization would deduct from capital any retained securitization exposure (or part thereof) that absorbs losses at or below the level of KIRB (that is, an exposure for which $L+T \leq \text{KIRB}$).³³ This means that an originating banking organization would be given no risk-based capital relief unless it sheds at least some exposures below KIRB. Deduction from capital would be required regardless of the securitization exposure's external rating. This deduction treatment is in contrast to the A-IRB capital treatment for investors, who

³² For the purpose of determining the A-IRB capital requirement for a securitization exposure, the top-down method could be used regardless of the maturity of the underlying exposures, provided the other eligibility criteria for employing the top-down approach are satisfied.

³³ If an originator holds a securitization exposure that straddles KIRB, the exposure must be decomposed into two separate positions – one that is above KIRB and another that is at or below KIRB.

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would be able to look to the external (or inferred) rating of a securitization exposure regardless of whether the exposure was below KIRB.

While this disparate treatment of originators and investors may be viewed as inconsistent with the principle of equal capital for equal risk, the Agencies believe it is appropriate in order to provide incentives for originating banks to shed highly subordinated securitization exposures. Such exposures contain the greatest credit risks. Moreover, these risks are difficult to evaluate, and risk quantifications tend to be highly sensitive to modeling assumptions that are difficult to validate objectively. The proposal to prevent an originator from using the RBA for securitization exposures below KIRB reflects, in part, a concern by the Agencies that the market discipline underpinning an external credit rating may be less effective when the rating applies to a retained, non-traded securitization exposure and is sought by an originator solely for regulatory capital purposes.

The Agencies note that the specific securitization exposures retained by an originator that are subject to deduction treatment could change over time in response to variations in the credit quality of the underlying exposures. For example, if the pool's A-IRB capital charge were to increase after the inception of a securitization, additional portions of securitization exposures held by an originator may fall below KIRB and, thus, become subject to deduction. Therefore, when an originator retains a first-loss securitization exposure well in excess of KIRB, the originator's A-IRB capital requirement on the exposure could climb rapidly in the event of any marked deterioration of the underlying exposures. In general, an originator could minimize variability in future capital charges by minimizing the size of any retained first-loss securitization exposures.

The Agencies seek comment on the proposed treatment of securitization exposures held by originators. In particular, the Agencies seek comment on whether

originating banking organizations should be permitted to calculate A-IRB capital charges for securitizations exposures below the KIRB threshold based on an external or inferred rating, when available.

Positions above KIRB

When an originating banking organization retains a securitization exposure, or part thereof, that absorbs losses above the KIRB amount (that is, an exposure for which $L + T > KIRB$) and the banking organization has not already met the maximum capital requirement for securitization exposures described previously, the A-IRB capital requirement for the exposure would be calculated as follows. For securitization exposures having an external or inferred rating, the organization would calculate its A-IRB capital requirement using the RBA. However, if neither an external rating nor an inferred rating is available, an originator would be able to use the SFA, subject to supervisory review and approval. Otherwise, the organization would deduct the securitization exposure from total capital.

The Agencies seek comment on whether deduction should be required for all non-rated positions above KIRB. What are the advantages and disadvantages of the SFA approach versus the deduction approach?

Capital Calculation Approaches

The ratings-based approach (RBA)

The RBA builds upon the widespread acceptance of external ratings by third-party investors as objective assessments of a securitization exposure's stand-alone credit risk. Certain minimum requirements would have to be satisfied in order for a banking organization to rely on an external credit rating. To be recognized for regulatory capital purposes, the external credit rating on a securitization exposure must be public and take into account and reflect the entire amount of credit risk exposure the banking organization has with regard to all payments owed to it under the exposure. In particular, if a banking organization is owed both principal and interest

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on a securitization exposure, the external rating on the exposure must fully reflect the credit risk associated with both payment streams. The Agencies propose to establish criteria to ensure the integrity of external ratings processes and banking organizations' use of these ratings under the RBA. These criteria are expected to be consistent with the proposed guidance provided in the New Accord (paragraph 525).

In certain circumstances, an “inferred rating” may be used for risk weighting a non-rated securitization exposure. Similar to the general risk-based capital rules, to qualify for use of an inferred rating, a non-rated securitization exposure would have to be senior in all respects to the next subordinate, rated position within the same securitization transaction. Further, the junior rated tranche would have to have an equivalent or longer remaining maturity than the non-rated exposure. Where these conditions are met, the non-rated exposure would be treated as if it had the same rating (an “inferred rating”) as that of the rated junior tranche. External and inferred ratings would be treated equivalently.

Under the RBA, the capital charge per dollar of a securitization exposure would depend on: (i) the external rating (or inferred rating), (ii) whether the rating reflects a long-term or short-term assessment of the exposure’s credit risk, and (iii) a measure of the effective number -- or granularity -- of the underlying exposures, (N).³⁴ For a securitization exposure rated AA or AAA, the RBA capital charge also would depend on a measure of that exposure’s relative seniority in the overall transaction (Q).³⁵

Tables 1 and 2 below present the risk weights that would result from the RBA when a securitization exposure’s external rating (or inferred rating) represents a long-term or short-term

³⁴ N is defined more formally in the discussion below of the Supervisory Formula Approach.

³⁵ Q is defined as the total size of all securitization exposures rated at least AA- that are pari passu or junior to the exposure of interest, measured relative to the size of the pool and expressed as a decimal. Thus, for a securitization transaction having an AAA-rated tranche in the amount of 70 percent of the pool, an AA-rated tranche of 10 percent,

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credit rating, respectively. In both tables, the risk weights in column 2 would apply to AA-and AAA-rated securitization exposures when the effective number of exposures (N) is 100 or more, *and* the exposure's relative seniority (Q) is greater than or equal to $0.1 + 25/N$. If the underlying exposures are retail exposures, N would be treated as infinite and the minimum qualifying value of Q would be 0.10. The Agencies anticipate that these risk weights would apply to AA- and AAA-rated tranches of most retail securitizations. Column 4 would apply only to securitizations involving pools of non-retail exposures for which N is less than 6, while column 3 would apply in all other situations.

Within each table, risk weights increase as external rating grades decline. Under the Base Case (column 3), for example, the risk weights range from 12 percent for AAA-rated exposures to 650 percent for exposures rated BB-. This pattern of risk weights is broadly consistent with analyses employing standard credit risk models and a range of assumptions regarding correlation effects and the types of exposures being securitized.³⁶ These analyses imply that, compared with a corporate bond having a given level of stand-alone credit risk (for example, as measured by its expected loss rate), a securitization tranche having the same level of stand-alone risk -- but backed by a reasonably granular and diversified pool -- will tend to exhibit more systematic risk.³⁷ This effect is most pronounced for below-investment grade tranches, and is the primary reason why the RBA risk weights increase rapidly as ratings deteriorate over this range -- much more rapidly than for similarly rated corporate bonds. Similarly, the risk weights expected to apply to most securitization exposures backed by highly granular pools (column 2) decline steeply as ratings improve above single-A -- again, more so than might be the case for similarly

a BBB-rated tranche of 10 percent, and a non-rated tranche of 10 percent, the values of Q associated with these three positions would be 0.80, 0.10, 0, and 0, respectively.

³⁶ See Vladislav Peretyatkin and William Perraudin, "Capital for Asset-Backed Securities," Bank of England, February 2003.

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rated corporate bonds -- while the decline is less pronounced for the Base Case and for tranches backed by non-granular pools (column 4).

For securitization exposures rated below BB-, the proposed A-IRB treatment -- deduction from capital -- would be somewhat more conservative than suggested by credit risk modeling analyses. However, the Agencies believe this more conservative treatment would be appropriate in light of modeling uncertainties and the tendency for securitization exposures in this range, at least at the inception of the securitization transaction, to be non-traded positions retained by an originator because they cannot be sold at a reasonable price.

³⁷ See, for example, Michael Pykhtin and Ashish Dev, "Credit Risk in Asset Securitizations: Analytical Model," Risk (May 2002) S16-S20.

Table 1: ABS risk weights based on long-term credit assessments

External Rating (Illustrative)	Thick Tranches Backed by Highly Granular Pools	Base Case	Tranches Backed by Non-granular Pools
AAA	7%	12%	20%
AA	10%	15%	25%
A	N/A	20%	35%
BBB+	N/A	50%	50%
BBB	N/A	75%	75%
BBB-	N/A	100%	100%
BB+	N/A	250%	250%
BB	N/A	425%	425%
BB-	N/A	650%	650%
Below BB-	N/A	Deduction	Deduction

Table 2: ABS risk weights based on short-term credit assessments

External Rating (Illustrative)	Thick Tranches Backed by Highly Granular Pools	Base Case	Tranches Backed by Non-granular Pools
A-1/P-1	7%	12%	20%
A-2/P-2	N/A	20%	35%
A-3/P-3	N/A	75%	75%
All other ratings	N/A	Deduction	Deduction

The Agencies seek comment on the proposed treatment of securitization exposures under the RBA. For rated securitization exposures, is it appropriate to differentiate risk weights based on tranche thickness and pool granularity?

For non-retail securitizations, will investors generally have sufficient information to calculate the effective number of underlying exposures (N)?

What are views on the thresholds, based on N and Q, for determining when the different risk weights apply in the RBA?

Are there concerns regarding the reliability of external ratings and their use in determining regulatory capital? How might the Agencies address any such potential concerns?

Unlike the A-IRB framework for wholesale exposures, there is no maturity adjustment within the proposed RBA. Is this reasonable in light of the criteria to assign external ratings?

The supervisory formula approach (SFA)

As noted above, when an explicit A-IRB approach exists for the underlying exposures, originating and investing banking organizations would be able to apply the SFA to non-rated exposures above the KIRB threshold, subject to supervisory approval and review. The Agencies anticipate that, in addition to its application to liquidity facilities and to other traditional and synthetic securitization exposures, the SFA would be used when calculating A-IRB capital requirements for tranching guarantees (for example, a loan for which a guarantor assumes a first-loss position that is less than the full amount of the loan).

Under the SFA, the A-IRB capital charge for a securitization tranche would depend on six institution-supplied inputs:³⁸ the notional amount of underlying exposures that have been securitized (E), the A-IRB capital charge had the underlying exposures not been securitized (KIRB); the tranche's credit enhancement level (L); the tranche's thickness (T); the pool's effective number of exposures (N); and the pool's exposure-weighted average loss-given-default (LGD). In general, the estimates of N and LGD would be developed as a by-product of the process used to determine KIRB.

The SFA capital charge for a given securitization tranche would be calculated as the notional amount of exposures that have been securitized (E), multiplied by the greater of: (i) $0.0056 * T$ or (ii) the following expression:³⁹

³⁸ When the banking organization holds only a proportional interest in the tranche, that position's A-IRB capital charge equals the prorated share of the capital charge for the entire tranche.

³⁹ Because securitization exposures at or below KIRB must be deducted from regulatory capital, the SFA applies only to exposures above KIRB. When a tranche straddles KIRB, for the purpose of applying the SFA the

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$$(1) \quad K[L + T] - K[L] + \{0.05 \cdot (d \cdot K_{IRB} \cdot e^{-20 \cdot (L - K_{IRB}) / K_{IRB}}) \cdot (1 - e^{-20T / K_{IRB}})\},$$

where,⁴⁰

$$h = (1 - K_{IRB} / LGD)^N$$

$$c = K_{IRB} / (1 - h)$$

$$v = \frac{(LGD - K_{IRB}) K_{IRB} + 0.25 (1 - LGD) K_{IRB}}{N}$$

$$f = \left(\frac{v + K_{IRB}^2}{1 - h} - c^2 \right) + \frac{(1 - K_{IRB}) K_{IRB} - v}{(1 - h) \cdot 1000}$$

$$g = \frac{(1 - c)c}{f} - 1$$

$$a = g \cdot c$$

$$b = g \cdot (1 - c)$$

$$d = 1 - (1 - h) \cdot (1 - \text{Beta}[K_{IRB}; a, b])$$

$$K[x] = (1 - h) \cdot (x \cdot (1 - \text{Beta}[x; a, b]) + c \cdot \text{Beta}[x; a + 1, b]).$$

Although visually daunting, the above supervisory formula is easily programmable within standard spreadsheet packages, and its various components have intuitive interpretations.

Part (i), noted above, of the supervisory formula approach effectively imposes a 56 basis point minimum or floor A-IRB capital charge per dollar of tranche exposure. While acknowledging that such a floor is not risk-sensitive, the Agencies believe that some minimum prudential capital charge is nevertheless appropriate. The floor has been proposed at 56 basis points partly on the basis of empirical analyses suggesting that, across a broad range of modeling assumptions and exposure types, this level provides a reasonable lower bound on the capital charges implied by standard credit risk models for tranches meeting the standards for an external

tranche should be decomposed into a position at or below KIRB and another above KIRB. The former would be deducted from capital, while the latter would be the position to which the SFA is actually applied.

⁴⁰ In these expressions, Beta[X; a, b] refers to the cumulative beta distribution with parameters a and b evaluated at X. The cumulative beta distribution function is available in Excel as the function BETADIST.

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rating of AAA.⁴¹ This floor also is consistent with the lowest capital charge available under the RBA.

Part (ii) of the supervisory formula approach also is a blend of credit risk modeling results and supervisory judgment. The function denoted $K[x]$ represents a pure model-based estimate of the pool's aggregate systematic or non-diversifiable credit risk that is attributable to a first-loss position covering pool losses up to and including x . Since the tranche of interest (defined in terms of a credit enhancement level L , and thickness T) covers losses between L and $L+T$, its total systematic risk can be represented as $K[L+T] - K[L]$, which are the first two terms in (1). The term in braces within (1) represents a supervisory add-on to the pure model-based result. This add-on is intended primarily to avoid potential behavioral distortions associated with what would otherwise be a discontinuity in capital charges for relatively thin mezzanine tranches lying just below and just above KIRB: all tranches below KIRB would be deducted from capital, whereas a very thin tranche just above KIRB would incur a pure model-based capital charge that could vary between zero and one, depending upon the number of effective underlying exposures in the pool, N . The add-on would apply primarily to positions just above KIRB, and its quantitative effect would diminish rapidly as the distance from KIRB widens.

Most of the complexity of the supervisory formula is a consequence of attempting to make $K[x]$ as consistent as possible with the parameters and assumptions of the A-IRB framework that would apply to the underlying exposures if held directly by a banking organization.⁴² The specification of $K[x]$ assumes that KIRB is an accurate measure of the pool's total systematic credit risk, and that a securitization merely redistributes this systematic risk

⁴¹ See Vladislav Peretyatkin and William Perraudin, "Capital for Asset-Backed Securities," Bank of England, February 2003.

⁴² The conceptual basis for specification of $K[x]$ above is developed in Michael B. Gordy and David Jones, "Random Tranches," *Risk* (March 2003) 78-83.

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among its various tranches. In this way, $K[x]$ embodies precisely the same asset correlations as are assumed elsewhere within the A-IRB framework. In addition, this specification embodies the well-known result that a pool's total systematic risk (that is, KIRB) tends to be redistributed toward more senior tranches as the effective number of underlying exposures in the pool (N) declines.⁴³ The importance of pool granularity depends on the pool's average loss-rate-given-default, as increases in LGD also tend to shift systematic risk toward senior tranches when N is small. For highly granular pools, such as securitization of retail exposures, LGD would have no influence on the SFA capital charge.

The Agencies propose to establish criteria for determining E , KIRB, L , T , N , and LGD that are consistent with those suggested in the New Accord. A summary of these requirements is presented below.

E. This input would be measured (in dollars) as the A-IRB estimate of the exposures in the underlying pool of securitized exposures, as if they were held directly by the banking organization, rather than securitized. This amount would reflect only those underlying exposures that have actually been securitized to date. Thus, for example, E would exclude undrawn lines associated with revolving credit facilities (for example, credit card accounts).

KIRB. This input would be measured (in decimal form) as the ratio of (a) the pool's A-IRB capital requirement to (b) the notional or loan equivalent amount of underlying exposures in the pool (E). The pool's A-IRB capital requirement would be calculated in accordance with the applicable A-IRB standard for the type of underlying exposure. This calculation would incorporate the effect of any credit risk mitigant that is applied to the underlying exposures (either individually or to the entire pool), and hence benefits all of the securitization exposures. Consistent with the measurement of E , the estimate of KIRB would reflect only the underlying

⁴³ See Michael Pykhtin and Ashish Dev, "Coarse-grained CDOs", *Risk* (January 2003) 113-116.

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exposures that have been securitized. For example, KIRB generally would exclude the A-IRB capital charges against the undrawn portions of revolving credit facilities.

Credit enhancement level (L). This input would be measured (in decimal form) as the ratio of: (a) the notional amount of all securitization exposures subordinate to the tranche of interest to (b) the notional or loan equivalent amount of underlying exposures in the pool (E). L would incorporate any funded reserve account (for example, spread account or overcollateralization) that provides credit enhancement to the tranche of interest. Credit-enhancing interest-only strips would not be included in the calculation of L.

Thickness (T). This input would be measured (in decimal form) as the ratio of (a) the nominal amount of the tranche of interest to (b) the notional or loan equivalent amount of underlying exposures in the pool (E).

Effective number of exposures (N). This input would be calculated as

$$N = \frac{(\sum_i EAD_i)^2}{\sum_i EAD_i^2}$$

where EAD_i represents the exposure-at-default associated with the i -th underlying exposure in the pool. Multiple exposures to the same obligor would be consolidated (that is, treated as a single exposure). If the pool contains any underlying exposures that are themselves securitization exposures (for example, one or more asset-backed securities), each of these would be treated as a single exposure for the purpose of measuring N .⁴⁴

⁴⁴ Within the supervisory formula, the probability distribution of credit losses associated with the underlying pool of exposures is approximated by treating the pool as if it consisted of N homogeneous exposures, each having an A-IRB capital charge of $KIRB/N$. The proposed treatment of N implies, for example, that a pool containing one ABS tranche backed by 1 million effective loans behaves more like a single loan having an A-IRB capital charge of $KIRB$ than a pool of 1 million loans, each having an A-IRB capital charge of $KIRB/1,000,000$.

Exposure-weighted average LGD. This input would be calculated (in decimal form) as

$$LGD = \frac{\sum_i LGD_i \cdot EAD_i}{\sum_i EAD_i}$$

where LGD_i represents the average LGD associated with all underlying exposures to the i -th obligor. In the case of re-securitization (a securitization of securitization exposures), an LGD of 100 percent would be assumed for any underlying exposure that was itself a securitization exposure.⁴⁵

Simplified method for computing N and LGD. Under the conditions provided below, banking organizations would be able to employ simplified methods for calculating N and the exposure-weighted average LGD. When the underlying exposures are retail exposures, the SFA may be implemented by setting $h = 0$ and $v = 0$, subject to supervisory approval and review. When the share of the pool associated with the largest exposure, C_1 , is no more than 0.03 (or 3 percent of the pool), the banking organization would be able to set $LGD = 0.50$ and N equal to:

$$N = \left(C_1 C_m + \left(\frac{C_m - C_1}{m - 1} \right) \max\{1 - m C_1, 0\} \right)^{-1}, \text{ provided that the banking}$$

organization can measure C_m , which denotes the share of the pool corresponding to the largest “m” exposures (for example, a 15 percent share corresponds to a value of 0.15).⁴⁶ Alternatively, when only C_1 is available and this amount is no more than 0.03, then the banking organization would be able to set $LGD = 0.50$ and $N = 1 / C_1$.

⁴⁵ As noted above, the A-IRB securitization framework does not permit banking organizations to use their own internal estimates of LGDs (and PDs) for securitization exposures because such quantification requires implicit or explicit estimates of loss correlations among the underlying exposures. Recall that LGDs should be measured as the loss rates expected to prevail when default rates are high. While setting LGDs equal to 100 percent is reasonable for certain types of ABSs, such as highly subordinated or thin tranches, this level of LGD may be conservative for other types of ABSs. However, the Agencies believe that the complexity and burden associated with a more refined treatment of LGDs would outweigh any improvement in the overall risk sensitivity of A-IRB capital charges for

The Agencies seek comment on the proposed SFA. How might it be simplified without sacrificing significant risk sensitivity? How useful are the alternative simplified computation methodologies for N and LGD?

The Look-Through Approach for eligible liquidity facilities

ABCP conduits and similar programs sponsored by U.S. banking organizations are major sources of funding for financial and non-financial companies. Liquidity facilities supporting these programs are considered to be securitization exposures of the banking organizations providing the liquidity, and generally would be treated under the rules proposed for originators. As a general matter, the Agencies expect that banking organizations using the A-IRB approach would apply the SFA when determining the A-IRB capital requirement for liquidity facilities provided to ABCP conduits and similar programs. However, if it would not be practical for a banking organization to calculate KIRB using a top-down or a bottom-up approach, the banking organization may be allowed to use the Look-Through Approach, described below, for determining the A-IRB capital requirement, subject to supervisory approval and for a temporary period of time to be determined in consultation with the organization's primary Federal supervisor.

Because the Look-Through Approach has limited risk sensitivity, the Agencies propose that its applicability be restricted to liquidity facilities that are structured to minimize the extent to which the facilities provide credit support to the conduit. The Look-Through Approach would only be available to liquidity facilities that meet the following criteria:

- (a) the facility documentation clearly identifies and limits the circumstances under which it may be drawn. In particular, the facility must not be able to cover losses already sustained by the pool of underlying exposures (for example, to acquire assets from the pool at above fair

originators, owing to the combined effects of (a) the dollar-for-dollar A-IRB capital charge on positions below KIRB, and (b) the maximum or cap on an originator's total A-IRB capital charge, equal to KIRB.

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value) or be structured such that draw-down is certain (as indicated by regular or continuous draws);

- (b) the facility is subject to an asset quality test that precludes it from being drawn to cover underlying exposures that are in default;
- (c) the facility cannot be drawn after all applicable (specific and program-wide) credit enhancements from which the liquidity facility would benefit have been exhausted;
- (d) repayment of any draws on the facility (that is, assets acquired under a purchase agreement of loans made under a lending agreement) may not represent a subordinated obligation of the pool or be subject to deferral or waiver; and
- (e) reduction in the maximum drawn amount or early termination of the facility occurs, if the quality of the pool falls below investment grade.

Under the Look-Through Approach, the liquidity facility's A-IRB capital charge would be computed as the product of: (a) 8 percent, (b) the maximum potential drawdown under the facility, (c) the applicable credit conversion factor (CCF), and (d) the applicable risk weight. The CCF would be set at 50 percent if the liquidity facility's original maturity is one year or less, and at 100 percent if the original maturity is more than one year. The Agencies propose that the risk weight be set equal to the risk weight applicable under the general risk-based capital rules for banking organizations not using the A-IRB approach (that is, to the underlying assets or obligors after consideration of collateral or guarantees or, if applicable, external ratings).

The Agencies seek comment on the proposed treatment of eligible liquidity facilities, including the qualifying criteria for such facilities. Does the proposed Look-Through Approach -- to be available as a temporary measure -- satisfactorily address concerns that, in some cases, it may be impractical for providers of liquidity facilities to apply either the "bottom-up" or "top-down" approach for calculating KIRB? It would be helpful to understand the degree to which any potential obstacles are likely to persist.

⁴⁶ The level of m is to be set by each banking organization.

Feedback also is sought on whether liquidity providers should be permitted to calculate A-IRB capital charges based on their internal risk ratings for such facilities in combination with the appropriate RBA risk weight. What are the advantages and disadvantages of such an approach, and how might the Agencies address concerns that the supervisory validation of such internal ratings would be difficult and burdensome? Under such an approach, would the lack of any maturity adjustment with the RBA be problematic for assigning reasonable risk weights to liquidity facilities backed by relatively short-term receivables, such as trade credit?

Other Considerations

Capital treatment absent an A-IRB approach – The Alternative RBA

For originating banking organizations when there is not a specific A-IRB treatment for an underlying exposure or group of underlying exposures, the Agencies propose that a securitization exposure's capital charge be based exclusively on the exposure's external or inferred credit rating using the Alternative RBA.⁴⁷ Under the Alternative RBA, a risk weight of 20 percent is applied to exposures rated AAA to AA-, 50 percent to exposures rated A+ to A-, and 100 percent to exposures rated BBB+ to BBB-. Securitization exposures having ratings below investment grade, or that are non-rated, would be deducted from risk-based capital on a dollar-for-dollar basis.

Should the A-IRB capital treatment for securitization exposures that do not have a specific A-IRB treatment be the same for investors and originators? If so, which treatment should be applied – that used for investors (the RBA) or originators (the Alternative RBA)? The rationale for the response would be helpful.

Structures with early amortization provisions

Many securitizations of revolving credit facilities (for example, credit card accounts) contain provisions that call for the securitization to be wound down if the excess spread falls

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beyond a certain threshold.⁴⁸ This decrease in excess spread can, in some cases, be caused by deterioration in the credit quality of the underlying exposures. An early amortization event can increase a banking organization's capital needs if any new draws on the revolving facilities would need to be financed by the banking organization itself using on-balance-sheet sources of funding. The payment allocations used to distribute principal and finance charge collections during the amortization phase of these structures also can expose a banking organization to greater risk of loss than in other securitization structures. To account for the risks that early amortization structures pose to originating banking organizations, the capital treatment described below would apply to securitizations of revolving credit facilities containing such features.

In addition to the A-IRB capital charge an originating banking organization would incur on the securitization exposures it retains, an originator would be required to hold capital against all or a portion of the investors' interest in a securitization when (i) the organization sells exposures into a securitization that contains an early amortization feature, and (ii) the underlying exposures sold are of a revolving nature. The A-IRB capital charge attributed to the originator that is associated with the investors' interest is calculated as the product of: (a) the A-IRB capital charge that would be imposed if the entire investors' interest were held by the originating banking organization, and (b) an applicable CCF.

In general, the CCF would depend on whether the early amortization feature repays investors through a controlled or non-controlled mechanism, and whether the underlying exposures represent uncommitted revolving retail facilities that are unconditionally cancellable

⁴⁷ The Alternative RBA does not apply to eligible liquidity facilities, which may use the Look-Through Approach as described above. Additionally, the securitization exposures subject to the Alternative RBA are not limited by the maximum capital requirement discussed above.

⁴⁸ Excess spread is defined as gross finance charge collections and other income received by the trust or special purpose entity (SPE) minus certificate interest, servicing fees, charge-offs, and other senior trust or SPE expenses.

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without prior notice (for example, credit card receivables) or other credit lines (for example, revolving corporate facilities).

An early amortization provision would be considered controlled if, throughout the duration of the securitization transaction, including the amortization period, there is a pro rata sharing of interest, principal, expenses, losses, and recoveries based on the balances of receivables outstanding at the beginning of each month. Further, the pace of repayment may not be any more rapid than would be allowed through straight-line amortization over a period sufficient for 90 percent of the total debt outstanding at the beginning of the early amortization period to have been repaid or recognized as in default. In addition to these criteria, banking organizations with structures containing controlled early amortization features would also have to have appropriate plans in place to ensure that there is sufficient capital and liquidity available in the event of an early amortization. When these conditions are not met, the early amortization provision would be treated as non-controlled.

Determination of CCFs for controlled early amortization structures

The following method for determining CCFs applies to a securitization of revolving credit facilities containing a controlled early amortization mechanism. When the pool of underlying exposures includes uncommitted retail credit lines (for example, credit card receivables), an originator would first compare the securitization's three-month average excess spread against the following two reference levels:

- A. The point at which the banking organization would be required to trap excess spread under the terms of the securitization; and

B. The excess spread level at which an early amortization would be triggered.

In cases where a transaction does not require excess spread to be trapped, the first trapping point would be deemed to be 4.5 percentage points greater than the excess spread level at which an early amortization is triggered.

The banking organization would divide the distance between the two points described above into four equal segments. For example if the spread trapping point is 4.5 percent and the early amortization trigger is zero percent, then 4.5 percent would be divided into four equal segments of 112.5 basis points each. The following conversion factors, based on illustrative segments, would apply to the investors' interest.

Controlled Early Amortization of Uncommitted Retail Credit Lines

3-month average excess spread	Credit Conversion Factor (CCF)
450 basis points (bp) or more	0%
Less than 450 bp to 337.5 bp	1%
Less than 337.5 bp to 225 bp	2%
Less than 225 bp to 112.5 bp	20%
Less than 112.5 bp	40%

All other securitizations of revolving facilities (that is, those containing underlying exposures that are committed or non-retail) having controlled early amortization features would be subject to a CCF of 90 percent.

Determination of CCFs for non-controlled early amortization structures

The process for determining CCFs when a securitization of revolving credit facilities contains a non-controlled early amortization mechanism would be basically the same as that described above for controlled early amortization structures, except that different CCFs would apply to the various excess spread segments. For non-controlled structures, the following conversion factors, based on illustrative segments, would apply:

Non-Controlled Early Amortization of Uncommitted Retail Credit Lines

3-month average excess spread	Credit Conversion Factor (CCF)
450 basis points (bp) or more	0%
Less than 450 bp to 337.5 bp	5%
Less than 337.5 bp to 225 bp	10%
Less than 225 bp to 112.5 bp	50%
Less than 112.5 bp	100%

All other securitizations of revolving credit facilities (that is, those containing underlying exposures that are committed or non-retail) having non-controlled early amortization mechanisms would be subject to a CCF of 100 percent. In other words, no risk transference would be recognized for these structures; an originator's A-IRB capital charge would be the same as if the underlying exposures had not been securitized.

The Agencies seek comment on the proposed treatment of securitization of revolving credit facilities containing early amortization mechanisms. Does the proposal satisfactorily address the potential risks such transactions pose to originators?

Comments are invited on the interplay between the A-IRB capital charge for securitization structures containing early amortization features and that for undrawn lines that have not been securitized. Are there common elements that the Agencies should consider? Specific examples would be helpful.

Are proposed differences in CCFs for controlled and non-controlled amortization mechanisms appropriate? Are there other factors that the Agencies should consider?

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Market-disruption eligible liquidity facilities

A banking organization would be able to apply a 20 percent CCF to an eligible liquidity facility that can be drawn only in the event of a general market disruption (that is, where a capital market instrument cannot be issued at any price), provided that any advance under the facility represents a senior secured claim on the assets in the pool. A banking organization using this treatment would recognize 20 percent of the A-IRB capital charge required for the facility through use of the SFA. If the market disruption eligible liquidity facility is externally rated, a banking organization would be able to rely on the external rating under the RBA for determining the A-IRB capital requirement provided the organization assigns a 100 percent CCF rather than a 20 percent CCF to the facility.

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Overlapping credit enhancements or liquidity facilities

In some ABCP or similar programs, a banking organization may provide multiple facilities that may be drawn under varying circumstances. The Agencies do not intend that a banking organization incur duplicative capital requirements against these multiple exposures as long as, in the aggregate, multiple advances are not permitted against the same collateral. Rather, a banking organization would be required to hold capital only once for the exposure covered by the overlapping facilities (whether they are general liquidity facilities, eligible liquidity facilities, or the facilities serve as credit enhancements). Where the overlapping facilities are subject to different conversion factors, the banking organization would attribute the overlapping part to the facility with the highest conversion factor. However, if different banking organizations provide overlapping facilities, each institution would hold capital against the entire maximum amount of its facility. That is, there may be some duplication of capital charges for overlapping facilities provided by multiple banking organizations.

Servicer cash advances

Subject to supervisory approval, servicer cash advances that are recoverable would receive a zero percent CCF. This treatment would apply when servicers, as part of their contracts, may advance cash to the pool to ensure an uninterrupted flow of payments to investors, provided the servicer is entitled to full reimbursement and this right is senior to other claims on cash flows from the pool of underlying exposures.

When providing servicer cash advances, are banking organizations obligated to advance funds up to a specified recoverable amount? If so, does the practice differ by asset type? Please provide a rationale for the response given.

Credit risk mitigation

For securitization exposures covered by collateral or guarantees, the credit risk mitigation rules discussed earlier would apply. For example, a banking organization may reduce the A-IRB capital charge when a credit risk mitigant covers first losses or losses on a proportional basis. For all other cases, a banking organization would assume that the credit risk mitigant covers the most senior portion of the securitization exposure (that is, that the most junior portion of the securitization exposure is uncovered).

V. AMA Framework for Operational Risk

This section describes features of the proposed AMA framework for measuring the regulatory capital requirement for operational risk. Under this framework, a banking organization meeting the AMA supervisory standards would use its internal operational risk measurement system to calculate its regulatory capital requirement for operational risk. The discussion below provides background information on operational risk and the conceptual underpinnings of the AMA, followed by a discussion of the AMA supervisory criteria.⁴⁹

The Agencies' general risk-based capital rules do not currently include an explicit capital charge for operational risk, which is defined as the risk of loss resulting from inadequate or failed processes, people, and systems or from external events. When developing the general risk-based capital rules, the Agencies recognized that institutions were exposed to non-credit related risks, including operational risk. Consequently, the Agencies built a "buffer" into the general risk-based capital rules to implicitly cover other risks such as operational risk. With the introduction of the A-IRB framework for credit risk in this ANPR, which results in a more risk-sensitive treatment of credit risk, there is no longer an implicit capital buffer for other risks.

The Agencies recognize that operational risk is a key risk in financial institutions, and evidence indicates that a number of factors are driving increases in operational risk. These include the recent experience of a number of high-profile, high-severity losses across the banking industry highlighting operational risk as a major source of unexpected losses. Because the regulatory capital buffer for operational risk would be removed under the proposal, the Agencies are now seeking comment on a risk-sensitive capital framework for the largest, most complex institutions that would include an explicit risk-based capital requirement for operational risk. The Agencies propose to require banking organizations using the A-IRB approach for credit risk also to use the AMA to compute capital charges for operational risk.

The Agencies are proposing the AMA to address operational risk for regulatory capital purposes. The Agencies are interested, however, in possible alternatives. Are there alternative concepts or approaches that might be equally or more effective in addressing operational risk? If so, please provide some discussion on possible alternatives.

A. AMA Capital Calculation

The AMA capital requirement would be based on the measure of operational risk exposure generated by a banking organization's internal operational risk measurement system. In calculating the operational risk exposure, an AMA-qualified institution would be expected to estimate the aggregate operational risk loss that it faces over a one-year period at a soundness standard consistent with a 99.9 percent confidence level. The institution's AMA capital requirement for operational risk would be the sum of EL and UL, unless the institution can demonstrate that an EL offset would meet the supervisory criteria for operational risk. The institution would have to use a combination of internal loss event data, relevant external loss event data, business environment and internal control factors, and scenario analysis in calculating

⁴⁹ For a more detailed discussion of the concepts set forth in this ANPR and definitions of relevant terms, see the accompanying interagency "Supervisory Guidance on Operational Risk Advanced Measurement Approaches for

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its operational risk exposure. The institution also would be allowed to recognize the effect of risk dependency (for example, correlation) and, to a limited extent, the effect of insurance as a risk mitigant.

As with the proposed A-IRB capital requirement for credit risk, the operational risk exposure would be converted to an equivalent amount of risk-weighted assets for the calculation of an institution's risk-based capital ratios. An AMA-qualified institution would multiply the operational risk exposure generated by its analytical framework by a factor of 12.5 to convert the exposure to a risk-weighted assets equivalent. The resulting figure would be added to the comparable figures for credit and market risk in calculating the institution's risk-based capital denominator.

Does the broad structure that the Agencies have outlined incorporate all the key elements that should be factored into the operational risk framework for regulatory capital? If not, what other issues should be addressed? Are any elements included not directly relevant for operational risk measurement or management? The Agencies have not included indirect losses (for example, opportunity costs) in the definition of operational risk against which institutions would have to hold capital; because such losses can be substantial, should they be included in the definition of operational risk?

Overview of the Supervisory Criteria

Use of the AMA would be subject to supervisory approval. A banking organization would have to demonstrate that it has satisfied all supervisory standards before it would be able to use the AMA for risk-based capital purposes. The supervisory standards are briefly described below. Because an institution would have significant flexibility to develop its own methodology for calculating its risk-based capital requirement for operational risk, it would be necessary for supervisors to ensure that the institution's methodology is fundamentally sound. In addition, because different institutions may adopt different methodologies for assessing operational risk,

Regulatory Capital" (supervisory guidance) published elsewhere in today's [Federal Register](#).

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the requirement to satisfy supervisory standards offers some assurance to institutions and their supervisors that all AMA-qualified institutions would be subject to a common set of standards.

While the supervisory standards are rigorous, institutions would have substantial flexibility in terms of how they satisfy the standards in practice. This flexibility is intended to encourage an institution to adopt a system that is responsive to its unique risk profile, foster improved risk management, and allow for future innovation. The Agencies recognize that operational risk measurement is evolving rapidly and wish to encourage continued evolution and innovation. Nevertheless, the Agencies also acknowledge that this flexibility would make cross-institution comparisons more difficult than if a single supervisory approach were to be mandated for all institutions. The supervisory standards outlined below are intended to allow flexibility while also being sufficiently objective to ensure consistent supervisory assessment and enforcement of standards across institutions.

The Agencies seek comment on the extent to which an appropriate balance has been struck between flexibility and comparability for the operational risk requirement. If this balance is not appropriate, what are the specific areas of imbalance and what is the potential impact of the identified imbalance?

The Agencies are considering additional measures to facilitate consistency in both the supervisory assessment of AMA frameworks and the enforcement of AMA standards across institutions. Specifically, the Agencies are considering enhancements to existing interagency operational and managerial standards to directly address operational risk and to articulate supervisory expectations for AMA frameworks. The Agencies seek comment on the need for and effectiveness of these additional measures.

The Agencies also seek comment on the supervisory standards. Do the standards cover the key elements of an operational risk framework?

An institution's operational risk framework would have to include an independent operational risk management function, line of business oversight, and independent testing and verification. Both the institution's board of directors and management would have to have

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responsibilities in establishing and overseeing this framework. The institution would have to have clear policies and procedures in place for identifying, measuring, monitoring, and controlling operational risk.

An institution would have to establish an analytical framework that incorporates internal operational loss event data, relevant external loss event data, assessments of the business environment and internal control factors, and scenario analysis. The institution would have to have standards in place to capture all of these elements. The combination of these elements would determine the institution's quantification of operational risk and related regulatory capital requirement.

The supervisory standards for the AMA have both quantitative and qualitative elements. Effective operational risk quantification is critical to the objective of a risk-sensitive capital requirement. Consequently, a number of the supervisory standards are aimed at ensuring the integrity of the process by which an institution arrives at its estimated operational risk exposure.

It is not sufficient, however, to focus solely on operational risk measurement. If the Agencies are to rely on institutions to determine their risk-based capital requirements for operational risk, there would have to be assurances that institutions have in place sound operational risk management infrastructures. In addition, risk management elements would be critical inputs into the quantification of operational risk exposure, that is, operational risk quantification would have to take into account such risk management elements as the quality of an institution's internal controls. Likewise, the AMA capital requirement derived from an institution's quantification methodology would need to offer incentives for an institution to improve its operational risk management practices. Ultimately, the Agencies believe that better operational risk management will enhance operational risk measurement, and vice versa.

Corporate governance

An institution's operational risk framework would have to include an independent firm-wide operational risk management function, line of business management oversight, and independent testing and verification functions. While no specific management structure would be mandated, all three components would have to be evident.

The institution's board of directors would have to oversee the development of the firm-wide operational risk framework, as well as major changes to the framework. Management roles and accountability would have to be clearly established. The board and management would have to ensure that appropriate resources have been allocated to support the operational risk framework.

The independent firm-wide operational risk management function would be responsible for overseeing the operational risk framework at the firm level to ensure the development and consistent application of operational risk policies, processes, and procedures throughout the institution. This function would have to be independent from line of business management and the testing and verification functions. The firm-wide operational risk management function would have to ensure appropriate reporting of operational risk exposures and loss data to the board and management.

Lines of business would be responsible for the day-to-day management of operational risk within each business unit. Line of business management would have to ensure that internal controls and practices within their lines of business are consistent with firm-wide policies and procedures that support the management and measurement of the institution's operational risk.

The Agencies are introducing the concept of an operational risk management function, while emphasizing the importance of the roles played by the board, management, lines of business, and audit. Are the responsibilities delineated for

each of these functions sufficiently clear and would they result in a satisfactory process for managing the operational risk framework?

Operational risk management elements

An institution would have to have policies and procedures that clearly describe the major elements of its operational risk framework, including identifying, measuring, monitoring, and controlling operational risk. Management reports would need to be developed to address both firm-wide and line of business results. These reports would summarize operational risk exposure, operational loss experience, and relevant assessments of business environment and internal control factors, and would have to be produced at least quarterly. Operational risk reports, which summarize relevant firm-wide operational risk information, would also have to be provided periodically to senior management and the board. An institution's internal control system and practice would have to be adequate in view of the complexity and scope of its operations. In addition, an institution would be expected to meet or exceed minimum supervisory standards as set forth in the Agencies' supervisory policy statements and other guidance.

B. Elements of an AMA Framework

An institution would have to demonstrate that it has adequate internal loss event data, relevant external loss event data, assessments of business environments and internal control factors, and scenario analysis to support its operational risk management and quantification framework. These inputs would need to be consistent with the regulatory definition of operational risk. The institution would have to have clear standards for the collection and modification of operational risk inputs.

There are a number of standards that banking organizations would have to meet with respect to internal operational loss data. Institutions would have to have at least five years of

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internal operational risk loss data captured across all material business lines, events, product types, and geographic locations.⁵⁰ An institution would have to establish thresholds above which all internal operational losses would be captured. The New Accord introduces seven loss event type classifications; the Agencies are proposing that an institution would not be required to internally manage its operational risk according to these specific loss event type classifications, but nevertheless would have to be able to map its internal loss data to these loss event categories. The institution would have to provide consistent treatment for the timing of reporting an operational loss in its internal data systems. As highlighted earlier in this ANPR, credit losses caused or exacerbated by operational risk events would be treated as credit losses for regulatory capital purposes; these would include fraud-related credit losses.

An institution would have to establish and adhere to policies and procedures that provide for the use of relevant external loss data in the operational risk framework. External data would be particularly relevant where an institution's internal loss history is not sufficient to generate an estimate of major unexpected losses. Management would have to systematically review external data to ensure an understanding of industry experience. The Agencies seek comment on the use of external data and its optimal function in the operational risk framework.

While internal and external data provide an important historic picture of an institution's operational risk profile, it is important that institutions take a forward-looking view as well. Consequently, an institution would have to incorporate assessments of the business environment and internal control factors (for example, audit scores, risk and control assessments, risk indicators, etc.) into its AMA capital assessment. In addition, an institution would have to periodically compare its assessment of these factors with actual operational loss experience.

⁵⁰With supervisory approval, a shorter initial observation period may be acceptable for institutions that are newly authorized to use an AMA methodology.

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Another element of the AMA framework is scenario analysis. Scenario analysis is a systematic process of obtaining expert opinions from business managers and risk management experts to derive reasoned assessments of the likelihood and impact of plausible operational losses consistent with the regulatory soundness standard. While scenario analysis may rely, to a large extent, on internal or, especially, external data (for example, where an institution looks to industry experience to generate plausible loss scenarios), it is particularly useful where internal and external data do not generate a sufficient assessment of the institution's operational risk profile.

An institution would be required to have a comprehensive analytical framework that provides an estimate of the aggregate operational loss that it faces over a one-year period at a soundness standard consistent with a 99.9 percent confidence level. The institution would have to document the rationale for all assumptions underpinning its chosen analytical framework, including the choice of inputs, distributional assumptions, and weighting of quantitative and qualitative elements. The institution would also have to document and justify any subsequent changes to these assumptions.

An institution's operational risk analytical framework would have to use a combination of internal operational loss event data, relevant external operational loss event data, business environment and control factors, as well as scenario analysis. The institution would have to combine these elements in the manner that most effectively enables it to quantify its operational risk exposure. The institution would have to develop an analytical framework that is appropriate to its business model and risk profile.

Regulatory capital for operational risk would be based on the sum of EL and UL. There may be instances where an EL offset could be recognized, but the Agencies believe that this is

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likely to be difficult given existing supervisory and accounting standards. The Agencies have considered both reserving and budgeting as potential mechanisms for EL offsets. The use of reserves may be hampered by accounting standards, while budgeting raises concerns about availability over a one-year time horizon to act as a capital replacement mechanism. The Agencies are interested in specific examples of how business practices might be used to offset EL in the operational risk framework.

An institution would have to document how its chosen analytical framework accounts for dependence (for example, correlation) among operational losses across and within business lines. The institution would have to demonstrate that its explicit and embedded dependence assumptions are appropriate, and where dependence assumptions are uncertain, the institution would have to use conservative estimates.

An institution would be able to reduce its operational risk exposure by no more than 20 percent to reflect the impact of risk mitigants such as insurance. Institutions would have to demonstrate that qualifying risk mitigants meet a series of criteria (described in the supervisory guidance) to assess whether the risk mitigants are sufficiently capital-like to warrant a reduction of the operational risk exposure.

The Agencies seek comment on the reasonableness of the criteria for recognition of risk mitigants in reducing an institution's operational risk exposure. In particular, do the criteria allow for recognition of common insurance policies? If not, what criteria are most binding against current insurance products? Other than insurance, are there additional risk mitigation products that should be considered for operational risk?

An institution using an AMA for regulatory capital purposes would have to use advanced data management practices to produce credible and reliable operational risk estimates. These practices are comparable to the data maintenance requirements set forth under the A-IRB approach for credit risk.

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The institution would have to test and verify the accuracy and appropriateness of the operational risk framework and results. Testing and verification would have to be done independently of the firm-wide risk management function and the lines of business.

VI. Disclosure

Market discipline is a key component of the New Accord. The disclosure requirements summarized below seek to enhance the public disclosure practices, and thereby the transparency, of advanced approach organizations. Commenters are encouraged to consult the New Accord for specifics on the disclosure requirements under consideration. The Agencies view enhanced market discipline as an important complement to the advanced approaches to calculating minimum regulatory capital requirements, which would be heavily based on internal methodologies. Increased disclosures, especially regarding a banking organization's use of the A-IRB approach for credit risk and the AMA for operational risk, would allow a banking organization's private sector investors to more fully evaluate the institution's financial condition, risk profile, and capital adequacy. Given better information, private shareholders and debt holders can better influence the funding and capital costs of a banking organization. Such actions would enhance market discipline and supplement supervisory oversight of the organization's risk-taking and management.

A. Overview

Disclosure requirements would apply to the bank holding company representing the top consolidated level of the banking group. Individual banks within the holding company or consolidated group would not generally be required to fulfill the disclosure requirements set out below. An exception to the general rule would be that individual banks and thrifts within a group would still be required to disclose Tier 1 and total capital ratios and their components (that

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is, Tier 1, Tier 2 and Tier 3 capital), as is the case today. In addition, all banks and thrifts would continue to be required to submit appropriate information to regulatory authorities (for example, Report of Condition of Income (Call Reports) or Thrift Financial Reports).⁵¹

The Agencies are proposing a set of disclosure requirements that would allow market participants to assess key pieces of information regarding a banking group's capital structure, risk exposures, risk assessment processes, and ultimately, the capital adequacy of the institution. Failure to meet these minimum disclosure requirements, if not corrected, would render a banking organization ineligible to use the advanced approaches or would otherwise cause the banking organization to forgo potential capital benefits arising from the advanced approaches. In addition, other supervisory measures may be taken if appropriate.

Management would have some discretion to determine the appropriate medium and location of the required disclosure. Disclosures made in public financial reports (for example, in financial statements or Management's Discussion and Analysis included in periodic reports or SEC filings) or other regulatory reports (for example, FR Y-9C Reports), could fulfill the applicable disclosure requirements and would not need to be repeated elsewhere. For those disclosures that are not made under accounting or other requirements, the Agencies are seeking comment on the appropriate means of providing this data to market participants. Institutions would be encouraged to provide all related information in one location; at a minimum, institutions would be required to provide a cross reference to the location of the required disclosures.

The Agencies intend to maximize a banking organization's flexibility regarding where to make the required disclosures while ensuring that the information is readily available to market

⁵¹ In order to meet supervisory responsibilities, the Agencies plan to collect more detailed information through the supervisory process or regulatory reports. Much of this information may be proprietary and accordingly would

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participants without unnecessary burden. To balance these contrasting objectives, the Agencies are considering requiring banking organizations to provide a summary table on their public websites that indicate where all disclosures may be found. Such an approach also would allow institutions to cross-reference other web addresses (for example, those containing public financial reports or regulatory reports or other risk-oriented disclosures) where certain of the disclosures are located.

Given longstanding requirements for robust quarterly disclosure in the United States, and recognizing the potential for rapid change in risk profiles, the Agencies intend to require that the disclosures be made on a quarterly basis. However, qualitative disclosures that provide a general summary of a banking organization's risk management objectives and policies, reporting system, and definitions would be able to be published on an annual basis, provided any significant changes to these are disclosed in the interim. When significant events occur, banking organizations would be required to publish material information as soon as practicable rather than at the end of the quarter.

The risks to which banking organizations are exposed and the techniques that they use to identify, measure, monitor, and control those risks are important factors that market participants consider in their assessment of an institution. Accordingly, banking organizations would be required to have a formal disclosure policy approved by the board of directors that addresses the institution's approach for determining the disclosures it will make. The policy also would have to address the associated internal controls and disclosure controls and procedures. The board of directors and senior management would have to ensure that appropriate verification of the disclosures takes place and that effective internal controls and disclosure controls and procedures are maintained.

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Consistent with sections 302 and 404 of the Sarbanes-Oxley Act of 2002, management would have to certify to the effectiveness of internal controls over financial reporting and disclosure controls and procedures, and the banking organization's external auditor would have to attest to management's assertions with respect to internal controls over financial reporting. The scope of these reports would need to include all information included in regulatory reports and the disclosures outlined in this ANPR. Section 36 of the Federal Deposit Insurance Act has similar requirements. Accordingly, banking organizations would have to implement a process for assessing the appropriateness of their disclosures, including validation and frequency. Unless otherwise required by accounting or auditing standards, or by other regulatory authorities, the proposed requirements do not mandate that the new disclosures be audited by an external auditor for purposes of opining on whether the financial statements are presented in accordance with GAAP.

B. Disclosure Requirements

Banking organizations would be required to provide disclosures related to scope of application, capital structure, capital adequacy, credit risk, equities in the banking book, credit risk mitigation, asset securitization, market risk, operational risk and interest rate risk in the banking book. The disclosure requirements are summarized below.

The required disclosures pertaining to the scope of application of the advanced approaches would include a description of the entities found in the consolidated banking group. Additionally, banking organizations would be required to disclose the methods used to consolidate them, any major impediments on the transfer of funds or regulatory capital within the banking group, and specific disclosures related to insurance subsidiaries.

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Capital structure disclosures would provide summary information on the terms and conditions of the main features of capital instruments issued by the banking organization, especially in the case of innovative, complex, or hybrid capital instruments. Quantitative disclosures include the amount of Tier 1, Tier 2, and Tier 3 capital, deductions from capital, and total eligible capital.

Capital adequacy disclosures would include a summary discussion of the banking organization's approach to assessing the adequacy of its capital to support current and future activities. These requirements also include a breakdown of the capital requirements for credit, equity, market, and operational risks. Banking organizations would also be required to disclose their Tier 1 and total capital ratios for the consolidated group, as well as those of significant bank or thrift subsidiaries.

For each separate risk area, a banking organization would describe its risk management objectives and policies. Such disclosures would include an explanation of the banking organization's strategies and processes; the structure and organization of the relevant risk management function; the scope and nature of risk reporting and/or measurement systems; and the policies for hedging and/or mitigating risk and strategies and processes for monitoring the continuing effectiveness of hedges/mitigants.

The credit risk disclosure regime is intended to enable market participants to assess the credit risk exposure of A-IRB banking organizations and the overall applicability of the A-IRB framework, without revealing proprietary information or duplicating the role of the supervisor in validating the framework the banking organization has put into place.

Credit risk disclosures would include breakdowns of the banking organization's exposures by type of credit exposure, geographic distribution, industry or counterparty type

distribution, residual contractual maturity, amount and type of impaired and past due exposures, and reconciliation of changes in the allowances for exposure impairment.

Banking organizations would provide disclosures discussing the status of the regulatory acceptance process for the adoption of the A-IRB approach, including supervisory approval of such transition. The disclosures would provide an explanation and review of the structure of internal rating systems and relation between internal and external ratings; the use of internal estimates other than for A-IRB capital purposes; the process for managing and recognizing credit risk mitigation; and, the control mechanisms for the rating system including discussion of independence, accountability, and rating systems review. Required qualitative disclosures would include a description of the internal ratings process and separate disclosures pertaining to the banking organization's wholesale, retail and equity exposures.

There would be two categories of quantitative disclosures for credit risk: those that focus on the analysis of risk and those that focus on the actual results. Risk assessment disclosures would include the percentage of total credit exposures to which A-IRB disclosures relate. Also, for each portfolio except retail, the disclosures would have to provide: (1) a presentation of exposures across a sufficient number of PD grades (including default) to allow for a meaningful differentiation of credit risk;⁵² and (2) the default weighted-average LGD for each PD; and the amount of undrawn commitments and weighted average EAD.⁵³ For retail portfolios, banking organization would provide either:⁵⁴ (a) disclosures outlined above on a pool basis (that is, the

52 Where banking organizations are aggregating PD grades for the purposes of disclosure, this would be a representative breakdown of the distribution of PD grades used in the A-IRB approach.

53 Banking organizations need only provide one estimate of EAD for each portfolio. However, where banking organizations believe it is helpful, in order to give a more meaningful assessment of risk, they may also disclose EAD estimates across a number of EAD categories, against the undrawn exposures to which these relate.

54 Banking organizations would normally be expected to follow the disclosures provided for the non-retail portfolios. However, banking organizations would be able to adopt EL grades as the basis of disclosure where they believe this can provide the reader with a meaningful differentiation of credit risk. Where banking

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same as for non-retail portfolios); or (b) analysis of exposures on a pool basis against a sufficient number of EL grades to allow for a meaningful differentiation of credit risk.

Quantitative disclosures pertaining to historical results would include: actual losses (for example, charge-offs and specific provisions) in the preceding period for each portfolio and how this differs from past experience and a discussion of the factors that affected the loss experience in the preceding period. In addition, disclosures would include banking organizations' estimates against actual outcomes over a longer period.⁵⁵ At a minimum, this would include information on estimates of losses against actual losses in each portfolio over a period sufficient to allow for a meaningful assessment of the performance of the internal rating processes. Banking organizations would further be expected to decompose this to provide analysis of PD, LGD and EAD estimates against estimates provided in the quantitative risk assessment disclosures above.⁵⁶

Disclosures for banking book equity positions would include both balance sheet and fair values, and the types and nature of investments. The total cumulative realized gains or losses arising from sales and liquidations would be disclosed, together with total unrealized gains/losses and any amounts included in Tier 1 and/or Tier 2 capital. Details on the equity capital requirements would also be disclosed.

organizations are aggregating internal grades (either PD/LGD or EL) for the purposes of disclosure, this should be a representative breakdown of the distribution of those grades used in the IRB approach.

⁵⁵ For banking organizations implementing the A-IRB and AMA in 2007, the disclosures would be required from year-end-2008; In the meantime, early adoption would be encouraged. The phased implementation is to allow banking organizations sufficient time to build up a longer run of data that will make these disclosures meaningful. For banking organizations that may adopt the advanced approaches at a later date, they would also be subject to a one-year phase in period after which the disclosures would be required.

⁵⁶ Banking organizations would have to provide this further decomposition where it would allow users greater insight into the reliability of the estimates provided in the 'quantitative disclosures: risk assessment'. In particular, banking organizations should provide this information where there are material differences between the PD, LGD or EAD estimates given by banking organizations compared to actual outcomes over the long run. Banking organizations should also provide explanations for such differences.

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Disclosures relating to credit risk mitigation would include a description of the policies and processes for netting and collateral valuation and management, and the types of collateral accepted by the bank. Banking organizations would also be expected to include information about the main types of guarantor or credit derivative counterparties, and any risk concentrations arising from the use of a mitigation technique.

Securitization disclosures would summarize the banking organization's accounting policies for securitization activities and the current year's securitization activity. Further, banking organizations would be expected to disclose the names of the external credit rating providers used for securitizations. They would also provide details of the outstanding exposures securitized by the banking organization and subject to the securitization framework, including impairments and losses, exposures retained or purchased broken down into risk weight banks, and aggregate outstanding amount of securitized revolving exposures.

Disclosures for market risk would include a description of the models, stress testing, and backtesting used in assessing market risk, as well as information on the scope of supervisory acceptance. Quantitative disclosures would include the aggregate VaR, the high, mean, and low VaR values over the reporting period, and a comparison of VaR estimates with actual outcomes.

A key disclosure under the operational risk framework would be a description of the AMA the banking organization uses, including a discussion of relevant internal and external factors considered in the banking organization's measurement approach. In addition, the banking organization would disclose the operational risk charge before and after any reduction in capital resulting from the use of insurance or other potential risk mitigants.

Finally, disclosures relating to interest rate risk in the banking book would include the nature of that risk, key assumptions made, and the frequency of risk measurement. They would

also include the increase or decline in earnings or economic value for upward and downward rate shocks according to management's method for measuring interest rate risk in the banking book.

The Agencies seek comment on the feasibility of such an approach to the disclosure of pertinent information and also whether commenters have any other suggestions regarding how best to present the required disclosures.

Comments are requested on whether the Agencies' description of the required formal disclosure policy is adequate, or whether additional guidance would be useful.

Comments are requested regarding whether any of the information sought by the Agencies to be disclosed raises any particular concerns regarding the disclosure of proprietary or confidential information. If a commenter believes certain of the required information would be proprietary or confidential, the Agencies seek comment on why that is so and alternatives that would meet the objectives of the required disclosure.

The Agencies also seek comment regarding the most efficient means for institutions to meet the disclosure requirements. Specifically, the Agencies are interested in comments about the feasibility of requiring institutions to provide all requested information in one location and also whether commenters have other suggestions on how to ensure that the requested information is readily available to market participants.

VII. REGULATORY ANALYSIS

Federal agencies are required to consider the costs, benefits, or other effects of their regulations for various purposes described by statute or executive order. In particular, an executive order and several statutes may require the preparation of detailed analyses of the costs, benefits, or other effects of rules, depending on threshold determinations as to whether the rulemaking in question triggers the substantive requirements of the applicable statute or executive order.

For the reasons described above, the proposed and final rules that the Agencies may issue to implement the New Accord would represent a significant change to their current approach to the measurement of regulatory capital ratios, and the supervision of institutions' internal risk

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management processes with respect to capital allocations. First, in this ANPR, core and opt-in banks would rely on their own analyses to derive some of the principal inputs that would determine their regulatory capital requirements. Core and opt-in banks would incur new costs to create and refine their internal systems and to attract and train the staff expertise necessary to develop, oversee, manage and test those systems. Second, the measured regulatory capital ratios (although not the minimums) would likely change, perhaps substantially for core and opt-in banks. Third, the Agencies' approach to supervising capital adequacy would become bifurcated; that is, general banks would continue to use the Agencies' existing regulatory capital rules, either in their current form or as modified. As a result, there may be significant differences in the regulatory capital assigned to a particular type of asset depending on whether the bank is a core, opt-in, or general bank. To the extent that an institution's product mix would be directly affected by a change in the landscape of regulatory capital requirements, this might also affect the customers of those institutions due to the changes in pricing and market strategies.

The economic impact that would be created by these possibly unforeseen competitive effects is difficult to estimate, and the Agencies encourage comment. In particular, the Agencies are interested in comments on the competitive impact that a change in the regulatory capital regime applied to large institutions would have relative to the competitive position of smaller institutions that remain subject to the general risk-based capital rules. Conversely, if the regulatory burden of the more prescriptive A-IRB approach applied to core institutions were so large as to offset the potential for a lower measured capital requirement for certain exposures, then the competitive position of large institutions, with respect to both their domestic and international competitors, might be worsened. The Agencies are also interested in comments that address the competitive position of regulated institutions in the United States with respect to

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financial service providers, both domestic and foreign, that are not subject to the same degree of regulatory oversight.

None of the Agencies has yet made the threshold determinations required by executive order or statute with respect to this ANPR. Because the proposed approaches to assessing capital adequacy described in this ANPR are new, the Agencies currently lack information that is sufficiently specific or complete to permit those determinations to be made or to prepare any economic analysis that may ultimately be required. Therefore, this section of the ANPR describes the relevant executive order and statutes, and asks for comment and information that will assist in the determination of whether such analyses would be necessary before the Agencies published proposed or final rules.

Quantitative information would be the most useful to the Agencies. However, commenters may also provide estimates of costs, benefits, or other effects, or any other information they believe would be useful to the Agencies in making the determinations. In addition, commenters are asked to identify or estimate start-up, or non-recurring, costs separately from costs or effects they believe would be ongoing.

A. Executive Order 12866

Executive Order 12866 requires preparation of an economic analysis for agency actions that are "significant regulatory actions." "Significant regulatory actions" include, among other things, regulations that "have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities" ⁵⁷ Regulatory actions that satisfy one or more of these criteria are called

⁵⁷ Executive Order 12866 (Sept. 30, 1993), 58 FR 51735 (Oct. 4, 1993), as amended by Executive Order 13258, 67 FR 9385 [referred to hereafter as E.O. 12866]. For the complete text of the definition of "significant regulatory

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"economically significant regulatory actions." E.O. 12866 applies to the OCC and the OTS, but not the Board or the FDIC. If the OCC or the OTS determines that the rules implementing the New Accord comprise an "economically significant regulatory action," then the agency making that determination would be required to prepare and submit to the Office of Management and Budget's (OMB) Office of Information and Regulatory Affairs (OIRA) an economic analysis that includes:

- a description of the need for the rules and an explanation of how they will meet the need;
- an assessment of the benefits anticipated from the rules (for example, the promotion of the efficient functioning of the economy and private markets) together with, to the extent feasible, a quantification of those benefits;
- an assessment of the costs anticipated from the rules (for example, the direct cost both to the government in administering the regulation and to businesses and others in complying with the regulation, and any adverse effects on the efficient functioning of the economy, private markets (including productivity, employment, and competitiveness)), together with, to the extent feasible, a quantification of those costs; and
- an assessment of the costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation (including improving the current regulation and reasonably viable nonregulatory actions), and an explanation why

action," see E.O. 12866 at § 3(f). A "regulatory action" is "any substantive action by an agency (normally published in the Federal Register) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking." E.O. 12866 at § (e).

the planned regulatory action is preferable to the identified potential alternatives.⁵⁸

For purposes of determining whether this rulemaking would constitute an "economically significant regulatory action," as defined by E.O. 12866, and to assist any economic analysis that E.O. 12866 may require, the OCC and the OTS encourage commenters to provide information about:

- the direct and indirect costs, for core banks and those banks who intend to qualify as opt-in banks, of compliance with the approach described in this ANPR and the related supervisory guidance;
- the costs, for general banks, of adopting the approach;
- the effects on regulatory capital requirements for core, opt-in, and general banks;
- the effects on competitiveness, in both domestic and international markets, for core, opt-in, and general banks. This would include the possible effects on the customers served by these U.S. institutions through changes in the mix of product offerings and prices;
- the economic benefits of the approach for core, opt-in, or general banks, as measured by lower regulatory capital ratios, and a potentially more efficient allocation of capital. This might also include estimates of savings associated with regulatory capital arbitrage transactions that are currently undertaken in order to optimize return on capital under the current capital regime. That is, what estimates might exist to quantify the improvements in market efficiency from no longer pursuing regulatory capital arbitrage transactions?

⁵⁸The components of the economic analysis are set forth in E.O. 12866 § 6(a)(3)(C)(i)-(iii). For a description of the methodology that OMB recommends for preparing an economic analysis, see Office of Management and Budget, "Economic Analysis of Federal Regulations Under Executive Order 12866" (January 11, 1996). This publication is available on OMB's website at www.whitehouse.gov/omb/inforeg/riaguide.html. OMB recently published revisions to this publication for comment. See 68 FR 5492 (February 3, 2003).

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- the features of the A-IRB approach that provide an incentive for a bank to seek to qualify to use it, that is, to become an opt-in bank.

The OCC and the OTS also encourage comment on any alternatives to the regulatory approaches described in the ANPR that the Agencies should consider.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires agencies to prepare a "regulatory flexibility analysis" unless the head of the agency certifies that a regulation will not "have a significant economic impact on a substantial number of small entities."⁵⁹ The RFA applies to all of the Agencies.

The Agencies understand that the RFA has been construed to require consideration only of the direct impact on small entities.⁶⁰ The Small Business Administration (SBA) has said: "The courts have held that the RFA requires an agency to perform a regulatory flexibility analysis of small entity impacts only when a rule directly regulates them," that is, when it directly applies to them.⁶¹ Since the proposed approach would directly apply to only a limited number of large banking organizations, it would appear that the Agencies may certify that the issuance of this ANPR would not have significant economic impact on a substantial number of small entities.

Do the potential advantages of the A-IRB approach, as measured by the specific capital requirements on lower-risk loans, create a competitive inequality for small institutions, which are

⁵⁹The RFA is codified at 5 U.S.C. 601 *et seq.*

⁶⁰With respect to banks, the Small Business Administration (SBA) has defined a small entity to be a bank with total assets of \$150 million or less. 13 C.F.R. § 121.201.

⁶¹ SBA Office of Advocacy, A Guide for Government Agencies, "How to Comply with the Regulatory Flexibility Act (May 2003), at 20 (emphasis added). *See also Mid-Tex Electric Cooperative, Inc. v. FERC*, 773 F.2d 327, 340-43 (D.C. Cir. 1985) ("[W]e conclude that an agency may properly certify that no regulatory flexibility analysis is necessary when it determines that the rule will not have a significant economic impact on a substantial number of small entities *that are subject to the requirements of the rule.*") (emphasis added) (construing language in the RFA that was unchanged by subsequent statutory amendments).

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effectively precluded from adopting the A-IRB due to stringent qualification standards?

Conversely, would small institutions that remain on the general risk-based capital rules be at a competitive advantage from specific capital requirements on higher risk assets vis-à-vis advanced approach institutions? How might the Agencies estimate the effect on credit availability to small businesses or retail customers of general banks?

C. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 (UMRA) requires preparation of a written budgetary impact statement before promulgation of any rule likely to result in a "Federal mandate" that "may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100,000,000 or more (adjusted annually for inflation) in any 1 year."⁶² A "Federal mandate" includes any regulation "that would impose an enforceable duty upon the private sector. . . ." If a budgetary impact statement is required, the UMRA further requires the agency to identify and consider a reasonable number of regulatory alternatives before promulgating the rule in question. The UMRA applies to the OCC and the OTS, but not the Board or the FDIC.

The OCC and the OTS have asked for comments and information from core and opt-in banks on compliance costs and, generally, on alternative regulatory approaches, for purposes of evaluating what actions they need to take in order to comply with E.O. 12866. That same information (with cost information adjusted annually for inflation) is relevant to those agencies' determination of whether a budgetary impact statement is necessary pursuant to the UMRA. Commenters are therefore asked to be mindful of the UMRA requirements when they provide information about compliance costs and in suggesting alternatives to the approach described in this ANPR.

D. Paperwork Reduction Act

Each of the Agencies is subject to the Paperwork Reduction Act of 1995 (PRA).⁶³ The PRA requires burden estimates that will likely be based on some of the same information that is necessary to prepare an economic analysis under E.O. 12866 or an estimate of private sector expenditures pursuant to the UMRA.

In particular, an agency may not "conduct or sponsor" a collection of information without conducting an analysis that includes an estimate of the "burden" imposed by the collection. A collection of information includes, essentially, the eliciting of identical information – whether through questions, recordkeeping requirements, or reporting requirements – from 10 or more persons. "Burden" means the "time, effort, or financial resources expended by persons to generate, maintain, or provide information" to the agency. The rulemaking initiated by this ANPR will likely impose requirements, either in the regulations themselves or as part of interagency implementation guidance, that are covered by the PRA. In order to estimate burden, the Agencies will need to know, for example, the cost – in terms of time and money – that mandatory and opt-in banks would have to expend to develop and maintain the systems, procedures, and personnel that compliance with the rules would require. With this in mind, to assist in their analysis of the treatment of retail portfolios and other exposures, the Agencies intend to request from U.S. institutions additional quantitative data for which confidential treatment may be requested in accordance with the Agencies' applicable rules.

While it will be difficult to identify those requirements with precision before a proposed rule is issued, this notice and the draft supervisory guidance published elsewhere in today's Federal Register generally describes aspects of the Agencies' implementation of the revised

⁶²The Unfunded Mandates Reform Act is codified at 2 U.S.C. 1532 *et seq.*

⁶³44 U.S.C. § 3501 *et seq.*

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Basel accord where new reporting and recordkeeping requirements would be likely.

Commenters are asked to provide any estimates they can reasonably derive about the time, effort, and financial resources that will be required to provide the Agencies with the requisite plans, reports, and records that are described in this notice and in the supervisory guidance.

Commenters also are requested to identify any activities that will be conducted as a result from the capital and methodological standards in the framework presented in this ANPR that would impose new recordkeeping or reporting burden. Commenters should specify whether certain capital and methodological standards would necessitate the acquisition or development of new compliance/ information systems or the significant modification of existing compliance/information systems.

List of Acronyms

ABCP	Asset-Backed Commercial Paper
ADC	Acquisition, Development, and Construction
AIG	Accord Implementation Group
A-IRB	Advanced Internal Ratings-Based (approach for credit risk)
ALLL	Allowance for Loan and Lease Losses
AMA	Advanced Measurement Approach (for operational risk)
ANPR	Advance Notice of Proposed Rulemaking
BIS	Bank for International Settlements
BSC	Basel Committee on Banking Supervision
CCF	Credit Conversion Factor
CEDE	Community and Economic Development Entity
CF	Commodities Finance
CRE	Commercial Real Estate
CRM	Credit Risk Mitigation
EAD	Exposure at Default
EL	Expected Loss
FFIEC	Federal Financial Institutions Examination Council
FMI	Future Margin Income
GAAP	Generally Accepted Accounting Principles
HVCRE	High Volatility Commercial Real Estate
IMF	International Monetary Fund
IRB	Internal Ratings-Based
KIRB	Capital for Underlying Pool of Exposures (securitizations)
LGD	Loss Given Default
M	Maturity
MDB	Multilateral Development Bank
OF	Object Finance
OTC	Over-the-Counter (derivatives)
PCA	Prompt Corrective Action (regulation)
PD	Probability of Default
PDF	Probability Density Function
PF	Project Finance
PFE	Potential Future Exposure
PMI	Private Mortgage Insurance
PRA	Paperwork Reduction Act
PSE	Public-Sector Entity
QIS3	Third Quantitative Impact Study
QRE	Qualifying Revolving Exposures
R	Asset Correlation
RBA	Ratings-Based Approach (securitizations)
RFA	Regulatory Flexibility Act
S	Borrower-Size
SBIC	Small Business Investment Company

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SFA	Supervisory Formula Approach (securitizations)
SL	Specialized Lending
SME	Small- to Medium-Sized Enterprise
SPE	Special Purpose Entity
SSC	Supervisory Slotting Criteria
UL	Unexpected Loss
UMRA	Unfunded Mandates Reform Act
VaR	Value at Risk (model)

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[THIS SIGNATURE PAGE RELATES TO THE JOINT ADVANCE NOTICE OF PROPOSED RULEMAKING ON “RISK-BASED CAPITAL GUIDELINES; INTERNAL RATINGS-BASED CAPITAL REQUIREMENT”]

Date

John D. Hawke, Jr.
Comptroller of the Currency

Draft

[THIS SIGNATURE PAGE RELATES TO THE JOINT ADVANCE NOTICE OF PROPOSED
RULEMAKING ON “RISK-BASED CAPITAL GUIDELINES; INTERNAL RATINGS-
BASED CAPITAL REQUIREMENT]

By order of the Board of Governors of the Federal Reserve System (INSERT DATE HERE]

Jennifer J. Johnson
Secretary of the Board

Draft

[THIS SIGNATURE PAGE RELATES TO THE JOINT ADVANCE NOTICE OF PROPOSED
RULEMAKING ON “RISK-BASED CAPITAL GUIDELINES; INTERNAL RATINGS-
BASED CAPITAL REQUIREMENT]

By order of the Board of Directors.
Dated at Washington, DC, this day of 2003.
Federal Deposit Insurance Corporation

Robert E. Feldman,
Executive Secretary.
(SEAL)

Draft

[THIS SIGNATURE PAGE RELATES TO THE JOINT ADVANCE NOTICE OF PROPOSED
RULEMAKING ON “RISK-BASED CAPITAL GUIDELINES; INTERNAL RATINGS-
BASED CAPITAL REQUIREMENT]

Dated: 2003.

Director, Office of Thrift Supervision

**Draft Supervisory Guidance on
Internal Ratings-Based Systems
for Corporate Credit**

Draft Date: July 1, 2003

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Introduction

Purpose

1. This document describes supervisory expectations for banking organizations (institutions) adopting the advanced internal ratings-based approach (IRB) for the determination of minimum regulatory risk-based capital requirements. The focus of this guidance is corporate credit portfolios. Retail, commercial real estate, securitizations, and other portfolios will be the focus of later guidance. This draft guidance should be considered with the advance notice of proposed rulemaking (ANPR) on revisions to the risk-based capital standard as published in the Federal Register on July _____ no. _____.
2. The primary objective of IRB is to enhance the sensitivity of regulatory capital requirements to credit risk. To accomplish that objective, IRB harnesses a bank's own risk rating and quantification capabilities. In general, the IRB approach reflects and extends recent developments in risk management and banking supervision. However, the degree to which any individual bank will need to modify its own credit risk management practices to deliver accurate and consistent IRB risk parameters will vary from institution to institution.
3. This guidance is intended to provide supervisors and institutions with a clear description of the essential components and characteristics of an acceptable IRB framework. Toward that end, this document sets forth IRB system supervisory standards that are highlighted in bold and designated by the prefix "S." Whenever possible, these supervisory standards are principle-based to enable institutions to implement the framework flexibly. However, when prudential concerns or the need for standardization override the desire for flexibility, the supervisory standards are more detailed. Ultimately, institutions must have credit risk management practices that are consistent with the substance and spirit of the standards in this guidance.
4. The IRB conceptual framework outlined in this document is intended neither to dictate the precise manner by which institutions should seek to meet supervisory expectations, nor to provide technical guidance on how to develop such a framework. As institutions develop their IRB systems in anticipation of adopting them for regulatory capital purposes, supervisors will be evaluating, on an individual bank basis, the extent to which institutions meet the standards outlined in this document. In evaluating institutions, supervisors will rely on this supervisory guidance as well as examination procedures, which will be developed separately. This document assumes that readers are familiar with the proposed IRB approach to calculating minimum regulatory capital articulated in the ANPR.

Overview of Supervisory Expectations

5. Rigorous credit risk measurement is a necessary element of advanced risk management. Qualifying institutions will use their internal rating systems to associate a probability of default (PD) with each obligor grade, as well as a loss given default (LGD) with each credit facility. In addition, institutions will estimate exposure at default (EAD) and will calculate the effective remaining maturity (M) of credit facilities.

6. Qualifying institutions will be expected to have an IRB system consisting of four interdependent components:

- A system that assigns ratings and validates their accuracy (Chapter 1),
- A quantification process that translates risk ratings into IRB parameters (Chapter 2),
- A data maintenance system that supports the IRB system (Chapter 3), and,
- Oversight and control mechanisms that ensure the system is functioning as intended and producing accurate ratings (Chapter 4).

Together these rating, quantification, data, and oversight mechanisms present a framework for defining and improving the evaluation of credit risk.

7. It is expected that rating systems will operate dynamically. As ratings are assigned, quantified and used, estimates will be compared with actual results and data will be maintained and updated to support oversight and validation efforts and to better inform future estimates. The rating system review and internal audit functions will serve as control mechanisms that ensure that the process of ratings assignment and quantification function according to policy and design and that noncompliance and weaknesses are identified, communicated to senior management and the board, and addressed. Rating systems with appropriate data and oversight feedback mechanisms foster a learning environment that promotes integrity in the rating system and continuing refinement.

8. IRB systems need the support and oversight of the board and senior management to ensure that the various components fit together seamlessly and that incentives to make the system rigorous extend across line, risk management, and other control groups. Without strong board and senior management support and involvement, rating systems are unlikely to provide accurate and consistent risk estimates during both good and bad times.

9. The new regulatory minimum capital requirement is predicated on an institution's internal systems being sufficiently advanced to allow a full and

accurate assessment of its risk exposures. Under the new framework, an institution could experience a considerable capital shortfall in the most difficult of times if its risk estimates are materially understated. Consequently, the IRB framework demands a greater level of validation work and controls than supervisors have required in the past. When properly implemented, the new framework holds the potential for better aligning minimum capital requirements with the risk taken, pushing capital requirements higher for institutions that specialize in riskier types of lending, and lower for those that specialize in safer risk exposures.

10. Supervisors will evaluate compliance with the supervisory standards for each of the four components of an IRB system. However, evaluating compliance with each of the standards individually will not be sufficient to determine an institution's overall compliance. Rather, supervisors and institutions must also evaluate how well the various components of an institution's IRB system complement and reinforce one another to achieve the overall objective of accurate measures of risk. In performing their evaluation, supervisors will need to exercise considerable supervisory judgment, both in evaluating the individual components and the overall IRB framework. A summary of the key supervisory expectations for each of the IRB components follows.

Ratings Assignment

11. The first component of an IRB system involves the assignment and validation of ratings (see Chapter 1). Ratings must be accurately and consistently applied to all corporate credit exposures and be subject to initial and ongoing validation. Institutions will have latitude in designing and operating IRB rating systems subject to five broad standards:

Two-dimensional risk-rating system - IRB institutions must be able to make meaningful and consistent differentiations among credit exposures along two dimensions—obligor default risk and loss severity in the event of a default.

Rank order risks - IRB institutions must rank obligors by their likelihood of default, and facilities by the loss severity expected in default.

Calibration - IRB obligor ratings must be calibrated to values of the probability of default (PD) parameter and loss severity ratings must be calibrated to values of the loss given default (LGD) parameter.

Accuracy - Actual long-run actual default frequencies for obligor rating grades must closely approximate the PDs assigned to those grades and realized loss rates on loss severity grades must closely approximate the LGDs assigned to those grades.

Validation process - IRB institutions must have ongoing validation processes for rating systems that include the evaluation of developmental

evidence, process verification, benchmarking, and the comparison of predicted parameter values to actual outcomes (back-testing).

Quantification

12. The second component of an IRB system is a quantification process (see Chapter 2). Since obligor and facility ratings may be assigned separately from the quantification of the associated PD and LGD parameters, quantification is addressed as a separate process. The quantification process must produce values not only for PD and LGD but also for EAD and for the effective remaining maturity (M). The quantification of those four parameters is expected to be the result of a disciplined process. The key considerations for effective quantification are as follows:

Process - IRB institutions must have a fully specified process covering all aspects of quantification (reference data, estimation, mapping, and application).

Documentation - The quantification process, including the role and scope of expert judgment, must be fully documented and updated periodically.

Updating - Parameter estimates and related documentation must be updated regularly.

Review - A bank must subject all aspects of the quantification process, including design and implementation, to an appropriate degree of independent review and validation.

Constraints on Judgment - Judgmental adjustments may be an appropriate part of the quantification process, but must not be biased toward lower risk estimates.

Conservatism - Parameter estimates must incorporate a degree of conservatism that is appropriate for the overall robustness of the quantification process.

Data Maintenance

13. The third component of an IRB system is an advanced data management system that produces credible and reliable risk estimates (see Chapter 3). The broad standard governing an IRB data maintenance system is that it supports the requirements for the other IRB system components, as well as the institution's broader risk management and reporting needs. Institutions will have latitude in managing their data, subject to the following key data maintenance standards:

Life Cycle Tracking - Institutions must collect, maintain, and analyze essential data for obligors and facilities throughout the life and disposition of the credit exposure.

Rating Assignment Data - Institutions must capture all significant quantitative and qualitative factors used to assign the obligor and loss severity rating.

Support of IRB System - Data collected by institutions must be of sufficient depth, scope, and reliability to:

- Validate IRB system processes,
- Validate parameters,
- Refine the IRB system,
- Develop internal parameter estimates,
- Apply improvements historically,
- Calculate capital ratios,
- Produce internal and public reports, and
- Support risk management.

Control and Oversight Mechanisms

14. The fourth component of an IRB system is comprised of control and oversight mechanisms that ensure that the various components of the IRB system are functioning as intended (see Chapter 4). Given the various uses of internal risk ratings, including their direct link to regulatory capital requirements, there is enormous, sometimes conflicting, pressure on banks' internal rating systems. Control structures are subject to the following broad standards:

Interdependent System of Controls - IRB institutions must implement a system of interdependent controls that include the following elements:

- Independence,
- Transparency,
- Accountability,
- Use of ratings,
- Rating system review,
- Internal audit, and
- Board and senior management oversight.

Checks and Balances - Institutions must combine the various control mechanisms in a way that provides checks and balances for ensuring IRB system integrity.

15. The system of oversight and controls required for an effective IRB system may operate in various ways within individual institutions. This guidance does not prescribe any particular organizational structure for IRB oversight and control mechanisms. Banks have broad latitude to implement structures that are most effective for their individual circumstances, as long as those structures support

and enhance the institution's ability to satisfy the supervisory standards expressed in this document.

Scope of Guidance

16. This draft guidance reflects work performed by supervisors to evaluate and compare current practices at institutions with the concepts and requirements for an IRB framework. For instances in which a range of practice was observable, examples are provided on how certain practices may or may not qualify. However, in many other instances, practices were at such an early stage of development that it was not feasible to describe specific examples. In those cases, requirements tend to be principle-based and without examples. Given that institutions are still in the early stages of developing qualifying IRB systems, it is expected that this guidance will evolve over time to more explicitly take into account new and improving practices.

Timing

S. An IRB system must be operating fully at least one year prior to the institution's intended start date for the advanced approach.

17. As noted in the ANPR, the significant challenge of implementing a fully complying IRB system requires that institutions and supervisors have sufficient time to observe whether the IRB system is delivering risk-based capital figures with a high level of integrity. The ability to observe the institution's ratings architecture, validation, data maintenance and control functions in a fully operating environment prior to implementation will help identify how well the IRB system design functions in practice. This will be particularly important given that in the first year of implementation institutions will not only be subject to the new minimum capital requirements, but will also be disclosing risk-based capital ratios for the public to rely upon in the assessment of the institution's financial health.

Chapter 1: Ratings for IRB Systems

I. Overview

18. This chapter describes the design and operation of risk-rating systems that will be acceptable in an internal ratings-based (IRB) framework. Banks will have latitude in designing and operating IRB rating systems, subject to five broad standards:

Two-dimensional risk-rating system - IRB institutions must be able to make meaningful and consistent differentiations among credit exposures along two dimensions—obligor default risk and loss severity in the event of a default.

Rank order risks - IRB institutions must rank obligors by their likelihood of default, and facilities by the loss severity expected in default.

Calibration - IRB obligor ratings must be calibrated to values of the probability of default (PD) parameter and loss severity ratings must be calibrated to values of the loss given default (LGD) parameter.

Accuracy - Actual long-run actual default frequencies for obligor rating grades must closely approximate the PDs assigned to those grades and actual loss rates on loss severity grades must closely approximate the LGDs assigned to those grades.

Validation process - IRB institutions must have ongoing validation processes for rating systems that include the evaluation of developmental evidence, process verification, benchmarking, and the comparison of predicted parameter values to actual outcomes (back-testing).

II. Credit Ratings

19. In general, a credit rating is a summary indicator of the relative risk on a credit exposure. Credit ratings can take many forms. The most widely known credit ratings are the public agency ratings, which are expressed as letters; bank internal ratings tend to be expressed as whole numbers - for example, 1 through 10. Some rating model outputs are expressed in terms of probability of default or expected default frequency, in which case they may be more than relative measures of risk. Regardless of the form, meaningful credit ratings share two characteristics:

- They group credits to discriminate among possible outcomes.
- They rank the perceived levels of credit risk.

20. Banks have used credit ratings of various types for a variety of purposes. Some ratings are intended to rank obligors by risk of default and some are intended to rank facilities¹ by expected loss, which incorporates risk of default and loss severity. Bank rating systems that are geared solely to expected loss will need to be amended to meet the two-dimensional requirements of the IRB approach.

Rating Assignment Techniques

21. Banks use different techniques, such as expert judgment and models, to assign credit risk ratings. For banks using the IRB approach, how ratings are assigned is important because different techniques will require different validation processes and control mechanisms to ensure the integrity of the rating system. To assist the discussion of rating architecture requirements, described below are some of the current rating assignment techniques. Any of these techniques - expert judgment, models, constrained judgment, or a combination thereof - could be acceptable within an IRB system, provided the bank meets the standards outlined in this document.

1. Expert Judgment

22. Historically, banks have used expert judgment to assign ratings to commercial credits. With this technique, an individual weighs relevant information and reaches a conclusion about the appropriate risk rating. Presumably, the rater makes informed judgments based on knowledge gained through experience and training.

23. The key feature of expert-judgment systems is flexibility. The prevalence of judgmental rating systems reflects the view that the determinants of default are too complicated to be captured by a single quantitative model. The quality of management is often cited as an example of a risk determinant that is difficult to assess through a quantitative model. In order to foster internal consistency, banks employing expert judgment rating systems typically provide narrative guidelines that set out ratings criteria. However, the expert must decide how narrative guidelines apply to a given set of circumstances.

24. The flexibility possible in the assignment of judgmental ratings has implications for the types of ratings review that are feasible. As part of the ratings validation process, banks will attempt to confirm that raters follow bank policy. However, two individuals exercising judgment can use the same information to support different ratings. Thus, the review of an expert judgment rating system will require an expert who can identify the impact of policy and the impact of judgment on a rating.

¹ Facilities - loans, lines, or other separate extensions of credit to an obligor.

2. Models

25. In recent years, models have been developed for use in rating commercial credits. In a model-based approach, inputs are numeric and provide quantitative and qualitative information about an obligor. The inputs are combined using mathematical equations to produce a number that is translated into a categorical rating. An important feature of models is that the rating is perfectly replicable by another party, given the same inputs.

26. The models used in credit rating can be distinguished by the techniques used to develop them. Some models may rely on statistical techniques while others rely on expert-judgment techniques.

Statistical models. Statistically developed models are the result of statistical optimization, in which well-defined mathematical criteria are used to choose the model that has the closest fit to the observed data. Numerous techniques can be used to build statistical models; regression is one widely recognized example. Regardless of the specific statistical technique, a knowledgeable independent reviewer will have to exercise judgment in evaluating the reasonableness of a model's development, including its underlying logic, the techniques used to handle the data, and the statistical model building techniques.

Expert-derived models. Several banks have built rating models by asking their experts to decide what weights to assign to critical variables in the models. Drawing on their experience, the experts first identify the observable variables that affect the likelihood of default. They then reach agreement on the weights to be assigned to each of the variables. *Unlike* statistical

Scorecards: Some banks have developed credit rating models that they refer to as "scorecards," but they have used expert judgment to derive the weights. While they are models, they are not scoring models in the now conventional use of the term. In its conventional use, the term scoring model is reserved for a rating model derived using statistical techniques.

optimization, the experts are not necessarily using clear, consistent criteria to select the weights attached to the variables. Indeed, expert-judgment model building is often a practical choice when there is not enough data to support a statistical model building. Despite its dependence on expert judgment, this method can be called model-based as long as the result - the equation, most likely with linear weights - is used as the basis to rate the credits. Once the equation is set, the model shares the feature of replicability with statistically derived models. Generally, independent credit experts use judgment to evaluate the reasonableness of the development of these models.

3. Constrained Judgment

27. The alternatives just described present the extremes, but in practice, many banks use rating systems that combine models with judgment. Two approaches are common.

Judgmental systems with quantitative guidelines or model results as inputs. Historically, the most common approach to rating has involved individuals exercising judgment about risks, subject to policy guidelines containing quantitative criteria such as minimum values for particular financial ratios. Banks develop quantitative criteria to guide individuals in assigning ratings, but often believe that those criteria do not adequately reflect the information needed to assign a rating.

One version of this constrained judgment approach features a model output as one among several criteria that an individual may consider in assigning ratings. The individual assigning the rating is responsible for prioritizing the criteria, reconciling conflicts between criteria, and if warranted, overriding some criteria. Even if individuals incorporate model results as one of the factors in their ratings, they will exercise judgment in deciding what weight to attach to the model result. The appeal of this approach is that the model combines many pieces of information into a single output, which simplifies analysis, while the rater retains flexibility regarding the use of the model output.

Model-based ratings with judgmental overrides. When banks use rating models, individuals are generally permitted to override the results under certain conditions and within tolerance levels for frequency. Credit-rating systems in which individuals can override models raise many of the same issues presented separately by pure judgment and model-based systems. If overrides are rare, the system can be evaluated largely as if it is a model-based system. If, however, overrides are prevalent, the system will be evaluated more like a judgmental system.

Since constrained judgment systems combine features of both expert judgment and model-based systems, their evaluation will require the skills required to evaluate both of these other systems.

III. IRB Ratings System Architecture

A. Two-Dimensional Rating System

S. IRB risk rating systems must have two rating dimensions - obligor and loss severity ratings.

S. IRB obligor and loss severity ratings must be calibrated to values of the probability of default (PD) and the loss given default (LGD), respectively.

28. Regardless of the type of rating system(s) used by an institution, the IRB approach imposes some specific requirements. The first requirement is that an IRB rating system must be two-dimensional. Banks will assign obligor ratings, which will be associated with a PD. They will also either assign a loss severity rating, which will be associated with LGD values, or directly assign LGD values to each facility. The process of assigning the obligor and loss severity ratings - hereafter referred to as the rating system - is discussed below, and the process of calibrating obligor and loss severity ratings to PD and LGD parameters is discussed in Chapter 2.

S. Banks must record obligor defaults in accordance with the IRB definition of default.

Definition of Default

29. The consistent identification of defaults is fundamental to any IRB rating system. For IRB purposes, a default is considered to have occurred with regard to a particular obligor when either or both of the two following events have taken place:

- The obligor is past due more than 90 days on any material credit obligation to the banking group. Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstandings.
- The bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as liquidating collateral (if held).

30. Any obligor (or its underlying credit facilities) that meets one or more of the following conditions is considered unlikely to pay and therefore in default:

- The bank puts the credit obligation on non-accrual status.
- The bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.
- The bank sells the credit obligation at a material credit-related economic loss.

- The bank consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.
- The bank has filed for the obligor's bankruptcy or a similar order in respect of the obligor's credit obligation to the banking group.
- The obligor has sought or has been placed in bankruptcy or similar protection where this would avoid or delay repayment of the credit obligation to the banking group.

31. While most conditions of default currently are identified by bank reporting systems, institutions will need to augment data capture systems to collect those default circumstances that may not have been traditionally identified. These include facilities that are current and still accruing but where the obligor declared or was placed in bankruptcy. They must also capture so called "silent defaults" - defaults when the loss on a facility was avoided by liquidating collateral.

32. Loan sales on which a bank experiences a material loss due to credit deterioration are considered a default. Material credit related losses are defined as XX. (The agencies seek comment on how to define "material" loss in the case of loans sold at a discount). Banks should ensure that they have adequate systems to identify such transactions and to maintain adequate records so that reviewers can assess the adequacy of the institution's decision-making process in this area.

Obligor Ratings

S. Banks must assign discrete obligor grades.

33. While banks may use models to estimate probabilities of default for individual obligors, the IRB approach requires banks to group the obligors into discrete grades. Each obligor grade, in turn, must be associated with a single PD.

S. The obligor-rating system must result in a ranking of obligors by likelihood of default.

34. The proper operation of the obligor-rating system will feature a ranking of obligors by likelihood of default. For example, if a bank uses a rating system based on a 10-point scale, with 1 representing obligors of highest financial strength and 10 representing defaulted obligors, grades 2 through 9 should represent groups of ever-increasing risk. In a rating system in which risk

increases with the grade, an obligor with a grade 4 is riskier than an obligor with a grade 2, but need not be twice as risky.

S. Separate exposures to the same obligor must be assigned to the same obligor rating grade.

35. As noted above, the IRB framework requires that the obligor rating be distinct from the loss severity rating, which is assigned to the facility. Collateral and other facility characteristics should not influence the obligor rating. For example, in a 1-to-10 rating system, where risk increases with the number grade, a defaulted borrower with a fully cash-secured transaction should be rated a 10 - defaulted - regardless of the remote expectation of loss. Likewise, a borrower whose financial condition warrants the highest investment grade rating should be rated a 1 even if the bank's transactions are subordinate to other creditors and unsecured. Since the rating is assigned to the obligor and not the facility, separate exposures to the same obligor must be assigned to the same obligor rating grade.

36. At the bottom of any IRB system rating scale is a default grade. Once an obligor is considered to be in default for IRB purposes, that obligor must be assigned a default grade until such time as its financial condition and performance improve sufficiently to clearly meet the bank's internal rating definition for one of its non-default grades. *Once an obligor is in default on any material credit obligation to the subject bank, all of its facilities at that institution are considered to be in default.*

S. In assigning an obligor to a rating category, the bank must assess the risk of obligor default over a period of at least one year.

S. Obligor ratings must reflect the impact of financial distress.

37. In assigning an obligor to a rating category, the bank must assess the risk of obligor default over a period of at least one year. This use of a one-year assessment horizon does not mean that a bank should limit its consideration to outcomes for that obligor that are most likely over that year; the rating must take into account possible adverse events that might increase an obligor's likelihood of default.

Rating Philosophy—Decisions Underlying Ratings Architecture

S. Banks must adopt a ratings philosophy. Policy guidelines should describe the ratings philosophy, particularly how quickly ratings are expected to migrate in response to economic cycles.

S. A bank's capital management policy must be consistent with its ratings philosophy in order to avoid capital shortfalls in times of systematic economic stress.

38. In the IRB framework, banks assign obligors to groups that are expected to share common default frequencies. That general description, however, still leaves open different possible implementations, depending on how the bank defines the set of possible adverse events that the obligor might face. A bank must decide whether obligors are grouped by expected common default frequency over the next year (a so-called point-in-time rating system) or by an expected common default frequency over a wider range of possible stress outcomes (a so-called through-the-cycle rating system). Choosing between a point-in-time system and a through-the-cycle system yields a rating philosophy.

39. In point in time rating systems, obligors are assigned to groups that are expected to share a common default frequency in a particular year. Point-in-time ratings change from year to year as borrowers' circumstances change, including changes due to the economic possibilities faced by the borrowers. Since the economic circumstances of many borrowers reflect the common impact of the general economic environment, the transitions in point-in-time ratings will reflect that systematic influence. A Merton-style probability of default prediction model is commonly believed to be an example of a point-in-time approach to rating (although that may depend on the specific implementation of the model).

40. Through-the-cycle rating systems do not ask the question, what is the probability of default over the next year. Instead, they assign obligors to groups that would be expected to share a common default frequency if the borrowers in them were to experience distress, regardless of whether that distress is in the next year. Thus, as the descriptive title suggests, this rating philosophy abstracts from the near-term economic possibilities and considers a richer assessment of the possibilities. Like point-in-time ratings, through the cycle ratings will change from year to year due to changes in borrower circumstance. However, since this rating philosophy abstracts from the immediate economic circumstance and considers the implications of hypothetical stress circumstances, year to year transitions in ratings will be less influenced by changes in the actual economic environment. The ratings agencies are commonly believed to use through-the-cycle rating approaches.

41. Current practice in many banks in the U.S. is to rate obligors using an approach that combines aspects of both point-in-time and through the cycle approaches. The explanation provided by banks that combine those approaches is that they want rating transitions to reflect the directional impact of changes in the economic environment, but that they do not want all of the volatility in ratings associated with a point-in-time approach.

42. Regardless of which ratings philosophy a bank chooses, an IRB bank must articulate clearly its approach and the implications of that choice. As part of the choice of rating philosophy, the bank must decide whether the same ratings philosophy will be employed for all of the bank's portfolios. And management must articulate the implications that the bank's ratings philosophy has on the bank's capital planning process. If a bank chooses a ratings philosophy that is likely to result in ratings transitions that reflect the impact of the economic cycle, its capital management policy must be designed to avoid capital shortfalls in times of systematic economic stress.

Obligor-Rating Granularity

S. An institution must have at least seven obligor grades that contain only non-defaulted borrowers and at least one grade to which only defaulted borrowers are assigned.

43. The number of grades used in a rating system should be sufficient to reasonably ensure that management can meaningfully differentiate risk in the portfolio, without being so large that it limits the practical use of the rating system. To determine the appropriate number of grades beyond the minimum seven non-default grades, each institution must perform its own internal analysis.

S. An institution must justify the number of obligor grades used in its rating system and the distribution of obligors across those grades.

44. The mere existence of an exposure concentration in a grade (or grades) does not, by itself, reflect weakness in a rating system. For example, banks may focus on a particular type of lending, such as asset-based lending, in which the borrowers may have similar default risk. Banks with such focused lending activities may use close to the minimum number of obligor grades, while banks with a broad range of lending activities should have more grades. However, banks with a high concentration of obligors in a particular grade are expected to perform a thorough analysis that supports such a concentration.

45. A significant concentration within an obligor grade may be suspected if the financial strength of the borrowers within that grade varies considerably. If obligors seem unduly concentrated, then management should ask themselves the following questions:

- Are the criteria for each grade clear? Those rating criteria may be too vague to allow raters to make clear distinctions. Ambiguity may be an issue throughout the rating scale or it may be limited to the most commonly used ratings.
- How diverse are the obligors? That is how many market segments (for example, large commercial, middle market, private banking, small

business, geography, etc.) are significantly represented in the bank's borrower population? If a bank's commercial loan portfolio is not concentrated in one market segment, its risk rating distribution is not likely to be concentrated.

- How broad are the bank's internal rating categories compared to those of other lenders? The bank may be able to learn enough from publicly available information to adjust its rating criteria.

46. Some banks use "modifiers" to provide more risk differentiation to a given rating system. A risk rating modified with a plus, minus or other indicator does not constitute a separate grade unless the bank has developed a distinct rating definition and criteria for the modified grade. In the absence of such distinctions, grades such as 5, 5+, and 5- are viewed as a single grade for regulatory capital purposes regardless of the existence of the modifiers.

Loss Severity Ratings

S. Banks must rank facilities by the expected severity of the loss upon default.

47. The second dimension of an IRB system is the loss severity rating, which is calibrated to LGD. A facility's LGD estimate is the loss the bank is likely to incur in the event that the obligor defaults, and is expressed as a percentage of exposure at the time of default. LGD estimates can be assigned either through the use of a loss severity rating system or they can be directly assigned to each facility.

48. LGD analysis is still in very early stages of development relative to default risk modeling. Academic research in this area is relatively sparse, data are not abundant, and industry practice is still widely varying and evolving. Given the lack of data and the lack of research into LGD modeling, some banks are likely, as a first step, to segment their portfolios by a handful of available characteristics and determine the appropriate LGDs for those segments. Over time, banks' LGD methodologies are expected to evolve. Long-standing banking experience and existing research on LGD, while preliminary, suggests that collateral values, seniority, industry, etc. are predictive of loss severity.

S. Banks must have empirical support for LGD rating systems regardless of whether they use an LGD grading system or directly assign LGD estimates.

49. Whether a bank chooses to assign LGD values directly or, alternatively, to rate facilities and then quantify the LGD for the rating grades, the key requirement is that it will need to identify facility characteristics that influence LGD. Each of the loss severity rating categories must be associated with an

empirically supported LGD estimate. In much the same way an obligor- rating system ranks exposures by the probability of default, a facility rating system must rank facilities by the likely loss severity.

50. Regardless of the method used to assign LGDs (loss severity grades or direct LGD estimation), data used to support the methodology must be gathered systematically. For many banks, the quality and quantity of data available to support the LGD estimation process will have an influence on the method they choose.

Stress Condition LGDs

S. Loss severity ratings must reflect losses expected during periods with a relatively high number of defaults.

51. Like obligor ratings, which group obligors by expected default frequency, loss severity ratings assign facilities to groups that are expected to experience a common loss severity. However, the different treatment accorded to PD and LGD in the model used to calculate IRB capital requirements mandates an asymmetric treatment of obligor and loss severity ratings. Obligor ratings assign obligors to groups that are expected to experience common default frequencies across a number of years, some of which are years of general economic stress and some of which are not. In contrast, loss severity ratings (or estimates) must pertain to losses expected during periods with a high number of defaults - particular years that can be called stress conditions. For cases in which loss severities do not have a material degree of cyclical variability, use of a long-run default weighted average is appropriate, although stress condition LGD generally exceeds these averages.

Loss Severity Rating/LGD Granularity

S. Banks must have a sufficiently fine loss severity grading system or prediction model to avoid grouping facilities with widely varying LGDs together.

52. While there is no stated minimum number of loss severity grades, the systems that provide LGD estimates must be flexible enough to adequately segment facilities with significantly varying LGDs. Banks should have a sufficiently fine LGD grading system or LGD prediction model to avoid grouping facilities with widely varying LGDs together. For example, a bank using a loss severity rating-scale approach that has credit products with a variety of collateral packages or financing structures would be expected to have more LGD grades than those institutions with fewer options in their credit products.

B. Other Considerations of IRB Rating System Architecture

Timeliness of Ratings

S. All risk ratings must be updated whenever new relevant information is received, but must be updated at least annually.

53. A bank must have a policy that requires a dynamic ratings approach ensuring that obligor and loss severity ratings reflect current information. That policy must also specify minimum financial reporting and collateral valuation requirements. For example, at the time of servicing events, banks typically receive updated financial information on obligors. For cases in which loss severity grades or estimates are dependent on collateral values or other factors that change periodically, that policy must take into account the need to update these factors.

54. Banks' policies may include an alternative rating update timetable for exposures below a *de minimus* amount that is justified by the lack of materiality of the potential impact on capital. For example, some banks use triggering events to prompt an update of their ratings on *de minimus* exposures rather than adhering to a specific timetable.

Multiple Ratings Systems

55. Some banks may develop one risk-rating system that can be used across the entire commercial loan portfolio. However, a bank can choose to deploy any number of rating systems as long as all exposures are assigned PD and LGD values. A different rating system could be used for each business line and each rating system could use a different rating scale. A bank could also use a different rating system for each business line with each system using a common rating scale. Rating models could be used for some portfolios and expert judgment systems for others. An institution's complexity and sophistication, as well as the size and range of products offered, will affect the types and numbers of rating systems employed.

56. While using a number of rating systems is feasible, such a practice might make it more difficult to meet supervisory standards. Each rating system must conform to the standards in this guidance and must be validated for accuracy and consistency. The requirement that each rating systems be calibrated to parameter values imposes the ultimate constraint, which is that ratings be applied consistently.

Recognition of the Risk Mitigation Benefits of Guarantees

- S. **Banks reflecting the risk-mitigating effect of guarantees must do so by either adjusting PDs or LGDs, but not both.**
- S. **To recognize the risk-mitigating effects of guarantees, institutions must ensure that the written guarantee is evidenced by an unconditional and legally enforceable commitment to pay that remains in force until the debt is satisfied in full.**

57. Adjustments for guarantees must be made in accordance with specific criteria contained in the bank's credit policy. The criteria should be plausible and intuitive, and should address the guarantor's ability and willingness to meet its obligations. Banks are expected to gather evidence that confirms the risk-mitigating effect of guarantees.

58. Other forms of written third-party support (for example, comfort letters or letters of awareness) that are not legally binding should not be used to adjust PD or LGD unless a bank can demonstrate through analysis of internal data the risk-mitigating effect of such support. Banks may not adjust PDs or LGDs to reflect implied support or verbal assurances.

59. Regardless of the method used to recognize the risk-mitigating effects of guarantees, a bank must adopt an approach that is applied consistently over time and across the portfolio. Moreover, the onus is on the bank to demonstrate that its approach is supported by logic and empirical results. While guarantees may provide grounds for adjusting PD or LGD, they cannot result in a lower risk weight than that assigned to a similar direct obligation of the guarantor.²

C. Validation Process

- S. **IRB rating system architecture must be designed to ensure rating system accuracy**

60. As part of their IRB rating system architecture, banks must implement a process to ensure the accuracy of their rating systems. Rating system accuracy is defined as the combination of the following outcomes:

² The probability that an obligor and a guarantor (who supports the obligor's debt) will *both* default on a debt is lower than the probability that either the obligor or the guarantor will default. This favorable risk-mitigation effect is known as the reduced likelihood of "double default." In determining their rating criteria and procedures, banks are not permitted to consider possible favorable effects of imperfect expected correlation between default events for the borrower and guarantor for purposes of regulatory capital requirements. Thus, the adjusted risk weight cannot reflect the risk mitigation of double default. The ANPR solicits public comment on the double-default issue.

- The actual long-run average default frequency for each rating grade is not significantly greater than the PD assigned to that grade.
- The actual stress-condition loss rates experienced on defaulted facilities are not significantly greater than the LGD estimates assigned to those facilities.

61. Some differences across individual grades between observed outcomes and the estimated parameter inputs to the IRB equations can be expected. But if systematic differences suggest a bias toward lowering regulatory capital requirements, the integrity of the rating system (of either the PD or LGD dimensions or of both) becomes suspect. Validation is the set of activities designed to give the greatest possible assurances of ratings system accuracy.

S. Banks must have ongoing validation processes that include the review of developmental evidence, ongoing monitoring, and the comparison of predicted parameter values to actual outcomes (back-testing).

62. Validation is an integral part of the rating system architecture. Banks must have processes designed to give reasonable assurances of their rating systems' accuracy. The ongoing process to confirm and ensure rating system accuracy consists of:

- The evaluation of developmental evidence,
- Ongoing monitoring of system implementation and reasonableness (verification and benchmarking), and
- Back-testing (comparing actual to predicted outcomes).

63. IRB institutions are expected to employ all of the components of this process. However, the data to perform comprehensive back-testing will not be available in the early stages of implementing an IRB rating system. Therefore, banks will have to rely more heavily on developmental evidence, quality control tests, and benchmarking to assure themselves and other interested parties that their rating systems are likely to be accurate. Since the time delay before rating systems can be back-tested is likely to be an important issue – because of the rarity of defaults in most years and the bunching of defaults in a few years – the other parts of the validation process will assume greater importance. If rating processes are developed in a learning environment in which banks attempt to change and improve ratings, back testing may be delayed even further. Validation in its early stages will depend on bank management's exercising informed judgment about the likelihood of the rating system working – not simply on empirical tests.

1. Ratings System Developmental Evidence

64. The first source of support for the validity of a bank's rating system is developmental evidence. Evaluating developmental evidence involves making a reasonable assessment of the quality of the rating system by analyzing its design and construction. Developmental evidence is intended to answer the question, Could the rating system be expected to work reasonably if it is implemented as designed? That evidence will have to be revisited whenever the bank makes a change to its rating system. If a bank adopts a rating system and does not make changes, this step will not have to be revisited. However, since rating systems are likely to change over time as the bank learns about the effectiveness of the system and incorporates the results of those analyses, the evaluation of developmental evidence is likely to be an ongoing part of the process. The particular steps taken in evaluating developmental evidence will depend on the type of rating system.

65. Generally, the evaluation of developmental evidence will include a body of expert opinion. For example, developmental evidence in support of a statistical rating model must include information on the logic that supports the model and an analysis of the statistical model-building techniques. In contrast, developmental evidence in support of a constrained-judgment system that features guidance values of financial ratios might include a description of the logic and evidence relating the values of the ratios to past default and loss outcomes.

66. Regardless of the type of rating system, the developmental evidence will be more persuasive when it includes empirical evidence on how well the ratings might have worked in the past. This evidence should be available for a statistical model since such models are chosen to maximize the fit to outcomes in the development sample. In addition, statistical models should be supported by evidence that they work well outside the development sample. Use of "holdout" sample evidence is a good model-building practice to ensure that the model is not merely a statistical quirk of the particular data set used to build the model.

67. Empirical developmental evidence of rating effectiveness will be more difficult to produce for a judgmental rating system. Such evidence would require asking raters how they would have rated past credits for which they did not know the outcomes. Those retrospective ratings could then be compared to the outcomes to determine whether the ratings were correct on average. Conducting such tests, however, will be difficult because historical data sets may not include all of the information that an individual would have actually used in making a judgment about a rating.

68. The sufficiency of the developmental evidence will itself be a matter of informed expert opinion. Even if the rating system is model-based, an evaluation of developmental evidence will entail judging the merits of the model-building

technique. Although no bright line tests are feasible because expert judgment is essential to the evaluation of rating system development, experts will be able to draw conclusions about whether a well-implemented system would be likely to perform satisfactorily.

2. Ratings System Ongoing Validation

69. The second source of analytical support for the validity of a bank rating system is the ongoing analysis intended to confirm that the rating system is being implemented and continues to perform as intended. Such analysis involves process verification and benchmarking.

Process Verification

70. Verification activities address the question, Are the ratings being assigned as intended? Specific verification activities will depend on the rating approach. If a model is used for rating, verification analysis begins by confirming that the computer code used to deploy the model is correct. The computer code can be verified in a number of established ways. For example, a qualified expert can duplicate the code or check the code line by line. Process verification for a model will also include confirmation that the correct data are being used in the model.

71. For expert-judgment and constrained-judgment systems, verification requires other individual reviewers to evaluate whether the rater followed rating policy. The primary requirements for verification of ratings assigned by individuals are:

- a transparent rating process,
- a database with information used by the rater, and
- documentation of how the decisions were made.

The specific steps will depend on how much the process incorporates specific guidelines and how much the exercise of judgment is allowed. As the dependence on specific guidelines increases, other individuals can more easily confirm that guidelines were followed by reference to sufficient documentation. As the dependence on judgment rises, the ratings review function will have to be staffed increasingly by experts with appropriate skills and knowledge about the rating policies of the bank.

72. Ratings process verification also includes override monitoring. If individuals have the ability to override either models or policies in a constrained-judgment system, the bank should have both a policy stating the tolerance for overrides and a monitoring system for identifying the occurrence of overrides. A reporting system capturing data on reasons for overrides will facilitate learning about whether overrides improve accuracy.

Benchmarking

S. Banks must benchmark their internal ratings against internal, market and other third-party ratings.

73. Benchmarking is the set of activities that uses alternative tools to draw inferences about the correctness of ratings before outcomes are actually known. The most important type of benchmarking of a rating system is to ask whether another rater or rating method attaches the same rating to a particular obligor or facility. Regardless of the rating approach, the benchmark can be either a judgmental or a model-based rating. Examples of such benchmarking include:

- Ratings reviewers who completely re-rate a sample of credits rated by individuals in a judgmental system.
- An internally developed model is used to rate credits rated earlier in a judgmental system.
- Individuals rate a sample of credits rated by a model.
- Internal ratings are compared against results from external agencies or external models.

74. Because it will take considerable time before outcomes will be available, using alternative ratings as benchmarks will be a very important validation device. Such benchmarking must be applied to all rating approaches, and the benchmark can be either a model or judgment. At a minimum, banks must establish a process in which a representative sample of its internal ratings is compared to third-party ratings (e.g., independent internal raters, external rating agencies, models, or other market data sources) of the same credits.

75. Benchmarking also includes activities designed to draw broader inferences about whether the rating system - as opposed to individual ratings - is working as expected. The bank can look for consistency in ranking or consistency in the values of rating characteristics for similarly rated credits. Examples of such benchmarking activities include:

- Analyzing the characteristics of obligors that have received common ratings.
- Monitoring changes in the distribution of ratings over time.
- Calculating a transition matrix calculated from changes in ratings in a bank's portfolio and comparing it to historical transition matrices from internal bank data or publicly available ratings.

While benchmarking activities allow for inferences about the correctness of the ratings system, they are not the same thing as back-testing. The benchmark itself is a prediction and may be in error. If benchmarking evidence suggests a pattern of rating differences, it should lead the bank to investigate the source of the differences. Thus, the benchmarking process illustrates the possibility of feedback from ongoing validation to model development, underscoring the characterization of validation as a process.

3. Back Testing

- S. Banks must develop statistical tests to back-test their IRB rating systems.**
- S. Banks must establish internal tolerance limits for differences between expected and actual outcomes.**
- S. Banks must have a policy that requires remedial actions be taken when policy tolerances are exceeded.**

76. The third component of a validation process is back-testing, which is the comparison of predictions with actual outcomes. Back-testing of IRB systems is the empirical test of the accuracy of the parameter values, PD and LGD, associated with obligor and loss severity ratings, respectively. For IRB rating systems, back-testing addresses the combined effectiveness of the assignment of obligor and loss severity ratings and the calibration of the parameters PD and LGD attached to those ratings.

77. At this time, there is no generally agreed-upon statistical test of the accuracy of IRB systems. Banks must develop statistical tests to back-test their IRB rating systems. In addition, banks must have a policy that specifies internal tolerance limits for comparing back-testing results. Importantly, that policy must outline the actions that would be taken whenever policy limits are exceeded.

78. As a combined test of ratings effectiveness, back-testing is a conceptual bridge between the ratings system architecture discussed in this chapter and the quantification of parameters, discussed in Chapter 2. The final section of Chapter 2 discusses back-testing as one type of quantitative test required to validate the quantification of parameter values.

Chapter 2: Quantification of IRB Systems

79. Ratings quantification is the process of assigning numerical values to the four key components for internal ratings-based assessments of credit-risk capital: probability of default (PD), the expected loss given default (LGD), the expected exposure at default (EAD), and maturity (M). Section I establishes an organizing framework for considering IRB quantification and develops general principles that apply to the entire process. Sections II through IV cover specific principles or supervisory standards that apply to PD, LGD, and EAD respectively. The maturity component, which is much less dependent on statistical estimates and the use of data, receives somewhat different treatment in section V. Validation of the quantification process is covered in section VI.

I. Introduction

A. Stages of the Quantification Process

80. With the exception of maturity, the risk components are unobservable and must be estimated. The estimation must be consistent with sound practice and supervisory standards. In addition, a bank must have processes to ensure that these estimates remain valid.

81. Calculation of risk components for IRB involves two sets of data: the bank's actual portfolio data, consisting of current credit exposures assigned to internal grades, and a "reference data set," consisting of a set of defaulted credits (in the case of LGD and EAD estimation) or both defaulted and non-defaulted credits (in the case of PD estimation). The bank estimates a relationship between the reference data set and probability of default, loss severity, or exposure; then this estimated relationship is applied to the actual portfolio data for which capital is being assessed.

82. Quantification proceeds through four logical stages: obtaining reference data; estimating the reference data's relationship to the parameters; mapping the correspondence between the reference data and the portfolio's data; and applying the relationship between reference data and parameters to the portfolio's data. (Readers may find it helpful to refer to the appendix to this chapter, which illustrates how this four-stage framework can be applied to ratings quantification approaches in practice.) An evaluation of any bank's IRB quantification process focuses on understanding how the bank implements each stage for each of the key parameters, and on assessing the adequacy of the bank's approach.

Data - First, the bank constructs a reference data set, or source of data, from which parameters can be estimated.

Reference data sets include internal data, external data, and pooled internal/external data. Important considerations include the comparability

of the reference data to the current credit portfolio, whether the sample period “appropriately” includes periods of stress, and the definition of default used in the reference data. The reference data must be described using a set of observed characteristics; consequently, the data set must contain variables that can be used for this characterization. Relevant characteristics might include external debt ratings, financial measures, geographic regions, or any other factors that are believed to be related in some way to PD, LGD, or EAD. More than one reference data set may be used.

Estimation - Second, the bank applies statistical techniques to the reference data to determine a relationship between characteristics of the reference data and the parameters (PD, LGD, or EAD).

The result of this step is a model that ties descriptive characteristics of the obligor or facility in the reference data set to PD, LGD, or EAD estimates. In this context, the term ‘models’ is used in the most general sense; a model may be simple, such as the calculation of averages, or more complicated, such as an approach based on advanced regression techniques. This step may include adjustments for differences between the IRB definition of default and the default definition in the reference data set, or adjustments for data limitations. More than one estimation technique may be used to generate estimates of the risk components, especially if there are multiple sets of reference data or multiple sample periods.

Mapping - Third, the bank creates a link between its portfolio data and the reference data based on common characteristics.

Variables or characteristics that are available for the current portfolio must be mapped to the variables used in the default, loss-severity, or exposure model. (In some cases, the bank constructs the link for a representative exposure in each internal grade, and the mapping is then applied to all credits within a grade.) An important element of mapping is making adjustments for differences between reference data sets and the bank’s portfolio. The bank must create a mapping for each reference data set and for each combination of variables used in any estimation model.

Application - Fourth, the bank applies the relationship estimated for the reference data to the actual portfolio data.

The ultimate aim of quantification is to attribute a PD, LGD, or EAD to each exposure within the portfolio, or to each internal grade if the mapping was done at the grade level. This step may include adjustments to default frequencies or loss rates to “smooth” the final parameter estimates. If the estimates are applied to individual transactions, the bank must in some way aggregate the estimates at the grade level. In addition, if multiple data sets or estimation methods are used, the bank must adopt a means of combining the various estimates.

83. A number of examples are given in this chapter to aid exposition and interpretation. None of the examples is sufficiently detailed to incorporate all the considerations discussed in this chapter. Moreover, technical progress in the area of quantification is rapid. Thus, banks should not interpret an example that is consistent with the standard being discussed, and that resembles the bank's current practice, as creation of a "safe harbor" or as an indication that the bank's practice will be approved as-is. Banks should consider this guidance in its entirety when determining whether systems and practices are adequate.

B. General Principles for Sound IRB Quantification

84. Several core principles apply to all elements of the overall ratings quantification process; those general principles are discussed in this introductory section. Each of these principles is, in effect, a supervisory standard for IRB systems. Other supervisory standards, specific to particular elements or parameters, are discussed in the relevant sections.

85. Supervisory evaluation of IRB quantification requires consideration of all of these principles and standards, both general and specific. Particular practical approaches to ratings quantification may be highly consistent with some standards, and less so with others. In any particular case, an ultimate assessment relies on the judgment of supervisors to weigh the strengths and weaknesses of a bank's chosen approach, using these supervisory standards as a guide.

S. IRB institutions must have a fully specified process covering all aspects of quantification (reference data, estimation, mapping, and application). The quantification process, including the role and scope of expert judgment, must be fully documented and updated periodically.

86. A fully specified quantification process must describe how all four stages (data, estimation, mapping, and application) are implemented for each parameter. Documentation promotes consistency and allows third parties to review and replicate the entire process. Examples of third parties that might use of the documentation include rating-system reviewers, auditors, and bank supervisors. Periodic updates to the process must be conducted to ensure that new data, analytical techniques, and evolving industry practice are incorporated into the quantification process.

S. Parameter estimates and related documentation must be updated regularly.

87. The parameter estimates must be updated at least annually, and the process for doing so must be documented in bank policy. The update should also evaluate the judgmental adjustments embedded in the estimates; new data or techniques may suggest a need to modify those adjustments. Particular attention should be given to new business lines or portfolios in which the mix of

obligors is believed to have changed substantially. A material merger, acquisition, divestiture, or exit clearly raises questions about the continued applicability of the process and should trigger an intensive review and updating.

88. The updating process is particularly relevant for the reference data stage because new data become available all the time. New data must be incorporated, into the PD, LGD, and EAD estimates, using a well-defined process.

S. A bank must subject all aspects of the quantification process, including design and implementation, to an appropriate degree of independent review and validation.

89. An independent review is an assessment conducted by persons not accountable for the work being reviewed. The reviewers may be either internal or external parties. The review serves as a check that the quantification process is sound and works as intended; it should be broad-based, and must include all of the elements of the quantification process that lead to the ultimate estimates of PD, LGD, and EAD. The review must cover the full scope of validation: evaluation of the integrity of data inputs, analysis of the internal logic and consistency of the process, comparison with relevant benchmarks, and appropriate back-testing based on actual outcomes.

S. Judgmental adjustments may be an appropriate part of the quantification process, but must not be biased toward lower estimates of risk.

90. Judgment will inevitably play a role in the quantification process and may materially affect the estimates. Judgmental adjustments to estimates are often necessary because of some limitations on available reference data or because of inherent differences between the reference data and the bank's portfolio data. The bank must ensure that adjustments are not biased toward optimistically low parameter estimates for PD, LGD, and EAD. Individual assumptions are less important than broad patterns; consistent signs of judgmental decisions that lower parameter estimates materially may be evidence of bias.

91. The reasoning and empirical support for any adjustments, as well as the mechanics of the calculation, must be documented. The bank should conduct sensitivity analysis to demonstrate that the adjustment procedure is not biased toward reducing capital requirements. The analysis must consider the impact of any judgmental adjustments on estimates and risk weights, and must be fully documented.

S. Parameter estimates must incorporate a degree of conservatism that is appropriate for the overall robustness of the quantification process.

92. In estimating values of PD, LGD, and EAD should be as precise and accurate as possible. However, estimates of PD, LGD and EAD are statistics,

and thus inherently subject to uncertainty and potential error. It is often possible to be reasonably confident that a risk component or other parameter lies within a particular range, but greater precision is difficult to achieve. Aspects of the ratings quantification process that are apt to introduce uncertainty and potential error include the following:

- The estimation of coefficients of particular variables in a regression-based statistical default or severity model.
- The calculation of average default or loss rates for particular categories of credits in external default databases.
- The mapping between portfolio obligors or facilities and reference data when the set of common characteristics does not align exactly.

93. A general principle of the IRB approach is that a bank must adjust estimates conservatively in the presence of uncertainty or potential error. In many cases this corresponds to assigning a final parameter estimate that increases required capital relative to the best estimate produced through sound-practice estimation techniques. The extent of this conservative adjustment should be related to factors such as the relevance of the reference data, the quality of the mapping, the precision of the statistical estimates, and the amount of judgment used throughout the process. Margins of conservatism need not be added at each step; indeed, that could produce an excessively conservative result. The overall margin of conservatism should adequately account for all uncertainties and weaknesses; this is the general interpretation of requirements to incorporate appropriate degrees of conservatism. Improvements in the quantification process (use of better data, estimation techniques, and so on) may reduce the appropriate degree of conservatism over time.

94. Estimates of PD, LGD, EAD, or other parameters or coefficients should be presented with an accompanying sense of the statistical precision of the estimates; this facilitates an assessment of the appropriate degree of conservatism.

II. Probability of Default (PD)

A. Data

95. To estimate PD accurately, a bank must have a comprehensive reference data set with observations that are comparable to the bank's current portfolio of obligors. Clearly, the data set used for estimation should be similar to the portfolio to which such estimates will be applied. The same comparability standard applies to both internal and external data sets.

96. To ensure ongoing applicability of the reference data, a bank must assess the characteristics of its current obligors relative to the characteristics of obligors in the reference data. Such variables might include qualitative and quantitative obligor information, internal and external rating, rating dates, and line of business or geography. To this end, a bank must maintain documentation that fully describes all explanatory variables in the data set, including any changes to those variables over time. A well-defined and documented process must be in place to ensure that the reference data are updated as frequently as is practical, as fresh data become available or portfolio changes make necessary.

S. The sample for the reference data must be at least five years, and must include periods of economic stress during which default rates were relatively high.

97. To foster more robust estimation, banks should use longer time series when more than five years of data are available. However, the benefits of using a longer time series (longer than five years) may have to be weighed against a possible loss of data comparability. The older the reference data, the less similar they are likely to be to the bank's current portfolio; striking the correct balance is a matter of judgment. Reference obligors must not differ from the current portfolio obligors systematically in ways that seem likely to be related to obligor default risk. Otherwise, the derived PD estimates may not be applicable to the current portfolio.

98. Note that this principle does not simply restate the requirement for five years of data: periods of stress during which default rates are relatively high must be included in the data sample. Exclusion of such periods biases PD estimates downward and unjustifiably lowers regulatory capital requirements.

Example 1

A bank's reference data set covers the years 1987 through 2001. Each year includes identical data elements, and each year is similarly populated. For its grade PD estimates, the bank relies upon data from a sub-sample covering 1992 through 2001. The bank provides no justification for dropping the years from 1987 through 1991. The bank contends that it is not necessary to include those

data, as the reference sample they use for estimation satisfies the five-year requirement. This practice is not consistent with the standard because the bank has not supported its decision to ignore available data. The fact that the excluded years include a recession would raise particular concerns.

S. The definition of default within the reference data must be reasonably consistent with the IRB definition of default.

99. Regardless of the source of the reference data, a bank must apply the same default definition throughout the quantification processes. This fosters consistent estimation across parameters and reduces the potential for undesired bias. In addition, consistent application of the same definition across banks will permit true horizontal analysis by supervisors and engaged market participants.

100. This standard applies to both internal and external reference data. For internal data, a bank's default definition is expected to be consistent with the IRB definition going forward. Banks will be expected to make appropriate adjustments to their data systems such that all defaults as defined for IRB are captured by the time a bank fully implements its IRB system. For any historical or external data that do not fully comply with the IRB definition of default, a bank must make conservative adjustments to reflect such discrepancies. Larger discrepancies require larger adjustments for conservatism.

Example 1

To identify defaults in its historical data, a bank applies a consistent definition of "placed on nonaccrual." This definition is used in the bank's quantification exercises to estimate PD, LGD, and EAD. The bank recognizes that use of the nonaccrual definition fails to capture certain defaults as identified in the IRB rules. Specifically, the bank indicates that the following kinds of defaulted facilities would not have been placed on nonaccrual: (1) credit obligations that were sold at a material credit-related economic loss, and (2) distressed restructurings. To be consistent with the standard, the bank must make a well-supported adjustment to its grade PD estimates to reflect the difference in the default definitions.

B. Estimation

101. Estimation of PD is the process by which characteristics of the reference data are related to default frequencies.³ The relevant characteristics that help to determine the likelihood of default are referred to as "drivers of default". Drivers

³The New Basel Capital Accord produced by the Basel Committee on Banking Supervision discusses three techniques for PD estimation. IRB banks are not constrained to select from among these three techniques; they have broad flexibility to implement appropriate approaches to quantification. The three Basel techniques are best regarded not as a complete taxonomy of the possible approaches to PD estimation, but rather as illustrations of a few of the many possible approaches.

might include variables such as financial ratios, management expertise, industry, and geography.

S. Estimates of default rates must be empirically based and must represent a long-run average.

102. Estimates must capture average default experience over a reasonable mix of high-default and low-default years of the economic cycle. The average is labeled “long-run” because a long observation period would span both peaks and valleys of the economic cycle. The emphasis should not be on time-span; the long-run average concept captures the breadth, not the length, of experience.

103. If the reference data are characterized by internal or external rating grades, one estimation approach is to calculate the mean of one-year realized default rates for each grade, giving equal weight to each year’s realized default rate. PD estimates generally should be calculated in this manner.

104. Another approach is to pool obligors in a given grade over a number of years and then calculate the mean default rate. In this case, each year’s default rate is weighted by the number of obligors. This approach may underestimate default rates. For example, if lending declines in recessions so that obligors are fewer in those years than in others, weighting by number of obligors would dilute the effect of the recession year on the overall mean. The obligor-weighted calculation, or another approach, will be allowed only if the bank can demonstrate that this approach provides a better estimate of the long-run average PD. At a minimum, this would involve comparing the results of both methods.

105. Statistical default prediction models may also play a role in PD estimation. For example, the characteristics of the reference data might include financial ratios or a distance-to-default measure, as defined by a specific implementation of a Merton-style structural model.

106. For a model-based approach to meet the requirement that ultimate grade PD estimates be long-run averages, the reference data used in the default model must meet the long-run requirement. For example, a model can be used to relate financial ratios to likelihood of default based on the outcome for the firms - default or non-default. Such a model must be calibrated to capture the default experience over a reasonable mix of good and bad years of the economic cycle. The same requirement would hold for a structural model; distance to default must be calibrated to default frequency using long-run experience. This applies to both internal and vendor models, and a bank must verify that this requirement is met.

Example 1

A bank uses external data from a rating agency to estimate PD. The PD estimate for each agency grade is calculated as the mean of yearly realized default rates over a time period (1980 through 2001) that includes several recessions and

high-default years. The bank provides support that this time period adequately represents long-run experience. This illustrates an estimation method that is consistent with the standard.

Example 2a

Like the institution in example 1, a bank maps internal ratings to agency grades. The estimates for the agency grades are set indirectly, using the default probabilities from a default prediction model. The bank does so because although it links internal and agency grades, the bank views the default model's results as more predictive than the historical agency default experience. For each agency grade, the bank calculates a PD estimate as the mean of the model-based default probabilities for the agency-rated obligors. In order to meet the long-run requirement, the bank calculates the estimates over the seven years from 1995 through 2001. The bank demonstrates that this time period includes a reasonable mix of high-default and low-default experience. This estimation method is consistent with the standard.

Example 2b

In a variant of example 2a, a bank uses the mean default frequency per agency rating grade for a single year, such as 2001. Empirical evidence shows that the mean default frequency for agency grades varies substantially from year to year. A single year thus does not reflect the full range of experience, because a long-run average should be relatively stable year to year. Such instability makes this estimation method unacceptable.

Example 2c

Another bank calculates the agency grade PD estimates as the median default probability of companies in that grade. The bank does so without demonstrating that the median is a better statistical estimator than the mean. This estimation method is not consistent with the standard. A median gives less weight to obligors with high estimated default probabilities than a simple mean does. The difference between mean and median can be material because distributions of credits within grades often are substantially skewed toward higher default probabilities: the riskier obligors within a grade tend to have individual default probabilities that are substantially worse than the median, while the least risky have default probabilities only somewhat better than the median.

S. Judgmental adjustments may play an appropriate role in PD estimation, but must not be biased toward lower estimates.

107. The following examples illustrate how supervisors will evaluate adjustments:

Example 1

A bank uses the last five years of internal default history to estimate grade PDs. However, they recognize that the internal experience does not include any high-default years. In order to remedy this and still take advantage of its experience,

the bank uses external agency data to adjust the estimates upward. Using the agency data, the bank calculates the ratio between the long-run average and the mean default rate per grade over the last five years. The bank assumes that the relationship observed in the agency data applies to its portfolio, and adjusts the estimates for the internal data accordingly. This practice is consistent with the standard.

Example 2

A bank uses internal default experience to estimate grade PDs. However, the bank has historically failed to recognize defaults when the loss on the default obligation was avoided by seizing collateral. The bank makes no adjustment for such missing defaults. The realized default rate using the more inclusive definition would be higher than that observed by the bank (and loss severity rates would be correspondingly lower). This practice would not be consistent with the standard, unless the bank demonstrates that the necessary adjustment is immaterial.

C. Mapping

108. Mapping is the process of establishing a correspondence between the bank's current obligors and the reference obligor data used in the default model. Hence, mapping involves identifying how default-related characteristics of the current portfolio correspond to the characteristics of reference obligors. Such characteristics might include financial and nonfinancial variables, and assigned ratings or grades.

109. Mapping can be thought of as taking each obligor in the bank's portfolio and characterizing it as if it were part of the reference data. There are two broad approaches to the mapping process:

Obligor mapping: Each portfolio obligor is mapped to the reference data based on its individual characteristics. For example, if a bank applies a default model, a default probability will be generated for each obligor. That individual default probability is then used to assign each obligor to a particular internal grade, based on the bank's established criteria. To obtain a final estimate of the grade PD in the subsequent application stage, the bank averages the default probabilities of individual obligors within each grade.

Grade mapping: Characteristics of the obligors within an internal grade are averaged or otherwise summarized to construct a "typical" or representative obligor for each grade. Then, the bank maps that representative obligor to the reference data. For example, if the bank uses a default model, the default probability associated with that typical obligor will serve as the grade PD in the application stage. Alternatively, the bank may map the typical obligor to a particular external rating grade based on

quantitative and qualitative characteristics, and assign the long-run default rate for that rating to the internal grade in the application stage.

110. Either grade mapping or obligor mapping can be part of the quantification process; either method can produce a single PD estimate for each grade in the application stage. However, in the absence of other compelling considerations, banks should use obligor mapping for two reasons:

- First, default probabilities are nonlinear under many estimation approaches. As a result, the default probability of the typical obligor – the result of a grade mapping approach – is often lower than the mean of the individual obligor default probabilities from the obligor mapping approach. For example, consider a bank that maps to the S&P scale and uses historical S&P bond default rates. For ease of illustration, suppose that one internal grade contains only three obligors that individually map to BB, BB-, and B+. The historical default rates for these three grades are 1.07, 1.76, and 3.24 percent, respectively (based on 1981-2001 data). Using obligor mapping, those rates would be assigned directly to the three obligors, yielding a mean PD of 2.02 percent for the grade. Using grade mapping, the grade PD would be only 1.76, because the grade’s typical obligor is rated BB-.
- Second, a hypothetical obligor with a grade’s average characteristics may not represent well the risks presented by the grade’s typical obligor. For example, a bank might observe that obligors with *high* leverage and *low* earnings variability have about the same default risk as obligors with *low* leverage and *high* earnings variability. These two types of obligors might both end up in the same grade, for example, Grade 6. If so, the typical obligor in Grade 6 would have moderate leverage and moderate earnings variability – a combination that might fail to reflect any of the individual obligors in Grade 6, and that could easily result in a PD for the grade that is too low.

111. A bank electing to use grade mapping instead of obligor mapping should be especially careful in choosing a “typical” obligor for each grade. Doing so typically requires that the bank examine the actual distribution of obligors within each grade, as well as the characteristics of those obligors. Banks should be aware that different measures of central tendency (such as mean, median, or mode) will give different results, and that these different results may have a material effect on a grade’s PD; they must be able to justify their choice of a measure. Banks must have a clear and consistent policy toward the calculation.

S. The mapping must be based on a robust comparison of available data elements that are common to the portfolio and the reference data.

112. Sound mapping practice uses all common elements that are available in the data as the basis for mapping. If a bank chooses to ignore certain common variables or to weight some variables more heavily than others, those choices must be supported. Mapping should also take into account differences in rating philosophy (for example, point-in-time or through-the-cycle) between any ratings embedded in the reference data set and the bank's own rating regime.

113. A mapping should be plausible, and should be consistent with the rating philosophy established by the bank as part of its obligor rating policy. For a bank that uses grade mapping, levels and ranges of key variables within each internal grade should be close to values of similar variables for corresponding obligors within the reference data.

114. The standard allows for use of a limited set of common variables that are predictive of default risk, in part to permit flexibility in early years when data may be far from ideal. Nevertheless, banks will eventually be expected to use variables that are widely recognized as the most reliable predictors of default risk in mapping exercises. In the meantime, banks relying on data elements that are weak predictors must compensate by making their estimates more conservative. For example, leverage and cash flow are widely recognized to be reliable predictors of corporate default risk. Borrower size is also predictive, but less so. A mapping based solely on size is by nature less reliable than one based on leverage, cash flow, and size.

Example 1

In estimating PD, a bank relies on observed default rates on bonds in various agency grades for PD quantification. To map its internal grades to the agency grades, the bank identifies variables that together explain much of the rating variation in the bond sample. The bank then conducts a statistical analysis of those same variables within its portfolio of obligors, using a multivariate distance calculation to assign each portfolio obligor to the external rating whose characteristics it matches most closely (for example, assigning obligors to ratings so that the sum of squared differences between the external grade averages and the obligor's characteristics is minimized). This practice is broadly consistent with the standard.

Example 2

A bank uses grade mapping to link portfolio obligors to the reference data set described by agency ratings. The bank looks at publicly rated portfolio obligors within an internal grade to determine the most common external rating, does the same for all grades, and creates a correspondence between internal and external ratings. The strength of the correspondence is a function of the number of externally rated obligors within each grade, the distribution of those external ratings within each grade and the similarity of externally rated obligors in the grade to those not externally rated. This practice is broadly consistent with this standard, but would require a comparison of rating philosophies and may require adjustments and the addition of margins of conservatism.

S. A mapping process must be established for each reference data set and for each estimation model.

115. Banks should never assume that a mapping is self-evident. Even a rating system that has been explicitly designed to replicate external agency ratings may or may not be effective in producing a replica; formal mapping is still necessary. Indeed, in such a system the kind of analysis involved in mapping may help identify inconsistencies in the rating process itself.

116. A mapping process is needed even where the reference obligors come from internal historical experience. Banks must not assume that internal data do not require mapping, because changes in bank strategy or external economic forces may alter the composition of internal grades or the nature of the obligors in those grades over time. Mappings must be reaffirmed regardless of whether rating criteria or other aspects of the ratings system have undergone explicit changes during the period covered by the reference data set.

117. Banks often use multiple reference data sets, and then combine the resulting estimates to get a grade PD. A bank that does that must conduct a rigorous mapping process for each data set.

118. Supervisors expect all meaningful characteristics of obligors to be factored directly into the rating process; this should include characteristics like the obligor's industry or physical location. But in some circumstances, certain effects related to industry, geography, or other factors are not reflected in rating assignments or default estimates. In such cases, it may be appropriate for banks to capture the impact of the omissions by using different mappings for different business lines or types of obligors. Supervisors expect this practice to be transitional; banks will eventually be required to incorporate the omitted effects into the rating system and the estimation process as they are uncovered and documented, rather than adjusting the mapping.

Example 1

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

Example 2

A bank uses internal historical data as its reference data. The bank computes a mean default rate for each grade as the grade PD for capital purposes, and asserts that mapping is unnecessary because "its strong credit culture ensures that a 4 is always a 4." This practice is not consistent with the standard, because

no mapping has been done; there is no assurance that a representative obligor in a grade today is comparable to an obligor in that same grade in the past.

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

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

120. Sound validation practices may include tests for internal consistency such as “reverse mapping.” Using this technique, a bank evaluates obligors from the reference data set as if they were subject to the bank’s rating system (that is, part of the bank’s current portfolio). The bank’s mapping is then applied to these reverse-mapped obligors to see whether the mapped characterization of the reference obligor is consistent with that of the initial evaluation.⁴ Another valuable technique is to apply different mapping methods and compare the results. For example, mappings based on financial ratio comparisons can be rechecked using mappings based on available external ratings.

Example 1

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

D. Application

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

⁴ For example, suppose a bank asserts that its Grade 3 corresponds to an S&P rating of A. Applying reverse mapping, the bank would take a sample of A-rated obligors from the reference data, run them through the bank’s rating process (perhaps a simplified version), and check to see that those obligors usually receive a grade of 3 on the bank’s internal scale.

Example

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

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

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

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

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

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

sensitive to how estimates from different data sources are combined, the bank must choose among the alternatives conservatively.

III. Loss Given Default (LGD)

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

A. Data

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

127. First, data must be available to calculate the actual economic loss experienced for each defaulted facility. Such data may include the market value of the facility at default, which can be used to proxy a recovery rate. Alternatively, economic loss may be calculated using the exposure at the time of default, loss of principal, interest, and fees, the present value of subsequent recoveries and related expenses (or the costs as calculated using an approved allocation method), and the appropriate discount rate.

128. Second, factors must be available to group the defaulted facilities in meaningful ways. Characteristics that are likely to be important in predicting loss rates include whether or not the facility is secured and the type and coverage of collateral if the facility is secured, seniority of the claim, general economic conditions, and obligor's industry. Although these factors have been found to be significant in existing academic and industry studies, a bank's quantification of LGD certainly need not be limited to these variables. For example, a bank might expand its loss severity research by examining many other potential drivers of severity (characteristics of an obligor that might help the bank predict the severity of a loss), including obligor size, line of business, geographic location, facility type, obligor ratings (internal or external), historical internal severity grade, or tenor of the relationship.

129. A bank must ensure that the reference data remains applicable to its current portfolio of facilities. It must implement established processes to ensure that reference data sets are updated when new data become available. All data sources, variables, and the overall processes concerning data collection and maintenance must be fully documented, and that documentation should be readily available for review.

- S. The sample period for the reference data must be at least seven years, and must include periods of economic stress during which defaults were relatively high.**

130. Seven years is the minimum sample period for the LGD reference data. A longer sample period is desirable, because more default observations will be available for analysis and may serve to refine severity estimates. In any case, a bank must select a sample period that includes episodes of economic stress, which are defined as periods with a relatively high number of defaults. Inclusion of stress periods increases the size and potentially the breadth of the reference data set. According to some empirical studies, the average loss rate is higher during periods of stress.

Example 1

A bank intends to rely primarily on internal data when quantifying all parameter estimates, including LGD. Its internal data cover the period 1994 through 2000. The bank will continue to extend its data set as time progresses. Its current policy mandates that credits be resolved within two years of default, and the data set contains the most recent data available. Although the current data set satisfies the seven-year requirement, the bank is aware that it does not include stress periods. In comparing its loss estimates with rates published in external studies for similarly stratified data, the bank observes that its estimates are systematically lower. To be consistent with the standard, the bank must take steps to include stress periods in its estimates.

- S. The definition of default within the reference data must be reasonably consistent with the IRB definition of default.**

131. This standard parallels a similar standard in the section on PD. The following examples illustrate how it applies in the case of LGD.

Example 1

For LGD estimation, a bank includes in its default data base only defaulted facilities that actually experience a loss, and excludes credits for which no loss was recorded because liquidated collateral covered the loss (effectively applying a "loss given loss" concept). This practice is not consistent with the standard because the bank's default definition for LGD is narrower than the IRB definition.

Example 2

A bank relies on external data sources to estimate LGD because it lacks sufficient internal data. One source uses "bankruptcy filing" to indicate default while another uses "missed principal or interest payment," and the two sources result in significantly different loss estimates for the severity grades defined by the bank. The bank's practice is not consistent with the standard, and the bank

should determine whether the definitions used in the reference data sets differ substantially from the IRB definition. If so, and the differences are difficult to quantify, the bank should seek other sources of reference data. For more minor differences, the bank may be able to make appropriate adjustments during the estimation stage.

B. Estimation

132. Estimation of LGD is the process by which characteristics of the reference data are related to loss severity. The relevant characteristics that help explain how severe losses tend to be upon default might include variables such as seniority, collateral, facility type, or business line.

S. The estimates of loss severity must be empirically based and must reflect the concept of “economic loss.”

133. Loss severity is defined as economic loss, which is different from accounting measures of loss. Economic loss captures the value of recoveries and direct and indirect costs discounted to the time of default, and it should be measured for each defaulted facility. The scope of the cash flows included in recoveries and costs is meant to be broad. Workout costs that can be clearly attributed to certain facilities or types of facilities must be reflected in the bank’s LGD assignments for those exposures. When such allocation is not practical, the bank may assign those costs using factors based on broad averages.

134. A bank must establish a discount rate that reflects the time value of money and the opportunity cost of funds to apply to recoveries and costs. The discount rate must be no less than the contract interest rate on new originations of a type similar to the transaction in question, for the lowest-quality grade in which a bank originates such transactions.⁵ Where possible, the rate should reflect the fixed rate on newly originated exposures with term corresponding to the average resolution period of defaulting assets.

135. Ideally, severity should be measured once all recoveries and costs have been realized. However, a bank may not resolve a defaulted obligation for many years following default. For practical purposes, banks may choose to close the period of observation before this final resolution occurs – that is, at a point in time when most costs have been incurred and when recoveries are substantially complete. Banks that do so should estimate the additional costs and recoveries that would likely occur beyond this period and include them in the LGD estimates. A bank must document its choice of the period of observation, and how it estimated additional costs and recoveries beyond this period.

⁵ The appropriate discount rate for IRB purposes may differ from the contract interest rate required under FAS 114 for accounting purposes rate.

136. LGD for each type of exposure must be the loss per default (expressed as a percentage of exposure at default) expected during periods when default rates are relatively high. This expected loss rate is referred to as “stress-condition LGD.” For cases in which loss severities do not have a material degree of cyclical variability, use of the long-run default-weighted average is appropriate, although stress-condition LGD generally exceeds this average.

137. The drivers of severity can be linked to loss estimates in a number of ways. One approach is to segment the reference defaults into groups that do not overlap. For example, defaults could be grouped by business line, predominant collateral type, and loan-to-value coverage. The LGD estimate for each category is the mean loss calculated over the category’s defaulted facilities. Loss must be calculated as the default-weighted average (where individual defaults receive equal weight) rather than the average of annual loss rates, and must be based on results from periods during which default rates were relatively numerous if loss rates are materially cyclical.

138. Banks can also draw estimates of LGD from a statistical model. For example, they can build a regression model of severity using data on loss severity and some quantitative measures of the loss drivers. Any model must meet the requirements for model validation discussed in Chapter 1. Other methods for computing LGD could also be appropriate.

Example 1

A bank has internal data on defaulted facilities, including information on business line, facility type, seniority, and predominant collateral type (if the facility is secured). The data allow for a reasonable calculation of economic loss. The data span eight years and include three years that can be termed high-default years. After analyzing the economic cycle using internal and external data, the bank concludes that the data show no evidence of material cyclical variability in loss severities, and that the default data span enough experience to allow estimation of a long-run average. On the basis of preliminary analysis, the bank determines that the drivers of loss severity for large corporate facilities are similar to those for middle-market loans, and that the two groups can be estimated as a pool. Again on the basis of preliminary analysis, the bank segments this pool by seniority and by six collateral groupings, including unsecured. These groupings contain enough defaults to allow reasonably precise estimates. The loss severity estimates are then calculated by averaging loss rates within each segment. This practice is consistent with the standard.

Example 2

A bank uses internal data in which information on security and seniority is lacking. The bank groups corporate and middle-market defaulted facilities into a single pool and calculates the LGD estimate as the mean loss rate. No adjustments for the lack of data are made in the estimation or application steps. This practice is unacceptable because there is ample external evidence that

security and seniority matter in these segments. A bank with such limited internal default data must incorporate external or pooled data into the estimation.

Example 3

A bank determines that a business unit - for example, a unit dedicated to a particular type of asset-based lending - forms a homogeneous pool for the purposes of estimating loss severity. That is, although the facilities in this pool may differ in some respects, the bank determines that they share a similar loss experience in default. The bank must provide reasonable support for this pooling through analysis of lending practices and available internal and external data. In this example, the mean of a single segment is consistent with the standard.

S. Judgmental adjustments may play an appropriate role in LGD estimation, but must not be biased toward lower estimates.

139. It is difficult to make general statements about good and bad practices in this area, because adjustments can take many different forms. The following examples illustrate how supervisors would be likely to evaluate particular adjustments observed in practice.

Example 1

A bank divides observed defaults into segments according to collateral type. One of the segments has too few observations to produce a reliable estimate. Relying on external data and judgment, the bank determines that the segment's estimated severity of loss falls somewhere between the estimates for two other categories. This segment's severity is set judgmentally to be the mean of the estimates for the other segments. This practice is consistent with the standard.

Example 2

A bank does not know when recoveries (and related costs) occurred in a portfolio segment; therefore, it cannot properly discount the segment's cash flows. However, the bank has sufficient internal data to calculate economic loss for defaulted facilities in another portfolio segment. The bank can support the assumption that the timing of cash flows for the two segments is comparable. Using the available data and informed judgment, the bank estimates that the measured loss without discounting should be grossed up to account for the time value of money and the opportunity cost of funds. This practice is consistent with the standard.

Example 3

A bank segments internal defaults in a business unit by some factors, including collateral. Although the available internal and external evidence indicates a higher LGD, the bank judgmentally assigns a loss estimate of 2 percent for facilities secured by cash collateral. The basis for this adjustment is that the lower estimate is justified by the expectation that the bank would do a better job of following policies for monitoring cash collateral in the future. Such an adjustment is generally not appropriate because it is based on projections of

future performance rather than realized experience. This practice is not consistent with the standard.

C. Mapping

140. LGD mapping follows the same general principles that PD mapping does. A mapping must be plausible and must be based on a comparison of severity-related data elements common to both the reference data and the current portfolio. The mapping approach is expected to be unbiased, such that the exercise of judgment does not consistently lower LGD estimates. The default definitions in the reference data and the current portfolio of obligors should be comparable. The mapping process must be updated regularly, well-documented, and independently reviewed.

S. A bank must conduct a robust comparison of available common elements in the reference data and the portfolio.

141. Mapping involves matching facility-specific data elements available in the current portfolio to the factors in the reference data set used to estimate expected loss severity rates. Examples of factors that influence loss rates include collateral type and coverage, seniority, industry, and location.

142. At least three kinds of mapping challenges may arise. First, even if similarly named variables are available in the reference data and portfolio data, they may not be directly comparable. For example, the definition of particular collateral types, or the meaning of “secured,” may vary from one application to another. Hence, a bank must ensure that linked variables are truly similar. Although adjustments to enhance comparability can be appropriate, they must be rigorously developed and documented. Second, levels of aggregation may vary. For example, the reference data may only broadly identify collateral types, such as financial and nonfinancial. The bank’s information systems for its portfolio might supply more detail, with a wide variety of collateral type identifiers. To apply the estimates derived from the reference data, the internal data must be regrouped to match the coarser level of aggregation in the reference data. Third, reference data often do not include workout costs and will often use different discounting. Judgmental adjustments for such problems must be well-documented and, as much as possible, empirically based.

S. A mapping process must be established for each reference data set and for each estimation model.

143. Mapping is never self-evident. Even when reference data are drawn from internal default experience, a bank must still link the characteristics of the reference data with those of the current portfolio.

144. Different data sets and different approaches to severity estimation may be entirely appropriate, especially for different business segments or product lines. Each mapping process must be specified and documented.

D. Application

145. At the application stage, banks apply the LGD estimation framework to their current portfolio of credit exposures. Doing so might require them to aggregate individual LGD estimates into broader averages (for example, into discrete severity grades) or to combine estimates in various ways.

146. The inherent variability of recovery, due in part to unanticipated circumstances, demonstrates that no facility type is wholly risk-free, regardless of structure, collateral type, or collateral coverage. The existence of recovery risk dictates that application of a zero percent LGD is not acceptable.

S. IRB institutions that aggregate LGD estimates for severity grades from individual exposures within those grades must have a clear policy governing the aggregation process.

147. Banks with discrete severity grades compute a single estimate of LGD for a representative exposure within each of those grades. If a bank with a discrete scale of severity grades maps those grades to the reference data using grade mapping, there will be a single estimate of LGD for each grade, and the bank does not need to aggregate further. However, if the bank maps at the individual transaction level, the bank may then choose to aggregate those individual LGD estimates to the grade level and use the grade LGD in capital calculations. Because different methods of aggregation are possible, a bank must have a clear policy regarding how aggregation should be accomplished; in general, simple averaging is preferred. (This standard is irrelevant for banks that choose to assign LGD estimates directly to individual exposures rather than grades, because aggregation is not required in that case.)

S. An IRB institution must have a policy describing how it combines multiple sets of reference data.

148. Multiple data sets may produce superior estimates of loss severity, if the results are appropriately combined. Combining such sets differently usually produces different estimates of LGD. As a matter of internal policy, a bank should investigate alternative combinations, and document the impact on the estimates. If the results are highly sensitive to the manner in which different data sources are combined, the bank must choose conservatively among the alternatives.

IV. Exposure at Default (EAD)

149. Compared with PD and LGD quantification, EAD quantification is less advanced. As such, it is addressed in somewhat less detail in this guidance than are PD and LGD quantification. Banks should continue to innovate in the area EAD estimation, refining and improving practices in EAD measurement and prediction. Additional supervisory guidance will be provided as more data become available and estimation techniques evolve.

150. A bank must provide an estimate of expected EAD for each facility in its portfolio. EAD is defined as the bank's expected gross dollar exposure of the facility upon the obligor's default. For fixed exposures like term loans, EAD is equal to the current amount outstanding. For variable exposures such as loan commitments or lines of credit, exposure is equal to current outstandings plus an estimate of additional drawings up to the time of default. This additional drawdown, identified as loan equivalent exposure (LEQ) in many institutions, is typically expressed as a percentage of the current total committed but undrawn amount. EAD can thus be represented as:

$$\text{EAD} = \text{current outstanding} + \text{LEQ} \times (\text{total committed} - \text{current outstanding})$$

As it is the LEQ that must be estimated, LEQ is the focus of this guidance.

151. Even though EAD estimation is less sophisticated than PD and LGD estimation, a bank still develops EAD estimates by working through the four stages that produce the other types of quantification: The bank must use a reference data set; it must apply an estimation technique to produce an expected total dollar exposure at default for a facility with a given array of characteristics; it must map its current portfolio to the reference data; and, by applying the estimation model, it must generate an EAD estimate for each portfolio facility or facility-type, as the case may be.

A. Data

152. Like reference data sets used for LGD estimation, LEQ data sets contain only exposures to defaulting obligors. In many cases, the same reference data may be used for both LGD and LEQ. In addition to relevant descriptive characteristics (referred to as "drivers") that can be used in estimation, the reference data must include historical information on the exposure (both drawn and undrawn amounts) as of some date prior to default, as well as the drawn exposure at the date of default.

153. As discussed below under "Estimation," LEQ estimates may be developed using either a cohort method or a fixed-horizon method. The bank's reference data set must be structured so that it is consistent with the estimation method the bank applies. Thus, the data must include information on the total commitment, the undrawn amount, and the exposure drivers for each defaulted facility, either

at fixed calendar dates for the cohort method or at a fixed interval prior to the default date for the fixed-horizon method.

154. The reference data must contain variables that enable the bank to group the exposures to defaulted obligors in meaningful ways. Obligor and facility risk ratings are commonly believed to be significant characteristics for predicting additional drawdown. Since less empirical research has been done on EAD estimation, little is known about other potential drivers of EAD. Among the many possibilities, banks may consider time from origination, time to expiration or renewal, economic conditions, risk rating changes, or certain types of covenants. Some potential drivers may be linked to a bank's credit risk management skills, while others may be exogenous. Industry practice is likely to improve as banks extend their research to identify other meaningful drivers of EAD.

155. A bank must ensure continued applicability of the reference data to its current portfolio of facilities. The reference data must include the types of variable exposures found in a bank's current portfolio. The definitions of default and exposure in the reference data should be consistent with the IRB definition of default, and consistent with the definitions used for PD and LGD quantification. Established processes must be in place to ensure that reference data sets are updated when new data are available. All data sources, variables, and the overall processes governing data collection and maintenance must be fully documented, and that documentation should be readily available for review.

156. Seven years of data are required for EAD (or LEQ) estimation. The sample should include periods during which default rates were relatively high, and ideally cover a complete economic cycle.

B. Estimation

157. To derive LEQ estimates, characteristics of the reference data are related to additional drawings preceding a default event. The estimation process must be capable of producing a plausible estimate of LEQ to support the EAD calculation for each facility. Two broad types of estimation methods are used in practice, the cohort method and the fixed-horizon method.

158. Under the cohort method, a bank groups defaults into discrete calendar periods (such as a year or a quarter). The bank then estimates the relationship between the drivers as of the start of that calendar period, and EAD or LEQ for each exposure to a defaulter. For each exposure category (that is, for each combination of exposure drivers identified by the bank), the LEQ estimate is calculated as the mean additional drawing for facilities in that category. To combine results for multiple periods into a single long-run average, the period-by-period means should be weighted by the proportion of defaults occurring in each period.

159. Under the fixed-horizon method, for each exposure to a defaulted obligor the bank compares additional drawdowns to the total commitment but undrawn amount that existed at the start of a fixed interval prior to the date of the default (the horizon). For example, the bank might base its estimates on a reference data set that supplies the actual exposure at default along with the drawn and undrawn amounts (as well as relevant drivers) at a date a fixed number of months prior to the date of each default, regardless of the actual calendar date on which the default occurred. Estimates of LEQ are computed from the average drawdowns that occur over the fixed-horizon interval, for whatever combinations of the driving variables the bank has determined are relevant for explaining and predicting exposure at default.

160. Evidence may indicate that LEQ estimates are positively correlated with economic downturns; that is, it may be that LEQs increase during high-default periods. If so, the higher drawdowns that occur during high-default periods are denoted “stress-condition LEQs,” analogous to the “stress-condition LGDs” discussed earlier in this chapter. For any exposure type whose LEQ estimates exhibit material cyclicalities, a bank must use the stress-condition LEQ for purposes of calculating EAD.

161. In general, all available data should be used; particular observations or time periods should not be excluded from the data sample. Any adjustments a bank makes to the estimation results should be justified and fully documented. The analysis should be refreshed periodically as new data become available, and a bank should have a process in place to ensure that advances in analytical techniques and industry practice are considered as they emerge and are incorporated as appropriate. LEQ estimates should be updated at least annually. Detailed documentation, ongoing validation, and adequate oversight are fundamental controls that support a sound estimation process.

C. Mapping

162. If the same variables that drive exposure in the reference data are also available for facilities in the portfolio, mapping may be relatively easy. However, the bank must still review the definitions to ensure that variables that seem to be the same actually are. If the relevant variables are not available in a bank’s current portfolio information system, the bank will encounter the same mapping complexities that it does when mapping for PD and LGD in similar circumstances. A bank should have well-documented policies that govern the mapping. Any exceptions to mapping policy should be reviewed, justified and fully documented. Mapping may be done for each exposure or for broad categories of exposure; the latter would be analogous to the “grade mapping” discussed earlier in this chapter.

D. Application

163. In the application stage, the estimated relationship between drivers and LEQ is applied to the bank's actual portfolio. To ensure that estimated EAD is at least as large as the currently drawn amount for all exposures, LEQs must not be negative. Multiple reference data sets may be used for LEQ estimation and combined at the application stage; those combinations should be rigorously developed, approved, and documented. Any smoothing or use of expert judgment to adjust the results should be well-justified and clearly documented. This includes any adjustment for definitions of default that do not meet the supervisory standards. The less robust the process, the more conservative the result should be.

164. Some facility types may be treated as exceptions, and assigned an LEQ that does not vary with characteristics such as line of business or risk rating. Such exceptional treatment should be clearly justified, and the justification should be fully documented.

165. EAD may be particularly sensitive to changes in the way banks manage individual credits. For example, a change in policy regarding covenants may have a significant impact on LEQ. When such changes take place, the bank should consider them when making its estimates – and it should do so from a conservative point of view. Policy changes likely to significantly increase LEQ should prompt immediate increases in LEQ estimates. If a bank's policy changes seem likely to reduce LEQ, estimates should be reduced only after the bank accumulates a significant amount of actual experience under the new policy to support the reductions.

V. Maturity (M)

166. A bank must assign a value of effective remaining maturity (M) to each credit exposure in its portfolio. In general, M is the weighted-average number of years to receipt of the cash flows the bank expects under the contractual terms of the exposure, where the weights are equal to the fraction of the total undiscounted cash flow to be received at each date. Mathematically, M is given by:

$$M = \sum_t t \times w_t$$

where w_t is the fraction of the total cash flow received at time t , that is:

$$w_t = C_t / \sum_t C_t$$

C_t is the undiscounted cash flow received at time t , with t measured in years from the date of the calculation of M.

167. Effective maturity, sometimes referred to as “average life,” need not be a whole number, and often is not. For example, if 33 percent of the cash flow is expected at the end of one year ($t=1$) and the other 67 percent two years from today ($t=2$), then M is calculated as:

$$M = (1 \times 0.33) + (2 \times 0.67) = 1.67$$

for an effective maturity of 1.67 years. This value of M would be used in the IRB capital calculation.

168. The relevant cash flows are the future payments the bank expects to receive from the obligor, regardless of form; they may include payments of interest or fees, principal repayments, or other types of payments depending on the structure of the transaction. For exposures whose cash flow schedule is virtually predetermined unless the obligors defaults (fixed-rate loans, for example), the calculation of the weighted-average remaining maturity is straightforward, using the scheduled timing and amounts of the individual undiscounted cash flows. These cash flows should be the contractually expected payments; the bank should not take into account the possibility of delayed or reduced cash flows due to potential future default.

169. Cash flows associated with other types of credit exposures may be somewhat less certain. In such cases, the bank must establish a method of projecting expected cash flows. In general, the method used for any exposure should be the same as the one used by the bank for purposes of valuation or risk management. The method must be well-documented and subject to independent review and approval. A bank must demonstrate that the method used is standard

industry practice, that it is widely used within the bank for purposes other than regulatory capital calculations, or both.

170. To be conservative, a bank may set M equal to the maximum number of years the obligor could take to fully discharge the contractual obligation (provided that the maximum is not longer than five years, as noted below). In many cases, this maximum will correspond to the stated or nominal maturity of the instrument. Banks must make this conservative choice (maximum nominal maturity) if the timing and amounts of the cash flows on the exposure cannot be projected with a reasonable degree of confidence.

171. Certain over-the-counter derivatives contracts and repurchase transactions may be subject to master netting agreements. In such cases, the bank may compute a single value of M for the transactions as a group by weighting each individual transaction's effective maturity by that transaction's share of the total notional value subject to the netting agreement, and summing the result across all of the transactions.

172. For IRB capital calculations, the value of M for any exposure is subject to certain upper and lower limits, regardless of the actual effective maturity of the exposure. In all cases, the value of M should be no greater than 5 years. If an exposure clearly has an effective maturity that exceeds this upper limit, the bank may simply use a value of M=5 rather than calculating the actual effective maturity.

173. For most exposures, the value of M must be no less than one year. For certain short-term exposures (repo-style transactions, money market transactions, trade finance-related transactions, and exposures arising from payment and settlement processes) that are not part of a bank's ongoing financing of a borrower and that have an original maturity of less than three months, M may be set as low as one day. For over-the-counter derivative and repurchase-style transactions subject to a master netting agreement, weighted average maturity must be set at no less than five days.

VI. Validation

174. Values of PD, LGD, and EAD are estimates with implications for credit risk and the future performance of a bank's credit portfolio under IRB; in essence, they are forecasts. "Validation" of these estimates describes the full range of activities used to assess their quality as forecasts of default rates, loss severity rates, and exposures at default. Chapter 1 discusses validation of IRB systems in general; this section focuses specifically on ratings quantification, which includes the assignment of PD to obligor grades and the assignment of LGD, EAD, and M to exposures.

S. A validation process must cover all aspects of IRB quantification.

175. Banks must have a process for validating IRB quantification; their policies must state who is accountable for validation, and describe the actions that will proceed from the different possible results. Validation should focus on the three estimated IRB parameters (PD, LGD, and EAD). Although the established validation process should result in an overall assessment of IRB quantification for each parameter, it also must cover each of the four stages of the quantification process as described in preceding sections of this chapter (data, estimation, mapping, and application). The validation process must be fully documented, and must be approved by appropriate levels of the bank's senior management. The process must be updated periodically to incorporate new developments in validation practices and to ensure that validation methods remain appropriate; documentation must be updated whenever validation methods change.

176. Banks should use a variety of validation approaches or tools; no single validation tool can completely and conclusively assess IRB quantification. Three broad types of tools that are useful in this regard are evaluation of the conceptual soundness of the approach to quantification (evaluation of logic), comparison to other sources of data or estimates (benchmarking), and comparisons of actual outcomes to predictions (back-testing). Each of these types of tools has a role to play in validation, although the role varies across the four stages of quantification.

177. Evaluation of logic is essential in validating all stages of the quantification process. The quantification process requires banks to adopt methods, choose variables, and make adjustments; each of these actions requires an exercise of judgment. Validation should ensure that these judgments are plausible and informed.

178. A bank should also validate estimates by comparing them with relevant external sources, a process broadly described as benchmarking. "External" in this context refers to anything other than the specific reference data, estimation approach, or mapping under consideration. Reference data can be compared with other data sources; choices of variables can be compared with similar choices made by others; estimation results can be compared with the results of alternative estimation methods using the same reference data. Other data

sources may show that default and severity rates across the economy or the banking system are high or low relative to other periods, or may reveal unusual effects in parts of the quality spectrum.

179. Effective validation must compare actual results with predictions. Such comparisons, often referred to as “back-testing,” are valuable comprehensive tests of the rating system and its quantification. However, they are only one element of the broader validation regime, and should not be a bank’s only method of validation. Because they test the results of the rating system as a whole, they are unlikely to identify specific reasons for any divergence between expectations and realizations. Rather they will indicate only that further investigation is necessary.

180. By applying back-testing to the reference data set as it is updated with new data, a bank can improve the estimation process. To further improve the process, a bank must regularly compare realized default rates, loss severities, and exposure-at-default experience from its portfolio with the PD, LGD, and EAD estimates on which capital calculations are based. Realizations should be compared with expected ranges based on the estimates. These expected ranges should take into account the bank’s rating philosophy (the relative weight given to current and stress conditions in assigning ratings). Depending on that philosophy, year-by-year realized default rates and loss severities may be expected to differ significantly from the long-run average. If a bank adjusts final estimates to be conservative, it should likely do its back-testing on the unadjusted estimates.

181. A bank’s quantitative testing methods and other validation techniques should be robust to economic cycles. A sound validation process should take business cycles into account, and any adjustments for stages of the cycle should be clearly specified in advance and fully documented as part of the validation policy. The fact that a year has been “unusual” should not be taken as a reason to abandon the bank’s standard validation practices.

S. A bank must comprehensively validate parameter estimates at least annually, must document the results, and must report these results to senior management.

182. A full and comprehensive annual validation is a minimum for effective risk management under IRB. More frequent validation may be appropriate for certain parts of the IRB system and in certain circumstances; for example, during high-default periods, banks should compute realized default and loss severity rates more frequently, perhaps quarterly. They must document the results of validation, and must report them to appropriate levels of senior risk management.

S. The validation policy must outline appropriate remedial responses to the results of parameter validation.

183. The goal of validation should be to continually improve the rating process and its quantification. To this end, the bank should establish thresholds or accuracy tolerances for validation results. Results that breach thresholds should bring an appropriate response; that response should depend on the results and should not necessarily be to adjust the parameter estimates. When realized default, severity, or exposures rates diverge from expected ranges, those divergences may point to issues in the estimation or mapping elements of quantification. They may also indicate potential problems in other parts of the ratings assignment process. The bank's validation policy must describe (at least in broad terms) the types of responses that should be considered when relevant action thresholds are crossed.

Appendix to Chapter 2: Illustrations of the Quantification Process

This appendix provides examples to show how the logical framework described in this guidance, with its four stages (data, estimation, mapping, and application), applies when analyzing typical current bank practices. The framework is broadly applicable – for PD or LGD or EAD; using internal, external, or pooled reference data; for simple or complex estimation methods – although the issues and concerns that arise at each stage depend on a bank’s approach. These examples are intended only to illustrate the logic of the four-stage IRB quantification framework, and should not be taken to endorse the particular techniques presented in the examples. In fact, certain aspects of the examples are not consistent with the standards outlined in this guidance.

Example 1: PD estimation from bond data

- A bank establishes a correspondence between its internal grades and external rating agency grades; the bank has determined that its Grade 4 is equivalent to $\frac{3}{4}$ BB and $\frac{1}{4}$ B on the Standard and Poor’s scale.
- The bank regularly obtains published estimates of mean default frequencies for publicly rated BB and B obligors in North America from 1970 through 2002.
- The BB and B historical default frequencies are weighted 75/25, and the result is a preliminary PD for the bank’s internal Grade 4 credits.
- However, the bank then increases the PD by 10 percent to account for the fact that the S&P definition of default is more lenient than the IRB definition.
- The bank makes a further adjustment to ensure that the resulting grade PD is greater than the PD attributed to Grade 3 and less than the PD attributed to Grade 5.
- The result is the final PD estimate for Grade 4.

Process Analysis for Example 1:

Data - The reference data set consists of issuers of publicly rated debt in North America over the period 1970 through 2002. The data description is very basic: each issuer in the reference data is described only by its rating (such as AAA, AA, A, BBB, and so on).

Estimation - The bank could have estimated default rates itself using a database purchased from Standard and Poor’s, but since these estimates would just be the mean default rates per year for each grade, the bank

could just as well (and in this example does) use the published historical default rates from S&P; in essence, the estimation step has been outsourced to S&P. The 10 percent adjustment of PD is part of the estimation process in this case because the adjustment was made prior to the application of the agency default rates to the internal portfolio data.

Mapping - The bank's mapping is an example of a grade mapping; internal Grade 4 is linked to the 75/25 mix of BB and B. Based on the limited information presented in the example, this step should be explored further. Specifically, how did the bank determine the 75/25 mix?

Application - Although the application step is relatively straightforward in this case, the bank does make the adjustment of the Grade 4 PD estimate to give it the desired relationship to the adjacent grades. This adjustment is part of the application stage because it is made after the adjusted agency default rates are applied to the internal grades.

Example 2: PD estimation using a Merton-type equity-based model

- A bank obtains a 20-year database of North American firms with publicly traded equity, some of which defaulted during the 20-year period.
- The bank uses the Merton approach to modeling equity in these firms as a contingent claim, constructing an estimate of each firm's distance-to-default at the start of each year in the database. The bank then ranks the firm-years within the database by distance-to-default, divides the ordered observations into 20 equal groups or buckets, and computes a mean historical one-year default frequency for each bucket. That default frequency is taken as an estimate of the applicable PD for any obligor within the range of distance-to-default values represented by each of the 20 buckets.
- The bank next looks at all obligors with publicly traded shares within each of its internal grades, applies the same Merton-type model to compute distance-to-default at quarter-end, sorts these observations into the 20 buckets from the previous step, and assigns the corresponding PD estimate.
- For each internal grade, the bank computes the mean of the individual obligor default probabilities and uses that average as the grade PD.

Process Analysis for Example 2:

Data - The reference data set consists of the North American firms with publicly traded equity in the acquired database. The reference data are

described in this case by a single variable, specifically an identifier of the specific distance-to-default range from the Merton model (one of the 20 possible in this case) into which a firm falls in any year.

Estimation - The estimation step is simple: the average default rate is calculated for each distance-to-default bucket. Since the data cover 20 years and a wide range of economic conditions, the resulting estimates satisfy the long-run average requirement.

Mapping - The bank maps selected portfolio obligors to the reference data set using the distance-to-default generated by the Merton model. However, not all obligors can be mapped, since not all have traded equity. This introduces an element of uncertainty into the mapping that requires additional analysis by the bank: were the mapped obligors representative of other obligors in the same grade? The bank would need to demonstrate comparability between the publicly traded portfolio obligors and those not publicly traded. It may be appropriate for the bank to make conservative adjustments to its ultimate PD estimates to compensate for the uncertainty in the mapping. The bank also would need further analysis to demonstrate that the implied distance-to-default for each internal grade represented long-run expectations for obligors assigned to that grade; this could involve computing the Merton model for portfolio obligors over several years of relevant history that span a wide range of credit conditions.

Application - The final step is aggregation of individual obligors to the grade level through calculation of the mean for each grade, and application of this grade PD to all obligors in the grade. The bank might also choose to modify PD assignments further at this stage, combining PD estimates derived from other sources, applying adjustments for cyclicity, introducing an appropriate degree of conservatism, or making other adjustments.

Example 3: LGD estimation from internal default data

- For each loan in its portfolio, a bank records collateral coverage as a percentage, as well as which of four types of collateral applies.
- A bank has retained data on all defaulted loans since 1995. For each defaulted loan in the database, the bank has a record of the collateral type within the same four broad categories. However, collateral coverage is only recorded at three levels (low, moderate, or high, depending on the ratio of collateral to exposure at default).
- The bank also records the timing and discounted value of recoveries net of workout costs for each defaulted loan in the database. Cash flows are tracked from the date of default to a “resolution date,” defined as the point at which the remaining balance is less than 5 percent of the exposure at the time of default. A recovery percentage is computed, equal to the value

- of recoveries discounted to the date of default, divided by the exposure at default.
- For each cell (each of the 12 combinations of collateral type and coverage), the bank computes a simple mean LGD percentage as the mean of one minus the recovery percentage. One of the categories has a mean LGD of less than zero (recoveries have exceeded exposure on average), so the bank sets the LGD at zero to be conservative.
 - The bank assigns an estimate of expected LGD to each loan in the current portfolio by using collateral information to slot it into one of the 12 cells. The bank then applies the mean historical LGD for that cell and adjusts the result upward by 10 percent to compensate for the fact that the loss data come from a period believed to be unusually good economic performance.

Process Analysis for Example 3:

Data - The reference data is the collection of historical defaults with the loss amounts from the bank's historical portfolio. The reference data are described by the two categorical variables (levels of collateral coverage and types of collateral). It would be important to determine whether the defaults over the past few years are comparable to defaults from the current portfolio. One would also want to ask why the bank ignores potentially valuable information by converting the continuous data on collateral coverage into a trimodal categorical variable.

Estimation - Conceptually, the bank is using a "loss severity model" in which 12 binary variables, one for each loan coverage/type combination, explain the percentage loss. The coefficients on the variables are just the mean loss figures from the reference data.

Mapping - Mapping in this case is fairly straightforward, since all of the relevant characteristics of the reference data are also in the loan system for the current portfolio. However, the bank should determine whether the variables are being recorded in the same way (for example, the same definitions of collateral types), otherwise some adjustment might be needed.

Application - The bank is able to apply the loss model by simply plugging in the relevant values for the current portfolio (or what amounts to the same thing, looking up the cell mean). The bank's assignment of zero LGD for one of the cells merits special attention; while the bank represented this assignment as conservative, the adjustment does not satisfy the supervisory requirement that LGD must exceed zero. A larger upward adjustment is necessary. Finally, the upward adjustment of the LGD numbers to account for the benign environment in which the reference data were generated presents one additional wrinkle. The bank

must provide a well-documented, empirically based analysis of why a 10 percent upward adjustment is sufficient.

Chapter 3: Data Maintenance

I. Overview

184. Institutions using the IRB approach for regulatory capital purposes will need advanced data management practices to produce credible and reliable risk estimates. The guiding principle governing an IRB data maintenance system is that it must support the requirements for the quantification, validation, control and oversight mechanisms described in this guidance, as well as the institution's broader risk management and reporting needs. The precise data elements to be collected will be dictated by the features and methodology of the IRB system employed by the institution. The necessary data elements will therefore vary by institution and even among business lines within an institution.

185. Institutions will have latitude in managing their data, subject to the following key data maintenance standards:

Life Cycle Tracking - institutions must collect, maintain, and analyze essential data for obligors and facilities throughout the life and disposition of the credit exposure.

Rating Assignment Data - institutions must capture all significant quantitative and qualitative factors used to assign the obligor and loss severity ratings.

Support of IRB System - data collected by institutions must be of sufficient depth, scope, and reliability to:

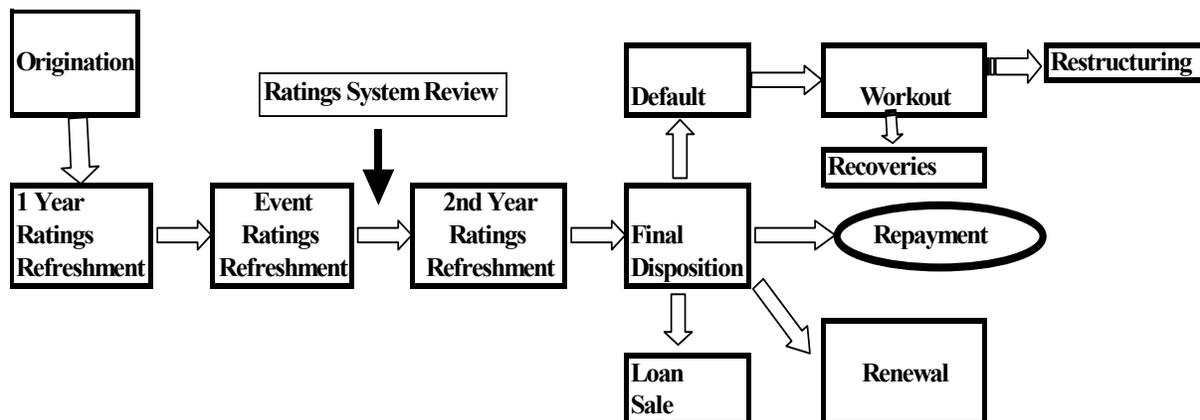
- Validate IRB system processes,
- Validate parameters,
- Refine the IRB system,
- Develop internal parameter estimates,
- Apply improvements historically,
- Calculate capital ratios,
- Produce internal and public reports, and
- Support risk management.

186. This chapter covers the requirements for maintaining internal data. Reference data sets used for estimating IRB parameters are discussed in Chapter 2.

II. Data Maintenance Framework

Life Cycle Tracking

187. S. Institutions must collect, maintain, and analyze essential data for obligors and facilities throughout the life and disposition of the credit exposure. Using a life cycle or “cradle to grave” concept for each obligor and facility supports front-end validation, back-testing, system refinements and risk parameter estimates. A depiction of life-cycle tracking follows:



188. Data elements must be recorded at origination and whenever the rating is reviewed, regardless of whether the rating is actually changed. Data elements associated with current and past ratings must be retained and include the following:

- Key borrower and facility characteristics,
- Ratings for obligor and loss severity grades,
- Key factors used to assign the ratings,
- Person or model responsible for assigning the rating,
- Date rating assigned, and
- Overrides to the rating and authorizing individual.

At disposition, data elements must include:

- Nature of disposition: renewal, repayment, loan sale, default, restructuring,
- For defaults: exposure, actual recoveries, source of recoveries, costs of workouts and timing,
- Guarantor support,
- Sale price for loans sold, and
- Other key elements that the bank deems necessary.

Rating Assignment Data

189. **S. Institutions must capture all significant quantitative and qualitative factors used to assign the obligor and loss severity rating.** Assigning a rating to an obligor requires the systematic collection of various borrower characteristics as these factors are critical to validating the rating system. Obligors are rated using various methods, as discussed in Chapter 1. Each of these methods presents different challenges for input collection. For example, in judgmental rating systems, the factors used in the ratings decision have not traditionally been explicitly recorded. For purposes of an IRB approach, institutions that use expert and constrained judgment must record these factors and deliver them to the data warehouse.

190. For loss severity estimates, institutions must record the basic structural characteristics of facilities and the factors used in developing the facility rating or LGD estimate. These often include the seniority of the credit, the amount and type of collateral, the most recent collateral valuation date and its fair value.

191. Institutions must also track any overrides of the obligor or loss severity rating. Tracking overrides separately allows risk managers to identify whether the outcome of such overrides suggests either problems with rating criteria, or an improper level of discretion in adjusting the ratings.

Example Data Elements

192. For illustrative purposes, the following section provides examples of the kinds of data elements institutions will collect under an IRB data maintenance framework.

General descriptive obligor and facility data

193. The data below could be contained within a loan record or derived from various sources within the data warehouse. Guarantor data requirements are the same as for the obligor.

Obligor / guarantor data
<ul style="list-style-type: none">• General data: name, address, industry• ID number (unique for all related parent / sub relationships)• Rating, date, and rater• PD percentage corresponding to rating

General facility characteristics
<ul style="list-style-type: none">• Facility amounts: committed, outstanding

- Facility type: Term, revolver, bullet, amortizing, etc.
- Purpose: acquisition, expansion, liquidity, inventory, working capital
- Covenants
- Facility ID number
- Origination and maturity dates
- Last renewal date
- Obligor ID link
- Rating, date and rater
- LGD dollar amount or percentage
- EAD dollar amount or percentage

Rating assignment data

194. The data below provide an example of the categories and types of data that institutions must retain in order to continually validate and improve rating systems. These data items should tie directly to the documented criteria that the institution employs in assigning ratings, both qualitative and quantitative. For example, rating criteria often include ranges of leverage or cash flow for a particular obligor rating. In addition, qualitative factors, such as management effectiveness can be recorded in numeric form. For example, a 1 may equate to exceptionally strong management, and a 5 to very weak. The rating data elements collected should be complete enough so that others can review the relevant factors driving the rating decisions.

Quantitative factors in obligor ratings
<ul style="list-style-type: none"> • Asset and sale size • Key ratios used within rating criteria: <ul style="list-style-type: none"> ➤ profitability, ➤ cash flow, ➤ leverage, ➤ liquidity, and ➤ other relevant factors.

Qualitative factors in obligor ratings
<ul style="list-style-type: none"> • Quality of earnings and cash flow • Management effectiveness, reliability • Strategic direction, industry outlook, position • Country factors and political risk • Other relevant factors

External factors in obligor ratings

- Public debt rating and trend
- External credit model score and trend

Rating Notations

- Flag for overrides or exceptions
- Authorized individual for changing rating

Key facility factors in LGD ratings

- Seniority
- Collateral type: (cash, marketable securities, AR, stock, RE, etc.)
- Collateral value and valuation date
- Advance rates, LTV
- Industry
- Geography

Rating Notations

- Flag for overrides or exceptions
- Authorized individual for changing rating

Final disposition data

195. Only recently have institutions begun to collect more complete data about a loan's disposition. Many institutions maintain subsidiary systems for their problem credits with details recorded, at times manually, on systems that were not linked with the institution's central loan or risk management systems. The unlinked data are a significant hindrance in developing reliable PD, LGD, and EAD estimates.

196. In advanced systems, the "grave" portion of obligor and exposure tracking is an essential component for producing and validating risk estimates and is an important feedback mechanism for adjusting and improving risk estimates over time. Essential data elements are outlined below.

Obligor/guarantor

- Default date
- Circumstances of default (for example, nonaccrual, bankruptcy chapters 7-11, nonpayment)

Facility

- Outstandings at default

- Amounts undrawn and outstanding plus time series prior to and through default

Disposition

- Amounts recovered and dates (including source: cash, collateral, guarantor, etc.)
- Collection cost and dates
- Discount factors to determine economic cost of collection
- Final disposition (for example, restructuring or sale)
- Sales price, if applicable
- Accounting items (charge-offs to date, purchased discounts)

III. Data Element Functions

S. Data elements must be of sufficient depth, scope, and reliability to:

- Validate IRB system processes,
- Validate parameters,
- Refine the IRB system,
- Develop internal parameter estimates,
- Apply improvements historically,
- Calculate capital ratios,
- Produce internal and public reports, and
- Support risk management.

Validation and Refinement

197. The data elements collected by institutions must be capable of meeting the validation requirements described in Chapters 1 and 2. These requirements include validating the institution's IRB system processes, including the "front end" aspects such as assigning ratings so that any issues can be identified early. The data must support efforts to identify whether raters and models are following rating criteria and policies and whether ratings are consistent across portfolios. In addition, data must support the validation of parameters, particularly the comparison of realized outcomes with estimates. Thorough data on default and disposition characteristics are of paramount importance for parameter back-testing.

198. A rich source of data for validation efforts provides insights on the performance of the IRB system, and contributes to a learning environment in which refinements can be made to the system. These potential refinements include enhancements to rating assignment controls, processes, criteria or model coefficients, rating system architecture and parameter estimates.

Developing Parameter Estimates

199. As detailed in Chapter 2, institutions will be developing their PD, LGD, and EAD parameter estimates using reference data sets comprised of internal, pooled, and external data. Institutions are expected to work toward eventually using as much of their own experience as possible in their reference data sets.

Applying Rating System Improvements Historically

200. For loss severity estimates, institutions must record the basic structural characteristics of facilities and the factors used in developing the facility rating or LGD estimate. These often include the seniority of the credit, the amount and type of collateral, the most recent collateral valuation date and its fair value.

201. To maintain a consistent series of information for credit risk monitoring and validation purposes, institutions need to be able to apply historically improvements they make to their rating systems. In the example below, a bank experiences unexpected and rapid migrations and defaults in its grade 4 category during 2006. Analysis of the actual financial condition of borrowers that defaulted compared with those that did not suggests the debt-to-EBITDA range for its expert judgment criteria of 3.0 to 5.5 is too broad. Research indicates that grade 4 should be redefined to include only borrowers with debt-to-EBITDA ratios of 3.0-4.5 and grade 5 as 4.5-6.5. In 2007, the change is initiated, but prior years' numbers are not recast (see Exhibit A). Consequently, a break in the series prevents the bank from evaluating credit quality changes over several years and from identifying whether applying the new rating criteria historically provides reasonable results.

Exhibit A (Revision of Grades 4 and 5 in 2007)

	Distribution of Obligor Risk Grades (%)					Change 04-'08
	2004	2005	2006	2007	2008	
1	1	1.1	1.2	1.2	1.3	0.3
2	10	11	12	13	13	3.0
3	22	23	24	26	25	3.0
4	30	30	32	16	17	(13.0)
5	20	21	19	33	34	14.0
6	8	7	7	7	6	(2.0)
7	4	4	3	2	1	(3.0)
D	5	2.9	1.8	1.8	2.7	(2.3)
Total	100	100	100	100	100	0

202. Recognizing the need to provide senior managers and board members with a consistent risk trend, the new criteria are applied historically to obligors in grades 4 and 5 as reflected in Exhibit B. The original ratings assigned to the grades are maintained along with notations describing what the grade would be under the new rating criteria. If the precise weight an expert has given one of the redefined criteria is unknown, institutions are expected to make estimates on a best efforts basis. After the retroactive reallocation process, the bank observes that the mix of obligors in grade 5 declined somewhat over the past several years while the mix in grade 4 increased slightly. This contrasts with the trend identified before the retroactive reallocation. The result is that the multiyear transition statistics for grades 4 and 5 provide risk managers a clearer picture of risk.

Exhibit B (After Recasting 2004-06)

	Distribution of Obligor Risk Grades (%)					Change 04-'08
	2004	2005	2006	2007	2008	
1	1	1.1	1.2	1.2	1.3	0.3
2	10	11	12	13	13	3.0
3	22	23	24	26	25	3.0
4	<i>16</i>	<i>15</i>	<i>16</i>	16	17	1.0
5	<i>35</i>	<i>36</i>	<i>35</i>	33	34	(1.0)
6	8	7	7	7	6	(2.0)
7	4	4	3	2	1	(3.0)
D	4	2.9	1.8	1.8	2.7	(1.3)
Total	100	100	100	100	100	0

203. This example is based on applying ratings historically using data already collected by the bank. However, for some rating system refinements, institutions may identify in the future drivers of default or loss that might not have been collected for borrowers or facilities in the past. That is why institutions are encouraged to collect data that they believe may serve as a stronger predictor of default in the future. For example, certain elements of a borrower's cash flow might currently be suspected to overstate actual operational health for a particular industry. In the future, should an institution decide to deduct this item from cash flow with a resulting downgrade of many obligor ratings, the institution that collected these data could apply this rating change for prior years. This would provide the benefit of providing a consistent picture of risk over time and also present opportunities to validate the new criteria using historical data. Recognizing that institutions will not be able to anticipate fully the data they might find useful in the future, institutions are expected to reallocate grades on a best efforts basis when practical.

Calculating Capital Ratios and Reporting to the Public

204. Data retained by the bank will be essential for regulatory risk-based capital calculations and public reporting under the Pillar 3 disclosures. These uses underscore the need for a well-defined data maintenance framework and strong controls over data integrity. Control processes and data elements themselves should also be subject to periodic verification and testing by internal and external auditors. Supervisors will rely on these processes and also perform testing as circumstances warrant.

Supporting Risk Management

205. The information that can be gleaned from more extensive data collection will support a broad range of risk management activities. Risk management functions will rely on accurate and timely data to track credit quality, make informed portfolio risk mitigation decisions, and perform portfolio stress tests. Trends developed from obligor and facility risk rating data will be used to support internal capital allocation models, pricing models, ALLL calculations, and performance management measures, among others. Summaries of these are included in reports to institutions' boards of directors, regulators, and in public disclosures.

IV. Managing data quality and integrity

206. Because data are collected at so many different stages involving a variety of groups and individuals, there are numerous challenges to ensuring the quality of the data. For example:

- Data will be retained over long timeframes,
- Qualitative risk-rating variables will have subjective elements and will be open to interpretation, and
- Exposures will be acquired through mergers and purchases, but without an adequate and easily retrievable institutional rating history.

Documentation and Definitions

207. Given the many challenges presented by data for an IRB system, the management of data must be formalized. **S. Institutions must document the process for delivering, retaining and updating inputs to the data warehouse and ensuring data integrity.** Fully documenting how the institution's flow of data is managed provides a means for evaluating whether the data maintenance framework is functioning as intended. Moreover, institutions must be able to communicate to individuals developing or delivering various data the precise definition of the items intended to be collected. Consequently, a "data dictionary" is necessary to ensure consistent inputs from individuals and data vendors and to allow third parties (such as the rating system review function, auditors, or bank supervisors) to evaluate data quality and integrity. **S. Institutions must develop**

comprehensive definitions for the data elements used within each credit group or business line (a “data dictionary”).

Electronic Storage

208. To meet the significant data management challenges presented by the validation and control features of an IRB system, institutions will need to store their data electronically. **S. Institutions must store data in electronic format to allow timely retrieval for analysis, validation of risk rating systems, and required disclosures.** Institutions will have a variety of storage techniques and potentially a variety of systems to create their data warehouses. IRB data requirements can be achieved by melding together existing accounting, servicing, processing, workout and risk management systems, provided the linkages among these systems are well documented and include sufficient edit and integrity checks to ensure the data can be used reliably.

209. Institutions without electronic databases would need to resort to manual reviews of paper files for *ongoing* back-testing and ad hoc “forensic” data mining and would be unable to perform that work in the timely and comprehensive manner required of IRB systems. Forensic mining of paper files to build an initial data warehouse from the institution’s credit history is encouraged. In some instances, paper research may be necessary to identify data elements or factors not originally considered significant in estimating the risk of a particular class of obligor or facility.

Data Gaps

210. Rating histories are often lost or are irretrievable for loans acquired through mergers, acquisitions, or portfolio purchases. Institutions are encouraged wherever practical to collect any missing historical rating assignment driver data and to re-grade the acquired obligors and facilities for prior periods. In cases where retrieving historical data is not practical, institutions may attempt to create a rating history through a careful mapping of the legacy system and the new rating structure. Mapped ratings should be reviewed thoroughly for accuracy. The level of effort placed on filling data gaps should be commensurate with the size of the new exposures to be newly incorporated into the institution’s IRB system.

Chapter 4: Control and Oversight Mechanisms

I. Overview

211. Banks' internal rating systems are the foundation for credit-risk management practices and play an important role in pricing, reserving, portfolio management, performance measurement, economic capital modeling, and long-term capital planning. Banks adopting the IRB approach will also use their credit-risk ratings to determine regulatory capital levels. The pivotal and varied uses of such risk ratings put enormous, sometimes conflicting, pressure on banks' internal rating systems. The consequences of inaccurate ratings and their associated estimates are significant, particularly as they affect minimum regulatory capital requirements.

212. As risk ratings and their related parameters become better integrated in institutions' decision making, conflicting incentives arise that, if not well managed, can lead to overly optimistic or biased ratings. For example, sales and marketing staff (relationship managers or RMs) are typically compensated according to the volume of business they generate. That may predispose the RMs to assign more favorable ratings in order to achieve rate-of-return and sales objectives. More favorable ratings may create the appearance of higher risk-adjusted returns and business line profitability. Banks need to be aware of the full range of incentive conflicts that arise, and must develop effective controls to keep these incentive conflicts in check.

213. Banks will have latitude in designing and implementing their control structures subject to the following principle:

IRB institutions must implement a system of controls that includes the following elements: independence, transparency, accountability, use of ratings, rating system review, internal audit, and board and senior management oversight. While banks will have flexibility in how these elements are combined, they must incorporate sufficient checks and balances to ensure that the credit risk management system is functioning properly.

214. Banks additionally will want to embody the following more generic principles in their control system: separation of duties, balancing incentives, and layers of review. Table 4.1 lists the key components of an IRB control and oversight system. How these control mechanisms can best be combined to reinforce one another is a key challenge for banks implementing IRB systems:

Table 4.1 Control and Oversight Mechanisms

<i>Independence</i>	The parties responsible for approving ratings and transactions should be separate from the sales and marketing staff and be principally compensated on risk-rating accuracy.
<i>Transparency</i>	The rating system and ratings should be sufficiently transparent to enable third parties, such as rating system reviewers, auditors and supervisors, the ability to understand the operations of the rating system and the rating rationale.
<i>Accountability</i>	Accountability is holding people responsible for their actions and establishing adverse consequences for inaccurate ratings.
<i>Use of Ratings</i>	Ratings should be used to guide day-to-day risk management activities.
<i>Rating System Review</i>	Ratings and rating system performance should be evaluated by an area independent of those responsible for assigning and approving ratings.
<i>Internal Audit</i>	Responsibility for ensuring the adequacy of control and oversight mechanisms and overall compliance with the IRB standards should rest with the internal audit function.
<i>Board and Senior Management Oversight</i>	Ultimate responsibility for the performance of the rating system rests with senior management and the board.

215. As the following examples indicate, how a bank conducts its business will influence how it designs its control structure. A bank using an expert-judgment system will likely establish a different set of controls than a bank using mainly models. Recognizing that its expert-judgment system is less than fully transparent, a bank could offset this vulnerability by opting for complete independence in the rating approval process and an enhanced rating system review.

216. Other considerations would influence the choice of controls when banks use models to assign ratings. While the ratings produced by models are transparent, a model's performance depends on how well the model was developed, the model's logic, and the quality of the data used to implement the model. Banks that use models to assign ratings must implement a system of controls that addresses model development, testing and implementation, data integrity and overrides. These activities would be covered by a comprehensive and independent rating system review and by ongoing spot checks on the accuracy of model inputs. Other control mechanisms such as accountability and audit would also be required.

II. Independence in the Rating Approval Process

An independent rating process is one in which the parties responsible for approving ratings and transactions are separate from sales and marketing and in which the persons approving ratings are principally compensated on risk-rating accuracy. As relative independence increases, the likelihood of accurate ratings assignments grows markedly.

217.

S. Ratings must be subject to independent approval or review.

One way institutions can better achieve objective and accurate risk ratings is by ensuring that its rating approval process is independent. Institutions that firmly separate sales/marketing from credit are better able to manage the conflict between the goal of high sales volume and the need for good credit quality. An institution whose rating process is less independent must compensate by strengthening other control and oversight mechanisms. A significant factor in the evaluation of the rating system will be the assessment of whether such compensating controls are sufficient to offset a less-than-independent ratings process. While the overriding objective is to achieve independence in the rating approval process, in some instances, the relative materiality of a portfolio and cost/benefit trade-offs may support a less rigorous control process.

218. The degree of independence achieved in the rating process depends on how an institution is organized and how it conducts its lending activities.

A. Rating Approval Processes

219. Responsibility for recommending and approving ratings varies by institution and, quite often, by portfolio⁶. At some institutions, ratings are assigned and approved by relationship managers (RMs); at others, deal teams assign ratings that are later approved by credit officers. Still other institutions have independent credit officers assign and approve ratings. The culture of an institution and its business mix generally determine whether the business line or credit function is ultimately responsible for ratings.

⁶ Rating processes vary by institution but generally involve an "assignor" and an "approver." For instance, at many organizations the rating assignor is the person who "owns" the relationship (such as a "relationship manager") and the rating approver is an individual with credit authority (a "credit risk manager"). In some cases, the rating assignor and approver are the same. Banks that separate the rating assignment and approval processes do so in order to minimize potential conflicts of interest and the potential for rating errors.

220. The subsections that follow describe various rating assignment and approval structures used by banking organizations and the challenges that emerge in ensuring objective and consistent ratings. Any of the following structures can work as long as ratings are subject to an independent approval or review process, and are not unduly influenced by the line of business:

Relationship Managers. As noted earlier, relationship managers are primarily responsible for marketing the bank's products and services, and their compensation is tied to the volume of business they generate. When RMs also have responsibility for assigning and approving ratings, there is an inherent conflict of interest. Credit quality and the ability to produce timely and accurate risk ratings are generally not major factors in an RM's compensation, even when he or she has responsibility for assigning and approving ratings. In addition, RMs also may become too close to the borrower to maintain their objectivity and remain unbiased. When banks delegate rating responsibility to RMs, they must offset the lack of independence with rigorous controls to prevent bias from affecting the rating process. Such controls must operate in practice, not just on paper, and would include, at a minimum, a comprehensive, independent post-closing review of ratings by a rating system review function.

Deal Team. Some major banks employ a "deal-team" structure for credit origination and rating assignment. Using this approach, all members of the team – credit officers, investment bankers, underwriters, and others – contribute to analyzing creditworthiness, underwriting the deal, and assigning ratings.

On the one hand, deal teams increase the access of credit officers to information on obligors and transactions early in the underwriting process, enabling them to make more informed credit decisions and to influence facility structure to address obligors' weaknesses. On the other hand, participation in the deal team could compromise the credit officer's objectivity. While credit officers typically report to an independent credit-risk-management function, they also have allegiance to the deal team that reports to executives within the sales and marketing line of business. In addition, credit officers may defer to the members of the team whose compensation is based on the revenue and sales volume they generate for the bank. Banks that maintain deal teams must ensure that the credit officer's independence is safeguarded through independent reporting lines and well-defined performance measures (e.g., adherence to policy, rating accuracy and timeliness).

Credit Officers. Some banks give sole responsibility for assigning and approving ratings to credit officers who report to an independent credit function. In addition to assigning and approving and assigning initial ratings, credit officers regularly monitor the condition of obligors and refresh ratings as necessary. The potential downside of this structure is

that these credit officers may have limited access to borrower information. Those credit officers that have a separate reporting line and whose compensation is principally based on their risk-rating accuracy are typically more independent than RMs or deal teams.

Models. At some institutions, models assign ratings directly; at other institutions, models and judgment are combined to rate credits. Models introduce a high degree of independence to the rating process, but they too require human oversight and controls. Banks that use models must incorporate an independent judgmental review of the rating assignments to ensure that all relevant information is considered and to identify potential rating errors. Judgmental reviews are also needed when model outputs are overridden. In addition, controls are needed to ensure accuracy of data inputs. When a bank uses a model to assign risk ratings, an individual obligor's rating is "transparent." However, the model itself is not "transparent" without a great deal of effort to document how the model functions.

III. Transparency

Transparency is the ability of a third party, such as rating system reviewers, auditors or bank supervisors, to observe how the rating system operates and to understand the pertinent characteristics of individual ratings

221.

S. IRB institutions must have a transparent rating system.

Transparency in a rating system is achieved through documentation that covers the following:

- The rating system's design, purpose, performance horizon, and performance standards;
- The rating assignment process, including procedures for adjustments and overrides;
- Rating definitions and criteria, scorecard criteria, and model specifications;
- Parameter estimates and the process for their estimation;
- Definition of the data elements to be warehoused to support controls, oversight, validation, and parameter estimation; and
- Specific responsibilities of, and performance standards for, individuals and units involved in the rating system and its oversight.

Transparency allows third parties (such as rating system review, auditors, or supervisors) to evaluate whether the rating system is performing as intended.

Without transparency, it is difficult to hold people accountable for ratings errors and to validate the performance of the system.

222.

S. Rating criteria must be clear and specific and must include qualitative and quantitative factors.

To produce transparent individual ratings, a bank's policies must contain clear, detailed ratings definitions. Banks should specify criteria for each factor that raters must consider, which may require unique rating definitions for certain industries. Banks should consider criteria for factors such as liquidity, sales and profitability, debt service and fixed charge coverage, minimum equity support, position within the industry, strength of management. A rating system with vague criteria or one merely defined by PDs or LGDs is not transparent. For example, the following rating definitions are not transparent because they require the rater to do too much interpreting:

Borrower exhibits satisfactory quality and demonstrates acceptable principal and interest repayment capacity in the near term.

Lower tier company in a cyclical industry. Unbalanced position with tight liquidity and high leverage. Declining or erratic profitability and marginal debt service capacity. Management is untested.

IV. Accountability

"Accountability" is holding people responsible for their actions and establishing adverse consequences for inaccurate ratings.

223.

S. Policies must identify the parties responsible for rating accuracy and rating system performance.

For accountability to be effective, it should be both observable and ingrained in the culture. Persons who assign and approve rate credits, derive parameter estimates, or oversee rating systems must be held accountable for complying with rating system policies and ensuring that aspects of the rating system within their control are as unbiased and accurate as possible. These persons must have the tools and resources necessary to carry out their responsibilities, and

their performance should be evaluated against clear and specific objectives documented in policy.

A. Responsibility for Assigning Ratings

224.

- S. Individuals must be held accountable for complying with rating system policies and for assigning accurate ratings, and their performance and compensation must be linked to well-defined measurable performance standards.**

Responsibilities of raters should be clear, and performance should be measured against specific objectives. Performance evaluation and incentive compensation should be tied to performance goals. Examples of performance measures include:

- Number and frequency of rating errors,
- Significance of errors (for example, multiple downgrades), and
- Proper and consistent application of criteria, including override criteria.

B. Responsibility for Rating System Performance

225. Just as individuals will be held accountable for the accuracy of ratings, an individual must be held responsible for the overall performance of the rating system. This individual must ensure that the rating system and all of its component parts – rating assignments, parameter estimation, data collection, control and oversight mechanisms – are functioning as intended. While these components often are housed within separate units of the organization, an individual must be responsible for ensuring that the parts work together effectively and efficiently.

V. Use of Ratings

226.

- S. Ratings used for regulatory capital must be the same ratings used to guide day-to-day credit risk management activities.**

The different uses and applications of the risk-rating system's outputs should promote greater accuracy and consistency of credit-risk evaluations across an organization. Ratings and the associated default, loss, and EAD estimates need to be incorporated within the credit-risk management, internal capital allocation, and corporate governance functions of IRB banks.

227.

S. Banks that use parameter estimates for risk management that are different from those used for regulatory capital must provide a well-documented rationale for the differences.

PD and LGD parameters used for regulatory capital purposes may not be appropriate for other uses purposes. For example, PD estimates used to estimate reserve needs could reflect current economic conditions that are different from the longer term view appropriate to calculations of regulatory capital. When banks employ different estimates, those parameters must be defensible and supported by the following:

- Qualitative and quantitative analysis of the logic and rationale for the difference(s); and
- Senior management approval of the difference(s).

VI. Rating System Review (RSR)

228.

S. Banks must have a comprehensive, coordinated, independent review process to ensure that ratings are accurate and that the rating system is performing as intended.

Rating system review (RSR) ensures that the rating system as a whole is functioning as intended. A broad range of responsibilities come under RSR's purview, as outlined in Table 4.2:

Table 4.2 Responsibilities of Rating System Review
SCOPE OF REVIEW:
Design of the rating system. Compliance with policies and procedures, including application of criteria. Check of all risk-rating grades for accuracy. Consistency across industries/portfolios/geographies. Model development. Model use, including inputs and outputs. Overrides and policy exceptions. Quantification process. Back-testing (perform or review). Actual and predicted ratings transitions. Benchmarking against third-party data sources (perform or review). Adequacy of data maintenance.
ANALYSIS AND REPORTING:
Identify errors and flaws. Recommend corrective action.

229. For each of these responsibilities, RSR is largely checking and confirming the work of others and ensuring that the rating system's components work well together. RSR's testing and review should identify current and potential weaknesses and should lead to recommendations and corrective action such as

- Adjusting policies and procedures,
- Requiring additional training of staff,
- Investing in infrastructure improvements,
- Adjusting rating criteria, and
- Adjusting parameter estimates.

230.

S. Rating system review must report significant findings to senior management and the board quarterly.

RSR's role is to identify issues and areas of concern and report findings to the area that is accountable. When issues are systematic, RSR should bring them to the attention of senior management and the board.

231. The activities of this function could be distributed across multiple areas or housed within one unit. Organizations will choose a structure that fits within their management and oversight framework. These units must always have high standing within the organization and should be staffed by individuals possessing the requisite stature, skills, and experience.

232. Like internal audit, RSR must be independent from all in-house designers and developers (that is, system and model designers) and raters (that is, ratings and parameter assigners) in the risk-rating process. RSR's independence eliminates potential conflicts of interest and gives the group credibility when it reports findings and conclusions to the board and senior management.

VII. Internal Audit

233.

S. An independent internal audit function must determine whether rating system controls function as intended.

S. Internal audit must evaluate annually whether the bank is in compliance with the risk-based capital regulation and supervisory guidance.

Internal audit determines whether the bank's system of controls over internal ratings and the related parameters is robust. In its evaluation of controls, internal audit must consider any trade-offs made between the various mechanisms and

confirm their continued appropriateness and relevance. As part of its review of control mechanisms, audit will evaluate the depth, scope, and quality of RSR's work and will conduct limited testing to ensure that their conclusions are well founded. The amount of testing will depend on whether audit is the primary or secondary reviewer of that work.

234. Internal audit will report to the board and management on whether the bank is in compliance with the IRB standards. This report will allow the board and management to disclose that its rating processes and the controls surrounding these processes are in compliance with the IRB standards. This will be critical for public disclosure and ongoing work of supervisors.

External Audit

235. As part of the process of certifying financial statements, external auditors will confirm that the institution's capital position is fairly presented. To verify that actual capital exceeds regulatory minimums and to confirm compliance with the IRB rules, the external auditors must ascertain that the IRB system is rating credit risk appropriately and linking these ratings to appropriate estimates. Auditors must evaluate the bank's internal control functions and its compliance with the risk-based capital regulation and supervisory guidance.

VIII. Corporate Oversight

236.

S. The full board or a committee of the board must approve key elements of the IRB system.

Consistent with sound practice, bank management must ensure that a corporate culture exists in which institutional needs are readily identified and appropriate resources are brought to bear to rectify shortcomings. In the IRB context, senior management and the board of directors must ensure the objectivity and accuracy of the bank's credit-risk management systems and approach.

237. Either the full board or a committee of the board should approve key elements of the risk-rating system. Information provided to the board should be sufficiently detailed to allow directors to confirm the continuing appropriateness of the institution's rating approach and to verify the adequacy of the controls supporting the rating system.

238.

S. Senior management must ensure that all components of the IRB system, including controls, are functioning as intended and comply with the risk-based capital regulation and supervisory guidance.

Senior management's oversight should be even more active than that of the board of directors. Senior management should articulate what it expects of the technical and operational units of the risk-rating system, as well as what it expects of the units that manage the system's controls. To oversee the risk-rating system, senior management must have an *extensive* understanding of credit policies, underwriting standards, lending practices, and collection and recovery practices, and must be able to understand how these factors affect default and loss estimates. Senior management should not only oversee the controls process (its traditional role) but also should periodically meet with raters and validators to discuss the rating system's performance, areas needing improvement, and the status of efforts to improve previously identified deficiencies.

239. The depth and frequency of information provided to the board and senior management must be commensurate with their oversight responsibilities and the condition of the institution. These reports should include the following information:

- Risk profile by grade,
- Risk rating migration across grades with emphasis on unexpected results,
- Changes in parameter estimates by grade,
- Comparison of realized PD, LGD, and EAD rates against expectations,
- Reports measuring changes in regulatory and economic capital,
- Results of capital stress testing, and
- Reports generated by rating system review, audit, and other control units.

Although all of an institution's controls must function smoothly, independently, and in concert with the others, the direction and oversight provided by the board and senior management are perhaps most important to ensure that the IRB system is functioning properly.

Supervisory Guidance on Operational Risk Advanced Measurement Approaches for Regulatory Capital

July 2, 2003

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- A. Supervisory Standards

I. Purpose

1. The purpose of this guidance is to set forth the expectations of the U.S. banking agencies for banking institutions that use Advanced Measurement Approaches (AMA) for calculating the operational risk capital charge under the new capital regulation. Institutions using the AMA will have considerable flexibility to develop operational risk measurement systems appropriate to the nature of their activities, business environment, and internal controls. An institution's operational risk regulatory capital requirement will be calculated as the amount needed to cover its operational risk at a level of confidence determined by the supervisors, as discussed below. Use of an AMA is subject to supervisory approval.

2. This draft guidance should be considered with the advance notice of proposed rulemaking (ANPR) on revisions to the risk-based capital standard as published in the Federal Register on July _____ no. _____. As with the ANPR, the Agencies are seeking industry comment on this draft guidance. In addition to seeking comment on all specific aspects of this supervisory guidance, the Agencies are seeking comment on the extent to which the supervisory guidance strikes the appropriate balance between flexibility and specificity. Likewise, the Agencies are seeking comment on whether an appropriate balance has been struck between the regulatory requirements set forth in the ANPR and the supervisory standards set forth in this guidance.

II. Background

3. Effective management of operational risk is integral to the business of banking and to institutions' roles as financial intermediaries. Although operational risk is not a new risk, deregulation and globalization of financial services, together with the growing sophistication of financial technology, new business activities and delivery channels, are making institutions'

operational risk profiles (i.e., the level of operational risk across an institution's activities and risk categories) more complex.

4. This guidance identifies the supervisory standards (S) that institutions must meet and maintain to use an AMA for the regulatory capital charge for operational risk. The purpose of the standards is to provide the foundation for a sound operational risk framework, while allowing institutions to identify the most appropriate mechanisms to meet AMA requirements. Each institution will need to consider its complexity, range of products and services, organizational structure, and risk management culture as it develops its AMA. Operational risk governance processes need to be established on a firm-wide basis to identify, measure, monitor, and control operational risk in a manner comparable with the treatment of credit, interest rate, and market risks.

5. Institutions will be expected to develop a framework that measures and quantifies operational risk for regulatory capital purposes. To do this, institutions will need a systematic process for collecting operational risk loss data, assessing the risks within the institution, and adopting an analytical framework that translates the data and risk assessments into an operational risk exposure (see definition below). The analytical framework must incorporate a degree of conservatism that is appropriate for the overall robustness of the quantification process. Because institutions will be permitted to calculate their minimum regulatory capital on the basis of internal processes, the requirements for data capture, risk assessment, and the analytical framework described below are detailed and specific.

6. Effective operational risk measurement systems are built on both quantitative and qualitative risk assessment techniques. While the output of the regulatory framework for operational risk is a measure of exposure resulting in a capital number, the integrity of that

estimate depends not only on the soundness of the measurement model, but also on the robustness of the institution's underlying risk management processes. In addition, supervisors view the introduction of the AMA as an important tool to further promote improvements in operational risk management and controls at large banking institutions.

7. This document provides both AMA supervisory standards and a discussion of how those standards should be incorporated into an operational risk framework. The relevant supervisory standards are listed at the beginning of each section and a full compilation of the standards is provided in Appendix A. Not every section has specific supervisory standards. When spanning more than one section, supervisory standards are listed only once.

8. Institutions will be required to meet, and remain in compliance with, all the supervisory standards to use an AMA framework. However, evaluating an institution's qualification with each of the individual supervisory standards will not be sufficient to determine an institution's overall readiness for AMA. Instead, supervisors and institutions must also evaluate how well the various components of an institution's AMA framework complement and reinforce one another to achieve the overall objectives of an accurate measure and effective management of operational risk. In performing their evaluation, supervisors will exercise considerable supervisory judgment, both in evaluating the individual components and the overall operational risk framework.

9. An institution's AMA methodology will be assessed as part of the ongoing supervision process. This will allow supervisors to incorporate existing supervisory efforts as much as possible into the AMA assessments. Some elements of operational risk (e.g., internal controls and information technology) have long been subject to examination by supervisors. Where this is the case, supervisors will make every effort to leverage off these examination activities to

assess the effectiveness of the AMA process. Substantive weaknesses identified in an examination will be factored into the AMA qualification process.

III. Definitions

10. There are important definitions that institutions must incorporate into an AMA framework. They are:

- *Operational risk*: The risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. The definition includes legal risk, which is the risk of loss resulting from failure to comply with laws as well as prudent ethical standards and contractual obligations. It also includes the exposure to litigation from all aspects of an institution's activities. The definition does not include strategic or reputational risks¹.
- *Operational risk loss*: The financial impact associated with an operational event that is recorded in the institution's financial statements consistent with Generally Accepted Accounting Principles (GAAP). Financial impact includes all out-of-pocket expenses associated with an operational event but does not include opportunity costs, foregone revenue, or costs related to investment programs implemented to prevent subsequent operational risk losses. Operational risk losses are characterized by seven event factors associated with:
 - i. *Internal fraud*: an act of a type intended to defraud, misappropriate property or circumvent regulations, the law or company policy, excluding diversity/discrimination events, which involve at least one internal party.
 - ii. *External fraud*: an act of a type intended to defraud, misappropriate property or circumvent the law, by a third party.
 - iii. *Employment practices and workplace safety*: an act inconsistent with employment, health or safety laws or agreements, from payment of personal injury claims, or from diversity/discrimination events.
 - iv. *Clients, products, and business practices*: an unintentional or negligent failure to meet a professional obligation to specific clients (including fiduciary and suitability requirements), or from the nature or design of a product.
 - v. *Damage to physical assets*: the loss or damage to physical assets from natural disaster or other events.
 - vi. *Business disruption and system failures*: disruption of business or system failures.
 - vii. *Execution, delivery, and process management*: failed transaction processing or process management, from relations with trade counterparties and vendors.
- *Operational risk exposure*: An estimate of the potential operational losses that the banking institution faces at a soundness standard consistent with a 99.9 per cent confidence level over a one-year period. The institution will multiply the exposure by

¹ An institution's definition of operational risk may encompass other risk elements as long as the supervisory definition is met.

12.5 to obtain risk-weighted assets for operational risk; this is added to the risk-weighted assets for credit and market risk to arrive at the denominator of the regulatory capital ratio.

- *Business environment and internal control factor assessments:* The range of tools that provide a meaningful assessment of the level and trends in operational risk across the institution. While the institution may use multiple tools in an AMA framework, they must all have the same objective of identifying key risks. There are a number of existing tools, such as audit scores and performance indicators that may be acceptable under this definition.

IV. Banking Activities and Operational Risk

11. The above definition of operational risk gives a sense of the breadth of exposure to operational risk that exists in banking today as well the many interdependencies among risk factors that may result in an operational risk loss. Indeed, operational risk can occur in any activity, function, or unit of the institution.

12. The definition of operational risk incorporates the risks stemming from people, processes, systems and external events. People risk refers to the risk of management failure, organizational structure or other human resource failures. These risks may be exacerbated by poor training, inadequate controls, poor staffing resources, or other factors. The risk from processes stem from breakdowns in established processes, failure to follow processes, or inadequate process mapping within business lines. System risk covers instances of both disruption and outright system failures in both internal and outsourced operations. Finally, external events can include natural disasters, terrorism, and vandalism.

13. There are a number of areas where operational risks are emerging. These include:

- Greater use of automated technology has the potential to transform risks from manual processing errors to system failure risks, as greater reliance is placed on globally integrated systems;
- Proliferation of new and highly complex products;
- Growth of e-banking transactions and related business applications expose an institution to potential new risks (e.g., internal and external fraud and system security issues);

- Large-scale acquisitions, mergers, and consolidations test the viability of new or newly integrated systems;
- Emergence of institutions acting as large-volume service providers create the need for continual maintenance of high-grade internal controls and back-up systems;
- Development and use of risk mitigation techniques (e.g., collateral, insurance, credit derivatives, netting arrangements and asset securitizations) optimize an institution's exposure to market risk and credit risk, but potentially create other forms of risk (e.g., legal risk); and
- Greater use of outsourcing arrangements and participation in clearing and settlement systems mitigate some risks while increasing others.

14. The range of banking activities and areas affected by operational risk must be fully identified and considered in the development of the institution's risk management and measurement plans. Since operational risk is not confined to particular business lines², product types, or organizational units, it should be managed in a consistent and comprehensive manner across the institution. Consequently, risk management mechanisms must encompass the full range of risks, as well as strategies that help to identify, measure, monitor and control those risks.

V. Corporate Governance

Supervisory Standards:

S 1. The institution's operational risk framework must include an independent firm-wide operational risk management function, line of business management oversight, and independent testing and verification functions.

15. The management structure underlying an AMA operational risk framework may vary between institutions. However, within all AMA institutions, there are three key components that must be evident -- the firm-wide operational risk management function, lines of business management, and the testing and verification function. These three elements are functionally

² Throughout this guidance, terms such as "business units" and "business lines" are used interchangeably and refer not only to an institution's revenue generating businesses, but also to corporate staff functions such as human resources or information technology.

independent³ organizational components, but should work in cooperation to ensure a robust operational risk framework.

A. Board and Management Oversight

Supervisory Standards:

- S 2. The board of directors must oversee the development of the firm-wide operational risk framework, as well as major changes to the framework. Management roles and accountability must be clearly established.**
- S 3. The board of directors and management must ensure that appropriate resources are allocated to support the operational risk framework.**

16. The board is responsible for overseeing the establishment of the operational risk framework, but may delegate the responsibility for implementing the framework to management with the authority necessary to allow for its effective implementation. Other key responsibilities of the board include:

- Ensuring appropriate management responsibility, accountability and reporting;
- Understanding the major aspects of the institution’s operational risk as a distinct risk category that should be managed;
- Reviewing periodic high-level reports on the institution’s overall operational risk profile, which identify material risks and strategic implications for the institution;
- Overseeing significant changes to the operational risk framework; and
- Ensuring compliance with regulatory disclosure requirements.

17. Effective board and management oversight forms the cornerstone of an effective operational risk management process. The board and management have several broad responsibilities with respect to operational risk:

- To establish a framework for assessing operational risk exposure and identify the institution’s tolerance for operational risk;

³ For the purposes of AMA, “functional independence” is defined as the ability to carry out work freely and objectively and render impartial and unbiased judgments. There should be appropriate independence between the firm-wide operational risk management functions, line of business management and staff and the testing/verification functions. Supervisory assessments of independence issues will rely upon existing regulatory guidance (e.g. audit, internal control systems, board of directors/management, etc.)

- To identify the senior managers who have the authority for managing operational risk;
- To monitor the institution's performance and overall operational risk profile, ensuring that it is maintained at prudent levels and is supported by adequate capital;
- To implement sound fundamental risk governance principles that facilitate the identification, measurement, monitoring, and control of operational risk;
- To devote adequate human and technical resources to operational risk management; and
- To institute remuneration policies that are consistent with the institution's appetite for risk and are sufficient to attract qualified operational risk management and staff.

18. Management should translate the operational risk management framework into specific policies, processes and procedures that can be implemented and verified within the institution's different business units. Communication of these elements will be essential to the understanding and consistent treatment of operational risk across the institution. While each level of management is responsible for effectively implementing the policies and procedures within its purview, senior management should clearly assign authority, responsibilities, and reporting relationships to encourage and maintain this accountability and ensure that the necessary resources are available to manage operational risk. Moreover, management should assess the appropriateness of the operational risk management oversight process in light of the risks inherent in a business unit's activities. The testing and verification function is responsible for completing timely and comprehensive assessments of the effectiveness of implementation of the institution's operational risk framework at the line of business and firm-wide levels.

19. Management collectively is also responsible for ensuring that the institution has qualified staff and sufficient resources to carry out the operational risk functions outlined in the operational risk framework. Additionally, management must communicate operational risk

issues to appropriate staff that may not be directly involved in its management. Key management responsibilities include ensuring that:

- Operational risk management activities are conducted by qualified staff with the necessary experience, technical capabilities and access to adequate resources;
- Sufficient resources have been allocated to operational risk management, in the business lines as well as the independent firm-wide operational risk management function and verification areas, so as to sufficiently monitor and enforce compliance with the institution's operational risk policy and procedures; and
- Operational risk issues are effectively communicated with staff responsible for managing credit, market and other risks, as well as those responsible for purchasing insurance and managing third-party outsourcing arrangements.

B. Independent Firm-wide Risk Management Function

Supervisory Standards:

S 4. The institution must have an independent operational risk management function that is responsible for overseeing the operational risk framework at the firm level to ensure the development and consistent application of operational risk policies, processes, and procedures throughout the institution.

S 5. The firm-wide operational risk management function must ensure appropriate reporting of operational risk exposures and loss data to the board of directors and senior management.

20. The institution must have an independent firm-wide operational risk management function. The roles and responsibilities of the function will vary between institutions, but must be clearly documented. The independent firm-wide operational risk function should have organizational stature commensurate with the institution's operational risk profile, while remaining independent of the lines of business and the testing and verification function. At a minimum, the institution's independent firm-wide operational risk management function should ensure the development of policies, processes, and procedures that explicitly manage operational risk as a distinct risk to the institution's safety and soundness. These policies, processes and procedures should include principles for how operational risk is to be identified, measured,

monitored, and controlled across the organization. Additionally, they should provide for the collection of the data needed to calculate the institution's operational risk exposure.

21. Additional responsibilities of the independent firm-wide operational risk management function include:

- Assisting in the implementation of the overall firm-wide operational risk framework;
- Reviewing the institution's progress towards stated operational risk objectives, goals and risk tolerances;
- Periodically reviewing the institution's operational risk framework to consider the loss experience, effects of external market changes, other environmental factors, and the potential for new or changing operational risks associated with new products, activities or systems. This review process should include an assessment of industry best practices for the institution's activities, systems and processes;
- Reviewing and analyzing operational risk data and reports; and
- Ensuring appropriate reporting to senior management and the board.

C. Line of Business Management

Supervisory Standards:

S 6. Line of business management is responsible for the day-to-day management of operational risk within each business unit.

S 7. Line of business management must ensure that internal controls and practices within their line of business are consistent with firm-wide policies and procedures to support the management and measurement of the institution's operational risk.

22. Line of business management is responsible for both managing operational risk within the business lines and ensuring that policies and procedures are consistent with and support the firm-wide operational risk framework. Management should ensure that business-specific policies, processes, procedures and staff are in place to manage operational risk for all material products, activities, and processes. Implementation of the operational risk framework within each line of business should reflect the scope of that business and its inherent operational

complexity and operational risk profile. Line of business management must be independent of both the firm-wide operational risk management and the testing and verification functions.

VI. Operational Risk Management Elements

23. The operational risk management framework provides the overall operational risk strategic direction and ensures that an effective operational risk management and measurement process is adopted throughout the institution. The framework should provide for the consistent application of operational risk policies and procedures throughout the institution and address the roles of both the independent firm-wide operational risk management function and the lines of business. The framework should also provide for the consistent and comprehensive capture of data elements needed to measure and verify the institution's operational risk exposure, as well as appropriate operational risk analytical frameworks, reporting systems, and mitigation strategies. The framework must also include independent testing and verification to assess the effectiveness of implementation of the institution's operational risk framework, including compliance with policies, processes, and procedures.

24. In practice, an institution's operational risk framework must reflect the scope and complexity of business lines, as well as the corporate organizational structure. Each institution's operational risk profile is unique and requires a tailored risk management approach appropriate for the scale and materiality of the risks present, and the size of the institution. There is no single framework that would suit every institution; different approaches will be needed for different institutions. In fact, many operational risk management techniques continue to evolve rapidly to keep pace with new technologies, business models and applications.

25. The key elements in the operational risk management process include:

- Appropriate policies and procedures;

- Efforts to identify and measure operational risk;
- Effective monitoring and reporting;
- A sound system of internal controls; and
- Appropriate testing and verification of the operational risk framework.

A. Operational Risk Policies and Procedures

Supervisory Standards:

S 8. The institution must have policies and procedures that clearly describe the major elements of the operational risk management framework, including identifying, measuring, monitoring, and controlling operational risk.

26. Operational risk management policies, processes, and procedures should be documented and communicated to appropriate staff. The policies and procedures should outline all aspects of the institution's operational risk management framework, including:

- The roles and responsibilities of the independent firm-wide operational risk management function and line of business management;
- A definition for operational risk, including the loss event types that will be monitored;
- The capture and use of internal and external operational risk loss data, including large potential events (including the use of Scenario analysis);
- The development and incorporation of business environment and internal control factor assessments into the operational risk framework;
- A description of the internally derived analytical framework that quantifies the operational risk exposure of the institution;
- An outline of the reporting framework and the type of data/information to be included in line of business and firm-wide reporting;
- A discussion of qualitative factors and risk mitigants and how they are incorporated into the operational risk framework;
- A discussion of the testing and verification processes and procedures;
- A discussion of other factors that affect the measurement of operational risk; and
- Provisions for the review and approval of significant policy and procedural exceptions.

B. Identification and Measurement of Operational Risk

27. The result of a comprehensive program to identify and measure operational risk is an assessment of the institution's operational risk exposure. Management must establish a process that identifies the nature and types of operational risk and their causes and resulting effects on

the institution. Proper operational risk identification supports the reporting and maintenance of capital for operational risk exposure and events, facilitates the establishment of mechanisms to mitigate or control the risks, and ensures that management is fully aware of the sources of emerging operational risk loss events.

C. Monitoring and Reporting

Supervisory Standards:

S 9. Operational risk management reports must address both firm-wide and line of business results. These reports must summarize operational risk exposure, loss experience, relevant business environment and internal control assessments, and must be produced no less often than quarterly.

S 10. Operational risk reports must also be provided periodically to senior management and the board of directors, summarizing relevant firm-wide operational risk information.

28. Ongoing monitoring of operational risk exposures is a key aspect of an effective operational risk framework. To facilitate monitoring of operational risk, results from the measurement system should be summarized in reports that can be used by the firm-wide operational risk and line of business management functions to understand, manage, and control operational risk and losses. These reports should serve as a basis for assessing operational risk and related mitigation strategies and creating incentives to improve operational risk management throughout the institution.

29. Operational risk management reports should summarize:

- Operational risk loss experience on an institution, line of business, and event-type basis;
- Operational risk exposure;
- Changes in relevant risk and control assessments;
- Management assessment of early warning factors signaling an increased risk of future losses;

- Trend analysis, allowing line of business and independent firm-wide operational risk management to assess and manage operational risk exposures, systemic line of business risk issues, and other corporate risk issues;
- Exception reporting; and
- To the extent developed, operational risk causal factors.

30. High-level operational risk reports must also be produced periodically for the board and senior management. These reports must provide information regarding the operational risk profile of the institution, including the sources of material risk both from a firm-wide and line of business perspective, versus established management expectations.

D. Internal Control Environment

Supervisory Standards:

S 11. An institution's internal control structure must meet or exceed minimum regulatory standards established by the Agencies.

31. Sound internal controls are essential to an institution's management of operational risk and are one of the foundations of safe and sound banking. When properly designed and consistently enforced, a sound system of internal controls will help management safeguard the institution's resources, produce reliable financial reports, and comply with laws and regulations. Sound internal controls will also reduce the possibility of significant human errors and irregularities in internal processes and systems, and will assist in their timely detection when they do occur.

32. The Agencies are not introducing any new internal control standards, but rather emphasizing the importance of meeting existing standards. There is a recognition that internal control systems will differ among institutions due to the nature and complexity of an institution's products and services, organizational structure, and risk management culture. The AMA standards allows for these differences, while also establishing a baseline standard for the quality

of the internal control structure. Institutions will be expected to at least meet the minimum interagency standards⁴ relating to internal controls as a criterion for AMA qualification.

33. The extent to which an institution meets or exceeds the minimum standards will primarily be assessed through current and ongoing supervisory processes. As noted earlier, the Agencies will leverage off existing examination processes, to avoid duplication in assessing an institution's implementation of an AMA framework. Assessing the internal control environment is clearly an area where the supervisory authorities already focus considerable attention.

VII. Elements of an AMA Framework

Supervisory Standards:

S 12. The institution must demonstrate that it has appropriate internal loss event data, relevant external loss event data, assessments of business environment and internal controls factors, and results from scenario analysis to support its operational risk management and measurement framework.

S 13. The institution must include the regulatory definition of operational risk as the baseline for capturing the elements of the AMA framework and determining its operational risk exposure.

S 14. The institution must have clear standards for the collection and modification of the elements of the operational risk AMA framework.

34. Operational risk inputs play a significant role in both the management and measurement of operational risk. Necessary elements of an institution's AMA framework include internal loss event data, relevant external loss event data, results of scenario analysis, and assessments of the institution's business environment and internal controls. Operational risk inputs aid the institution in identifying the level and trend of operational risk, determining the effectiveness of

⁴ There are a number of interagency standards that cover topics relevant to the internal control structure. These include, for example, the Interagency Policy Statement on the Internal Audit Function and Its Outsourcing (March 2003), the Federal Financial Institution's Examination Council's (FFIEC's) Business Continuity Planning Booklet (May 2003), the FFIEC's Information Security Booklet (January 2003). In addition, each Agency has extensive

risk management and control efforts, highlighting opportunities to better mitigate operational risk, and assessing operational risk on a forward-looking basis.

35. To use its AMA framework, an institution must demonstrate that it has established a consistent and comprehensive process for the capture of all elements of the AMA framework. The institution must also demonstrate that it has clear standards for the collection and modification of all AMA inputs. While the analytical framework will generally combine these inputs to develop the operational risk exposure, supervisors must have the capacity to review the individual inputs as well; specifically, supervisors will need to review the loss information that is being provided to the analytical framework that stems from internal loss event data, versus the loss event information provided by external loss event data capture, scenario analysis, or the assessments of the business environment and internal control factors.

36. The capture systems must cover all material business lines, business activities and corporate functions that could generate operational risk. The institution must have a defined process that establishes responsibilities over the systems developed to capture the AMA elements. In particular, the issue of overriding the data capture systems must be addressed. Any overrides should be tracked separately and documented. Tracking overrides separately allows management and supervisors to identify the nature and rationale, including whether they stem from simple input errors or, more importantly, from exclusion because a loss event was not pertinent for the quantitative measurement. Management should have clear standards for addressing overrides and should clearly delineate who has authority to override the data systems and under what circumstances.

37. As noted earlier, for AMA qualification purposes, an institution's operational risk framework must, at a minimum, use the definition of operational risk that is provided in paragraph 10 when capturing the elements of the AMA framework. Institutions may use an expanded definition if considered more appropriate for risk management and measurement efforts. However, for the quantification of operational risk exposure for regulatory capital purposes, an institution must demonstrate that the AMA elements are captured so as to meet the baseline definition.

A. Internal Operational Risk Loss Event Data

Supervisory Standards:

- S 15. The institution must have at least five years of internal operational risk loss data⁵ captured across all material business lines, events, product types, and geographic locations.**
- S 16. The institution must be able to map internal operational risk losses to the seven loss-event type categories.**
- S 17. The institution must have a policy that identifies when an operational risk loss becomes a loss event and must be added to the loss event database. The policy must provide for consistent treatment across the institution.**
- S 18. The institution must establish appropriate operational risk data thresholds.**
- S 19. Losses that have any characteristics of credit risk, including fraud-related credit losses, must be treated as credit risk for regulatory capital purposes. The institution must have a clear policy that allows for the consistent treatment of loss event classifications (e.g., credit, market, or operational risk) across the organization.**

38. The key to internal data integrity is the consistency and completeness with which loss event data capture processes are implemented across the institution. Management must ensure that operational risk loss event information captured is consistent across the business lines and

⁵ With supervisory approval, a shorter initial historical observation period is acceptable for banks newly authorized to use an AMA methodology.

incorporates any corporate functions that may also experience operational risk events. Policies and procedures should be addressed to the appropriate staff to ensure that there is satisfactory understanding of operational risk and the data capture requirements under the operational risk framework. Further, the independent operational risk management function must ensure that the loss data is captured across all material business lines, products types, event types, and from all significant geographic locations. The institution must be able to capture and aggregate internal losses that cross multiple business lines or event types. If data is not captured across all business lines or from all geographic locations, the institution must document and explain the exceptions.

39. AMA institutions must be able to map operational risk losses into the seven loss event categories defined in paragraph 10. Institutions will not be required to produce reports or perform analysis for internal purposes on the basis of the loss event categories, but will be expected to use the information about the event-type categories as a check on the comprehensiveness of the institution's data set.

40. The institution must have five years of internal loss data, although a shorter range of historical data may be allowed, subject to supervisory approval. The extent to which an institution collects operational risk loss event data will, in part, be dependent upon the data thresholds that the institution establishes. There are a number of standards that an institution may use to establish the thresholds. They may be based on product types, business lines, geographic location, or other appropriate factors. The Agencies will allow flexibility in this area, provided the institution can demonstrate that the thresholds are reasonable, do not exclude important loss events, and capture a significant proportion of the institution's operational risk losses.

41. The institution must capture comprehensive data on all loss events above its established threshold level. Aside from information on the gross loss amount, the institution should collect information about the date of the event, any recoveries, and descriptive information about the drivers or causes of the loss event. The level of detail of any descriptive information should be commensurate with the size of the gross loss amount. Examples of the type of information collected include:

- Loss amount;
- Description of loss event;
- Where the loss is reported and expensed;
- Loss event type category;
- Date of the loss;
- Discovery date of the loss;
- Event end date;
- Management actions;
- Insurance recoveries;
- Other recoveries; and
- Adjustments to the loss estimate.

42. There are a number of additional data elements that may be captured. It may be appropriate, for example, to capture data on “near miss” events, where no financial loss was incurred. These near misses will not factor into the regulatory capital calculation, but may be useful for the operational risk management process.

43. Institutions will also be permitted and encouraged to capture loss events in their operational risk databases that are treated as credit risk for regulatory capital purposes, but have an underlying element of operational risk failure. These types of events, while not incorporated into the regulatory capital calculation, may have implications for operational risk management. It will be essential for institutions that capture loss events that are treated differently for regulatory capital and management purposes to demonstrate that 1) loss events are being captured consistently across the institution; 2) the data systems are sufficiently advanced to allow

for this differential treatment of loss events; and 3) credit, market, and operational risk losses are being appropriated in the correct manner for regulatory capital purposes.

44. The Agencies have established a clear boundary between credit and operational risks for regulatory capital purposes. If a loss event has any element of credit risk, it must be treated as credit risk for regulatory capital purposes. This would include all credit-related fraud losses. In addition, operational risk losses with credit risk characteristics that have historically been included in institutions' credit risk databases will continue to be treated as credit risk for the purposes of calculating minimum regulatory capital.

45. The accounting guidance for credit losses provides that creditors recognize credit losses when it is probable that they will be unable to collect all amounts due according to the contractual terms of a loan agreement. Credit losses may result from the creditor's own underwriting, processing, servicing or administrative activities along with the borrower's failure to pay according to the terms of the loan agreement. While the creditor's personnel, systems, policies or procedures may affect the timing or magnitude of a credit loss, they do not change its character from credit to operational risk loss for regulatory capital purposes. Losses that arise from a contractual relationship between a creditor and a borrower are credit losses whereas losses that arise outside of a relationship between a creditor and a borrower are operational losses.

B. External Data

Supervisory Standards:

S 20. The institution must have policies and procedures that provide for the use of external loss data in the operational risk framework.

S 21. Management must systematically review external data to ensure an understanding of industry experience.

46. External data may serve a number of different purposes in the operational risk framework. Where internal loss data is limited, external data may be a useful input in determining the institution's level of operational risk exposure. Even where external loss data is not an explicit input to an institution's data set, such data provides a means for the institution to understand industry experience, and in turn, provides a means for assessing the adequacy of its internal data. External data may also prove useful to inform scenario analysis, fit severity distributions, or benchmark the overall operational risk exposure results.

47. To incorporate external loss information into an institution's framework, the institution should collect the following information:

- External loss amount;
- External loss description;
- Loss event type category;
- External loss event date;
- Adjustments to the loss amount (i.e., recoveries, insurance settlements, etc) to the extent that they are known; and
- Sufficient information about the reporting institution to facilitate comparison to its own organization.

48. Institutions may obtain external loss data in any reasonable manner. There are many ways to do so; some institutions are using data acquired through membership with industry consortia while other institutions are using data obtained from vendor databases or public sources such as court records or media reports. In all cases, management will need to carefully evaluate the data source to ensure that they are comfortable that the information being reported is relevant and reasonably accurate.

C. Business Environment and Internal Control Factor Assessments

Supervisory Standards:

S 22. The institution must have a system to identify and assess business environment and internal control factors.

S 23. Management must periodically compare the results of their business environment and internal control factor assessments against actual operational risk loss experience.

49. While internal and external loss data provide a historical perspective on operational risk, it is also important that institutions incorporate a forward-looking element to the operational risk measure. In principle, an institution with strong internal controls in a stable business environment will have less exposure to operational risk than an institution with internal control weaknesses that is growing rapidly or introducing new products. In this regard, institutions will be required to identify the level and trends in operational risk in the institution. These assessments must be current, comprehensive across the institution, and identify the critical operational risks facing the institution.

50. The business environment and internal control factor assessments should reflect both the positive and negative trends in risk management within the institution as well as changes in an institution's business activities that increase or decrease risk. Because the results of the risk assessment are part of the capital methodology, management must ensure that the risk assessments are done appropriately and reflect the risks of the institution. Periodic comparisons should be made between actual loss exposure and the assessment results.

51. The framework established to maintain the risk assessments must be sufficiently flexible to encompass an institution's increased complexity of activities, new activities, changes in internal control systems, or an increased volume of information.

D. Scenario Analysis

Supervisory Standards:

S 24. Management must have policies and procedures that identify how scenario analysis will be incorporated into the operational risk framework.

52. Scenario analysis is a systematic process of obtaining expert opinions from business managers and risk management experts to derive reasoned assessments of the likelihood and impact of plausible operational losses consistent with the regulatory soundness standard. Within an institution's operational risk framework, scenario analysis may be used as an input or may, as discussed below, form the basis of an operational risk analytical framework.

53. As an input to the institution's framework, scenario analysis is especially relevant for business lines or loss event types where internal data, external data, and assessments of the business environment and internal control factors do not provide a sufficiently robust estimate of the institution's exposure to operational risk. In some cases, an institution's internal loss history may be sufficient to provide a reasonable estimate of exposure to future operational losses. In other cases, the use of well-reasoned, scaled external data may itself be a form of scenario analysis.

54. The institution must have policies and procedures that define scenario analysis and identify its role in the operational risk framework. The policy should cover key elements of scenario analysis, such as the manner in which the scenarios are generated, the frequency with which they are updated, and the scope and coverage of operational loss events they are intended to reflect.

VIII. Risk Quantification

A. Analytical Framework

Supervisory Standards:

S 25. The institution must have a comprehensive operational risk analytical framework that provides an estimate of the institution's operational risk

exposure, which is the aggregate operational loss that it faces over a one-year period at a soundness standard consistent with a 99.9 per cent confidence level.

S 26. Management must document the rationale for all assumptions underpinning its chosen analytical framework, including the choice of inputs, distributional assumptions, and the weighting across qualitative and quantitative elements. Management must also document and justify any subsequent changes to these assumptions.

S 27. The institution's operational risk analytical framework must use a combination of internal operational loss event data, relevant external operational loss event data, business environment and internal control factor assessments, and scenario analysis. The institution must combine these elements in a manner that most effectively enables it to quantify its operational risk exposure. The institution can choose the analytical framework that is most appropriate to its business model.

S 28. The institution's capital requirement for operational risk will be the sum of expected and unexpected losses unless the institution can demonstrate, consistent with supervisory standards, the expected loss offset.

55. The industry has made significant progress in recent years in developing analytical frameworks to quantify operational risk. The analytical frameworks, which are a part of the overall operational risk framework, are based on various combinations of an institution's own operational loss experience, the industry's operational loss experience, the size and scope of the institution's activities, the quality of the institution's control environment, and management's expert judgment. Because these models capture specific characteristics of each institution, such models yield unique risk-sensitive estimates of the institutions' operational risk exposures.

56. While the Agencies are not specifying the exact methodology that an institution should use to determine its operational risk exposure, minimum supervisory standards for acceptable approaches have been developed. These standards have been set so as to assure that the regulation can accommodate continued evolution of operational risk quantification techniques, yet remain amenable to consistent application and enforcement across institutions. The Agencies will require that the institution have a comprehensive analytical framework that provides an

estimate of the aggregate operational loss that it faces over a one-year period at a soundness standard consistent with a 99.9 percent confidence level, referred to as the institution's operational risk exposure. The institution will multiply the exposure estimate by 12.5 to obtain risk weighted assets for operational risk, and add this figure to risk-weighted assets for credit and market risk to obtain total risk-weighted assets. The final minimum regulatory capital number will be 8 percent of total risk-weighted assets.

57. The Agencies expect that there will be significant variation in analytical frameworks across institutions, with each institution tailoring its framework to leverage existing technology platforms and risk management procedures. These approaches may only be used, provided they meet the supervisory standards and include, as inputs, internal operational loss event data, relevant external operational loss event data, assessments of business environment and internal control factors, and scenario analysis. The Agencies do expect that there will be some uncertainty and potential error in the analytical frameworks because of the evolving nature of operational risk measurement and data capture. Therefore, a degree of conservatism will need to be built into the analytical frameworks to reflect the evolutionary status of operational risk and its impact on data capture and analytical modeling.

58. A diversity of analytical approaches is emerging in the industry, combining and weighting these inputs in different ways. Most current approaches seek to estimate loss frequency and loss severity to arrive at an aggregate loss distribution. Institutions then use the aggregate loss distribution to determine the appropriate amount of capital to hold for a given soundness standard. Scenario analysis is also being used by many institutions, albeit to significantly varying degrees. Some institutions are using scenario analysis as the basis for their

analytical framework, while others are incorporating scenarios as a means for considering the possible impact of significant operational losses on their overall operational risk exposure.

59. The primary differences among approaches being used today relate to the weight that institutions place on each input. For example, institutions with comprehensive internal data may place less emphasis on external data or scenario analysis. Another example is that some institutions estimate a unique loss distribution for each business line/loss type combination (bottom-up approach) while others estimate a loss distribution on a firm-wide basis and then use an allocation methodology to assign capital to business lines (top-down approach).

60. The Agencies expect internal loss event data to play an important role in the institution's analytical framework, hence the requirement for five years of internal operational risk loss data. However, as footnote 5 makes clear, five years of data is not always required for the analytical framework. For example, if a bank exited a business line, the institution would not be expected to make use of that business unit's loss experience unless it had relevance for other activities of the institution. Another example would be where a bank has made a recent acquisition where the acquired firm does not have internal loss event data. In these cases, the Agencies expect the institution to make use of the loss data available at the acquired institution and any internal loss data from operations similar to that of the acquired firm, but the institution will likely have to place more weight relevant external loss event data, results from scenario analysis, and factors reflecting assessments of the business environment and internal controls.

61. Whatever analytical approach an institution chooses, it must document and provide the rationale for all assumptions embedded in its chosen analytical framework, including the choice of inputs, distributional assumptions, and the weighting of qualitative and quantitative elements.

Management must also document and justify any subsequent changes to these assumptions. This documentation should:

- Clearly identify how the different inputs are combined and weighted to arrive at the overall operational risk exposure so that the analytical framework is transparent. The documentation should demonstrate that the analytical framework is comprehensive and internally consistent. Comprehensiveness means that all required inputs are incorporated and appropriately weighted. At the same time, there should not be overlaps or double counting.
- Clearly identify the quantitative assumptions embedded in the methodology and provide explanation for the choice of these assumptions. Examples of quantitative assumptions include distributional assumptions about frequency and severity, the methodology for combining frequency and severity to arrive at the overall loss distribution, and dependence assumptions between operational losses across and within business lines.
- Clearly identify the qualitative assumptions embedded in the methodology and provide explanations for the choice of these assumptions. Examples of qualitative assumptions include the use of business environment and control factors as well as scenario analysis in the approach.
- Where feasible, provide results based purely on quantitative methods separately from results that incorporate qualitative factors. This will provide a transparent means of determining the relative importance of quantitative versus qualitative inputs.
- Where feasible, provide results based on alternative quantitative and qualitative assumptions to gauge the overall model's sensitivity to these assumptions.
- Provide a comparison of the operational risk exposure estimate generated by the analytical framework with actual loss experience over time, to assess the reasonableness of the framework's outputs.
- Clearly identify all changes to assumptions, and provide explanations for such changes.
- Clearly identify the results of an independent verification of the analytical framework.

62. The regulatory capital charge for operational risk will include both expected losses (EL) and unexpected losses (UL). The Agencies have considered two approaches that might allow for some recognition of EL; these approaches are reserving and budgeting. However, both approaches raise questions about their ability to act as an EL offset for regulatory capital purposes. The current U.S. GAAP treatment for reserves (or liabilities) is based on an incurred-loss (liability) model. Given that EL is looking beyond current losses to losses that will be incurred in the future, establishing a reserve for operational risk EL is not likely to meet US accounting standards. While reserves are specific allocations for incurred losses, budgeting is a

process of generally allocating future income for loss contingencies, including losses resulting from operational risk. Institutions will be required to demonstrate that budgeted funds are sufficiently capital-like and remain available to cover EL over the next year. In addition, an institution will not be permitted to recognize EL offsets on budgeted loss contingencies that fall below the established data thresholds; this is relevant as many institutions currently budget for low severity, high frequency events that are more likely to fall below most institutions' thresholds.

63. An institution's analytical framework complements but does not substitute for prudent controls. Rather, with improved risk measurement, institutions are finding that they can make better-informed strategic decisions regarding enhancements to controls and processes, the desired scale and scope of the operations, and how insurance and other risk mitigation tools can be used to offset operational risk exposure.

B. Accounting for Dependence

Supervisory Standards:

S 29. Management must document how its chosen analytical framework accounts for dependence (e.g., correlations) among operational losses across and within business lines. The institution must demonstrate that its explicit and embedded dependence assumptions are appropriate, and where dependence assumptions are uncertain, the institution must use conservative estimates.

64. Management must document how its chosen analytical framework accounts for dependence (e.g., correlation) between operational losses across and within business lines. The issue of dependence is closely related to the choice between a bottom-up or a top-down modeling approach. Under a bottom-up approach, explicit assumptions regarding cross-event dependence are required to estimate operational risk exposure at the firm-wide level. Management must demonstrate that these assumptions are appropriate and reflect the institution's current

environment. If the dependence assumptions are uncertain, the institution must choose conservative estimates. In so doing, the institution should consider the possibility that cross-event dependence may not be constant, and may increase during stress environments.

65. Under a top-down approach, an explicit assumption regarding dependence is not required. However, a parametric distribution for loss severity may be more difficult to specify under the top-down approach, as it is a statistical mixture of (potentially) heterogeneous business line and event type distributions. Institutions must carefully consider the conditions necessary for the validity of top-down approaches, and whether these conditions are met in their particular circumstances. Similar to bottom-up approaches, institutions using top-down approaches must ensure that implicit dependence assumptions are appropriate and reflect the institution's current environment. If historic dependence assumptions embedded in top-down approaches are uncertain, the institution must be conservative and implement a qualitative adjustment to the analysis.

IX. Risk Mitigation

Supervisory Standards:

S 30. Institutions may reduce their operational risk exposure results by no more than 20% to reflect the impact of risk mitigants. Institutions must demonstrate that mitigation products are sufficiently capital-like to warrant inclusion in the adjustment to the operational risk exposure.

66. There are many mechanisms to manage operational risk, including risk transfer through risk mitigation products. Because risk mitigation can be an important element in limiting or reducing operational risk exposure in an institution, an adjustment is being permitted that will directly impact the amount of regulatory capital that is held for operational risk. The adjustment is limited to 20% of the overall operational risk exposure result determined by the institution using its loss data, qualitative factors, and quantitative framework.

67. Currently, the primary risk mitigant used for operational risk is insurance. There has been discussion that some securities products may be developed to provide risk mitigation benefits; however, to date, no specific products have emerged that have characteristics sufficient to be considered capital-replacement for operational risk. As a result, securities products and other capital market instruments may not be factored in to the regulatory capital risk mitigation adjustment at this time.

68. For an institution that wishes to adjust its regulatory capital requirement as a result of the risk mitigating impact of insurance, management must demonstrate that the insurance policy is sufficiently capital-like to provide the cushion that is necessary. A product that would fall in this category must have the following characteristics:

- The policy is provided through a third party⁶ that has a minimum claims paying ability rating of A⁷;
- The policy has an initial term of one year⁸;
- The policy has no exclusions or limitations based upon regulatory action or for the receiver or liquidator of a failed bank;
- The policy has clear cancellation and non-renewal notice periods; and
- The policy coverage has been explicitly mapped to actual operational risk exposure of the institution.

69. Insurance policies that meet these standards may be incorporated into an institution's adjustment for risk mitigation. An institution should be conservative in its recognition of such policies, for example, the institution must also demonstrate that insurance policies used as the basis for the adjustment have a history of timely payouts. If claims have not been paid on a timely basis, the institution must exclude that policy from the operational risk capital adjustment.

⁶ Where operational risk is transferred to a captive or an affiliated insurer such that risk is retained within the group structure, recognition of such risk transfer will only be allowed for regulatory capital purposes where the risk has been transferred to a third party (e.g., an unaffiliated reinsurer) that meets the standards set forth in this section.

⁷ Rating agencies may use slightly different rating scales. For the purpose of this supervisory guidance, the insurer must have a rating that is at least the equivalent of A under Standard and Poor's Insurer Financial Strength Ratings or an A2 under Moody's Insurance Financial Strength Ratings.

In addition, the institution must be able to show that the policy would actually be used in the event of a loss situation; that is, the deductible may not be set so high that no loss would ever conceivably exceed the deductible threshold.

70. The Agencies will not specify how institutions should calculate the risk mitigation adjustment. Nevertheless, institutions are expected to use conservative assumptions when calculating adjustments. An institution should discount (i.e., apply its own estimates of haircuts) the impact of insurance coverage to take into account factors, which may limit the likelihood or size of claims payouts. Among these factors are the remaining terms of a policy, especially when it is less than a year, the willingness and ability of the insurer to pay on a claim in a timely manner, the legal risk that a claim may be disputed, and the possibility that a policy can be cancelled before the contractual expiration.

X. Data Maintenance

Supervisory Standards:

S 31. Institutions using the AMA approach for regulatory capital purposes must use advanced data management practices to produce credible and reliable operational risk estimates.

71. Data maintenance is a critical factor in an institution's operational risk framework. Institutions with advanced data management practices should be able to track operational risk loss events from initial discovery through final resolution. These institutions should also be able to make appropriate adjustments to the data and use the data to identify trends, track problem areas, and identify areas of future risk. Such data should include not only operational risk loss event information, but also information on risk assessments, which are factored into the operational risk exposure calculation. In general, institutions using the AMA should have the

⁸ Institutions must decrease the amount of the adjustment if the remaining term is less than one year. The institution

same data maintenance standards for operational risk as those set forth for A-IRB institutions under the credit risk guidance.

72. Operational risk data elements captured by the institution must be of sufficient depth, scope, and reliability to:

- Track and identify operational risk loss events across all business lines, including when a loss event impact multiple business lines.
- Calculate capital ratios based on operational risk exposure results. The institution must also be able to factor in adjustments related to risk mitigation, correlations, and risk assessments.
- Produce internal and public reports on operational risk measurement and management results, including trends revealed by loss data and/or risk assessments. The institution must also have sufficient data to produce exception reports for management.
- Support risk management activities.

73. The data warehouse⁹ must contain the key data elements needed for operational risk measurement, management, and verification. The precise data elements may vary by institution and also among business lines within an institution. An important element of ensuring consistent reporting of the data elements is to develop comprehensive definitions for each data element used by the institution for reporting operational risk loss events or for the risk assessment inputs. The data must be stored in an electronic format to allow for timely retrieval for analysis, verification and testing of the operational risk framework, and required disclosures.

74. Management will need to identify those responsible for maintaining the data warehouse. In particular, policies and processes will need to be developed for delivering, storing, retaining, and updating the data warehouse. Policies and procedures must also cover the edit checks for data input functions, as well as the requirements for the testing and verification function to verify data integrity. Like other areas of the operational risk framework, it is critical that management

must have a clear policy in place that links the remaining term to the adjustment factor.

⁹ In this document, the terms “database” and “data warehouse” are used interchangeably to refer to a collection of data arranged for easy retrieval using computer technology.

ensure accountability for ongoing data maintenance, as this will impact operational risk management and measurement efforts.

XI. Testing and Verification

Supervisory Standards:

S 32. The institution must test and verify the accuracy and appropriateness of the operational risk framework and results.

S 33. Testing and verification must be done independently of the firm-wide operational risk management function and the institution's lines of business.

75. The operational risk framework must provide for regular and independent testing and verification of operational risk management policies, processes and measurement systems, as well as operational risk data capture systems. For most institutions, operational risk verification and testing will primarily be done by the audit function. Internal and external audits can provide an independent assessment of the quality and effectiveness of the control systems' design and performance. However, institutions may use other independent internal units (e.g. quality assurance) or third parties. The testing and verification function, whether internally or externally performed, should be staffed by qualified individuals who are independent from the firm-wide operational risk management function and the institution's lines of business.

76. The verification of the operational risk measurement system should include the testing of:

- Key operational risk processes and systems;
- Data feeds and processes associated with the operational risk measurement system;
- Adjustments to empirical operational risk capital estimates, including operational risk exposure;
- Periodic certification of operational risk models used and their underlying assumptions; and
- Assumptions underlying operational risk exposure, data decision models, and operational risk capital charge.

77. The operational risk reporting processes should be periodically reviewed for scope and effectiveness. The institution should have independent verification processes to ensure the timeliness, accuracy, and comprehensiveness of operational risk reporting systems, both at the firm-wide and the line of business levels.

78. Independent verification and testing should be done to ensure the integrity and applicability of the operational risk framework, operational risk exposure/loss data, and the underlying assumptions driving the regulatory capital measurement process. Appropriate reports, summarizing operational risk verification and testing findings for both the independent firm-wide risk management function and lines of business should be provided to appropriate management and the board of directors or a designated board committee.

Appendix A

Supervisory Standards for the AMA

- S 1. The institution’s operational risk framework must include an independent firm-wide operational risk management function, line of business management oversight, and independent testing and verification functions.**
- S 2. The board of directors must oversee the development of the firm-wide operational risk framework, as well as major changes to the framework. Management roles and accountability must be clearly established.**
- S 3. The board of directors and management must ensure that appropriate resources are allocated to support the operational risk framework.**
- S 4. The institution must have an independent operational risk management function that is responsible for overseeing the operational risk framework at the firm level to ensure the development and consistent application of operational risk policies, processes, and procedures throughout the institution.**
- S 5. The firm-wide operational risk management function must ensure appropriate reporting of operational risk exposures and loss data to the board of directors and senior management.**
- S 6. Line of business management is responsible for the day-to-day management of operational risk within each business unit.**
- S 7. Line of business management must ensure that internal controls and practices within their line of business are consistent with firm-wide policies and procedures to support the management and measurement of the institution’s operational risk.**
- S 8. The institution must have policies and procedures that clearly describe the major elements of the operational risk management framework, including identifying, measuring, monitoring, and controlling operational risk.**
- S 9. Operational risk management reports must address both firm-wide and line of business results. These reports must summarize operational risk exposure, loss experience, relevant business environment and internal control assessments, and must be produced no less often than quarterly.**
- S 10. Operational risk reports must also be provided periodically to senior management and the board of directors, summarizing relevant firm-wide operational risk information.**
- S 11. An institution’s internal control structure must meet or exceed minimum regulatory standards established by the Agencies.**

- S 12. The institution must demonstrate that it has appropriate internal loss event data, relevant external loss event data, assessments of business environment and internal controls factors, and results from scenario analysis to support its operational risk management and measurement framework.**
- S 13. The institution must include the regulatory definition of operational risk as the baseline for capturing the elements of the AMA framework and determining its operational risk exposure.**
- S 14. The institution must have clear standards for the collection and modification of the elements of the operational risk AMA framework.**
- S 15. The institution must have at least five years of internal operational risk loss data¹⁰ captured across all material business lines, events, product types, and geographic locations.**
- S 16. The institution must be able to map internal operational risk losses to the seven loss-event type categories.**
- S 17. The institution must have a policy that identifies when an operational risk loss becomes a loss event and must be added to the loss event database. The policy must provide for consistent treatment across the institution.**
- S 18. The institution must establish appropriate operational risk data thresholds.**
- S 19. Losses that have any characteristics of credit risk, including fraud-related credit losses, must be treated as credit risk for regulatory capital purposes. The institution must have a clear policy that allows for the consistent treatment of loss event classifications (e.g., credit, market, or operational risk) across the organization.**
- S 20. The institution must have policies and procedures that provide for the use of external loss data in the operational risk framework.**
- S 21. Management must systematically review external data to ensure an understanding of industry experience.**
- S 22. The institution must have a system to identify and assess business environment and internal control factors.**
- S 23. Management must periodically compare the results of their business environment and internal control factor assessments against actual operational risk loss experience.**

¹⁰ With supervisory approval, a shorter initial historical observation period is acceptable for banks newly authorized to use an AMA methodology.

- S 24. Management must have policies and procedures that identify how scenario analysis will be incorporated into the operational risk framework.**
- S 25. The institution must have a comprehensive operational risk analytical framework that provides an estimate of the institution’s operational risk exposure, which is the aggregate operational loss that it faces over a one-year period at a soundness standard consistent with a 99.9 per cent confidence level.**
- S 26. Management must document the rationale for all assumptions underpinning its chosen analytical framework, including the choice of inputs, distributional assumptions, and the weighting across qualitative and quantitative elements. Management must also document and justify any subsequent changes to these assumptions.**
- S 27. The institution’s operational risk analytical framework must use a combination of internal operational loss event data, relevant external operational loss event data, business environment and internal control factor assessments, and scenario analysis. The institution must combine these elements in a manner that most effectively enables it to quantify its operational risk exposure. The institution can choose the analytical framework that is most appropriate to its business model.**
- S 28. The institution’s capital requirement for operational risk will be the sum of expected and unexpected losses unless the institution can demonstrate, consistent with supervisory standards, the expected loss offset.**
- S 29. Management must document how its chosen analytical framework accounts for dependence (e.g., correlations) among operational losses across and within business lines. The institution must demonstrate that its explicit and embedded dependence assumptions are appropriate, and where dependence assumptions are uncertain, the institution must use conservative estimates.**
- S 30. Institutions may reduce their operational risk exposure results by no more than 20% to reflect the impact of risk mitigants. Institutions must demonstrate that mitigation products are sufficiently capital-like to warrant inclusion in the adjustment to the operational risk exposure.**
- S 31. Institutions using the AMA approach for regulatory capital purposes must use advanced data management practices to produce credible and reliable operational risk estimates.**
- S 32. The institution must test and verify the accuracy and appropriateness of the operational risk framework and results.**

S 33. Testing and verification must be done independently of the firm-wide operational risk management function and the institution's lines of business.