



**BANK NEGARA MALAYSIA**  
CENTRAL BANK OF MALAYSIA

# **Capital Adequacy Framework**

## **(Internal Ratings-Based Approach for Credit Risk)**

### **Exposure Draft**

Applicable to:

1. Licensed banks
2. Licensed Islamic banks
3. Licensed investment banks
4. Financial holding companies engaged predominantly in banking or Islamic banking business

Issued on: 20 June 2025

BNM/RH/ED 029-37

This Exposure Draft (ED) sets out the proposed regulatory capital requirements for credit risk for financial institutions under the Basel III Internal Ratings-Based (IRB) approach.

The Bank proposes for the new Basel III rules to come into formal effect in 2028, at which point it will replace existing Basel II rules relating to IRB as currently set out in Part B in the policy document on *Capital Adequacy Framework (Basel II – Risk-Weighted Assets)* and the policy document on *Capital Adequacy Framework for Islamic Banks (Risk-Weighted Assets)*.

This document should be read together with the policy document on *Capital Adequacy Framework (Capital Components)* and the policy document on *Capital Adequacy Framework for Islamic Banks (Capital Components)*, as well as the policy document on *Capital Adequacy Framework (Standardised Approach for Credit Risk)*.

The Bank invites written feedback on the proposed regulatory requirements in this ED, including suggestions for specific issues, areas to be clarified or elaborated further and alternative proposals that the Bank should consider. The written feedback should be constructive and be supported with clear rationales and appropriate evidence, examples or illustrations, to facilitate the Bank's assessment. Where appropriate, please specify the applicable paragraph.

The Bank expects financial institutions that have been approved to adopt IRB to participate in this consultation.

- In addition to providing general feedback, financial institutions approved to adopt IRB should also respond to the specific questions set out in this ED and complete the Quantitative Impact Study (QIS) reporting template issued concurrently with this ED.
- Please refer to the accompanying Excel file and the reporting instructions provided in the *Capital Adequacy Framework (Internal Ratings-Based Approach for Credit Risk) Quantitative Impact Study (QIS) Instructions*.

The Bank also welcomes feedback to the ED from other stakeholders, including financial institutions not adopting IRB.

Submissions should be made electronically to the Bank by 31 December 2025 to [pfpcconsult@bnm.gov.my](mailto:pfpcconsult@bnm.gov.my) and addressed to Pengarah, Jabatan Dasar Kewangan Pruden.

Submissions received may be made public unless confidentiality is specifically requested for the whole or part of the submission. In the course of preparing your feedback, you may direct any queries to Encik See Thuan Eu and the following officers:

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## PART A OVERVIEW

### 1 Introduction

- 1.1 This Policy Document sets out the standards and guidance for computing capital requirements for credit risk under the IRB approach in line with Basel III standards set by the Basel Committee on Banking Supervision (BCBS)<sup>1</sup> and capital standards issued by the Islamic Financial Services Board (IFSB)<sup>2</sup>.
- 1.2 The provisions on (i) the applicability of this Policy Document on *Capital Adequacy Framework (Internal Ratings-Based Approach for Credit Risk)* (“this Policy Document”), (ii) the legal provisions pursuant to which this Policy Document is issued, (iii) the terms and expressions used in this Policy Document, (iv) the related legal instruments and policy documents, and (v) the level of application of this Policy Document shall be as follows:

Policy Document	Paragraph
<i>Capital Adequacy Framework (Capital Components)</i> issued on 14 June 2024 (CAF CC PD) and as may be amended by the Bank	<ul style="list-style-type: none"> <li>• Paragraph 2 on ‘Applicability’</li> <li>• Paragraph 3 on ‘Legal Provisions’</li> <li>• Paragraph 5 on ‘Interpretation’ subject to paragraph 3.1 of this Policy Document</li> <li>• Paragraph 6 on ‘Related legal instruments and policy documents’, subject to the modifications in paragraph 1.3 of this Policy Document</li> <li>• Paragraph 8 on ‘Level of application’</li> </ul>
<i>Capital Adequacy Framework for Islamic Banks (Capital Components)</i> issued on 14 June 2024 (CAFIB CC PD) and as may be amended by the Bank	<ul style="list-style-type: none"> <li>• Paragraph 2 on ‘Applicability’</li> <li>• Paragraph 3 on ‘Legal Provisions’</li> <li>• Paragraph 5 on ‘Interpretation’ subject to paragraph 3.1 of this Policy Document</li> <li>• Paragraph 6 on ‘Related legal instruments and policy documents’, subject to the modifications in paragraph 1.3 of this Policy Document</li> <li>• Paragraph 8 on ‘Level of application’</li> </ul>

<sup>1</sup> *Basel Framework (CRE30 to 36)* ([https://www.bis.org/basel\\_framework/standard/CRE](https://www.bis.org/basel_framework/standard/CRE)) and *Basel III: Finalising post-crisis reforms*, December 2017 (<https://www.bis.org/bcbs/publ/d424.pdf>).

<sup>2</sup> *Revised Capital Adequacy Standard for Institutions Offering Islamic Financial Services*, December 2021. [https://www.ifsb.org/wp-content/uploads/2023/10/IFSB-23\\_En.pdf](https://www.ifsb.org/wp-content/uploads/2023/10/IFSB-23_En.pdf)

- 1.3 This Policy Document shall be read together with the policy documents as set out in paragraph 1.2, the Bank's policy document on *Capital Adequacy Framework (Standardised Approach for Credit Risk)* (SACR PD), and other relevant legal instruments, policy documents and guidelines that have been issued by the Bank, including any amendments or reissuance thereafter.

## 2 Effective date

- 2.1 This Policy Document comes into effect on 1 January 2028, subject to the transitional arrangements as set out in paragraph 50.

### Question 1:

The Bank intends to provide for a transition period of at least 12 months between the issuance of the final Policy Document and the date in which the requirements in the Policy Document becomes effective. This includes all transitional arrangements provided for in paragraph 50.

Please provide feedback on whether this timeline is adequate, and if not, please indicate the challenges or constraints anticipated.

## 3 Interpretation

- 3.1 The terms and expressions used in this Policy Document shall have the same meanings assigned to them in the Financial Services Act 2013 (FSA), Islamic Financial Services Act 2013 (IFSA), CAF CC PD and CAFIB CC PD, as the case may be, unless otherwise defined in this Policy Document:

“**S**” denotes a standard, an obligation, a requirement, specification, direction, condition and any interpretative, supplemental and transitional provisions that shall be complied with. Non-compliance may result in enforcement actions;

“**G**” denotes guidance which may consist of statements or information intended to promote common understanding and advice or recommendations that are encouraged to be adopted;

“**banking book exposure**” refers to an exposure which is not a trading book exposure;

“**banking group**” refers to a group comprising the financial institution and other entities that control, or is controlled by, or is under common control with, the financial institution;

“**banking institution**” refers to both a banking institution as defined in the CAF CC PD and an Islamic banking institution as defined in the CAFIB CC PD;

“**board**” refers to the board of directors of a financial institution, including a committee of the board where the responsibilities of the board set out in this Policy Document have been delegated to such a committee;

“**commitment**” refers to any contractual arrangement to extend credit, purchase assets or issue credit substitutes, that has been offered by the financial institution and accepted by the obligor. This includes any such arrangement that can be unconditionally cancelled by the financial institution at any time without prior notice to the obligor. It also includes any such arrangement that can be cancelled by the financial institution if the obligor fails to meet the conditions set out in the facility documentation, including conditions that shall be met by the obligor prior to any initial or subsequent drawdown under the arrangement;

“**exposure**” refers to an asset or a contingent asset, as defined under Malaysian Financial Reporting Standards;

“**financial holding company**” refers to a financial holding company as defined in both the CAF CC PD and the CAFIB CC PD;

“**financial institution**” refers to both a financial institution as defined in the CAF CC PD and an Islamic financial institution as defined in the CAFIB CC PD;

“**IRB approach**” refers to any of the approaches set out in paragraph 14.1, with the exception of the Standardised Approach;

“**Islamic financial institution**” refers to an Islamic financial institution as defined in the CAFIB CC PD;

“**senior management**” refers to the chief executive officer and senior officers of a financial institution;

“**Standardised Approach for Credit Risk**” or “Standardised Approach” refers to the approach for computing capital requirements for credit risk under the SACR PD; and

“**trading book exposure**” refers to an exposure consisting of positions in financial instruments and commodities held either with trading intent or to hedge other elements of the trading book, as defined in paragraphs 5.24 to 5.31 of the policy document on *Capital Adequacy Framework (Basel II – Risk Weighted Assets)* (CAF RWA PD).

## 4 Policy documents superseded

- 4.1 Once in effect, the requirements in this Policy Document will supersede Part B.3 of the CAF RWA PD and the policy document on *Capital Adequacy Framework for Islamic Banks (Risk-Weighted Assets)* (CAFIB RWA PD).

## PART B GENERAL REQUIREMENTS

### 5 Computation of credit risk-weighted assets (RWA)

#### Use of the IRB approach for calculating credit RWA

- S** 5.1 A financial institution shall adopt the IRB approach only after it has received a prior written approval from the Bank to do so. A financial institution which has not been approved by the Bank to adopt the IRB approach shall use the Standardised Approach for credit risk.
- S** 5.2 In seeking the Bank's prior written approval to adopt the IRB approach, a financial institution shall submit an application in accordance with the application procedures set out in paragraph 48.
- S** 5.3 Except for permanently or temporarily exempted exposures under paragraph 5.12, a financial institution that has been approved by the Bank to adopt the IRB approach for credit risk shall determine its credit RWA by applying the rules set out in this Policy Document on its banking book exposures across the following asset classes and sub-asset classes, as the case may be:
- (a) sovereign;
  - (b) bank;
  - (c) corporate (excluding specialised financing and corporate purchased receivables);
  - (d) specialised financing (SF);
  - (e) corporate purchased receivables;
  - (f) qualifying revolving retail exposures;
  - (g) retail residential mortgage exposures;
  - (h) other retail exposures (excluding retail purchased receivables); and
  - (i) retail purchased receivables.
- S** 5.4 A financial institution approved by the Bank to adopt the IRB approach for credit risk shall also separately calculate credit RWA for its banking book exposures using the Standardised Approach for credit risk for the purposes of the output floor requirement under paragraph 6.
- S** 5.5 Trading book exposures shall be subject to the requirements under the market risk component in Part D of the CAF RWA PD and the CAFIB RWA PD.
- S** 5.6 A financial institution shall not undertake intra-group transactions<sup>3</sup> with the intent of reducing the banking group's aggregate capital requirements by transferring credit risks between entities adopting different approaches to computing capital requirements for credit risk. Where such transactions have occurred and the Bank imposes additional capital requirements on the financial institution, the financial institution shall comply with such requirements.

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<sup>3</sup> This includes, but is not limited to, asset sales or cross guarantees.

- S** 5.7 A financial institution approved by the Bank to adopt the IRB approach and is adopting any of the approaches provided for under the IRB approach for an exposure shall continue to employ the same approach for that exposure, unless otherwise approved by the Bank.

### **Adoption of IRB for Islamic banking assets**

- S** 5.8 A financial institution shall apply the IRB principles and methodologies outlined in this Policy Document on Islamic banking assets. In doing so, the financial institution shall ensure that the specificities of the products and the related risk profiles based on the different Shariah contracts as described in Part F of the Bank's SACR PD are represented when determining the capital requirements for Islamic banking assets. This includes the risk profile arising from the application of the 'look-through' approach<sup>4</sup> for investment account placements made with Islamic financial institutions.
- S** 5.9 A financial institution that extends the application of an IRB model for conventional banking assets to Islamic banking assets shall ensure that the model or approach adopted is representative of the risk profile of those Islamic banking assets. In this regard, the financial institution shall:
- (a) when seeking the Bank's approval for the IRB adoption or migration, provide empirical analysis to support the case for using the conventional IRB model and its parameters for Islamic banking assets;
  - (b) perform periodic back-tests on Islamic banking asset data; and
  - (c) collect data on Islamic banking assets by each Shariah contract for the purpose of future modelling requirements.
- S** 5.10 An Islamic financial institution leveraging the IRB infrastructure at the group level shall implement effective oversight arrangements at the entity level. The Islamic financial institution shall have in place an internal process within the Islamic financial institution and a formal avenue at the group level to ensure that any outcome or decision made at the group level is suitable and relevant for application at the entity level.

### **Adoption of IRB across asset classes**

- S** 5.11 Unless otherwise provided for in paragraph 5.12, a financial institution adopting the IRB approach for an asset class or sub-asset class within a particular business unit shall apply the IRB approach to all exposures within that asset class or sub-asset class in that business unit.
- S** 5.12 A financial institution adopting the IRB approach shall only be allowed to adopt the Standardised Approach for the following exposures:
- (a) Permanently ("permanent exemption") in the case of:
    - (i) exposures to:
      - sovereign asset class;
      - bank asset class; and
      - public sector entities (PSEs) within the corporate asset class;

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<sup>4</sup> The 'look-through' approach is described in Appendix 4 of the SACR PD.

- (ii) exposures which are immaterial in terms of size and perceived risk profile; and
    - (iii) exposures where the IRB approach is not completely available<sup>5</sup>; and
  - (b) Temporarily (“temporary exemption”), subject to the Bank’s prior written approval pursuant to paragraph 5.13, in the case of:
    - (i) exposures to be gradually migrated to IRB as part of a financial institution’s IRB roll-out plan; and
    - (ii) exposures through consolidated subsidiaries which cannot be reasonably modelled<sup>6</sup>.
- S** 5.13 A financial institution intending to temporarily adopt the Standardised Approach as provided for in paragraph 5.12(b) shall seek the Bank’s prior written approval to do so. Where such temporary adoption is exercised, the financial institution shall provide an update to the Bank at a minimum frequency of once a year on the materiality and details of the exposures exempted. The Bank reserves the right to revoke its approval granted for such temporary adoption.
- S** 5.14 In the event a financial institution adopts the Standardised Approach under paragraph 5.12, the financial institution shall monitor and ensure that the following IRB coverage ratios are observed on an on-going basis, at the entity and group levels, and across all the asset class and sub-asset class levels<sup>7</sup> listed in paragraph 5.3:
  - (a) the aggregate credit RWA of exposures permanently exempted under paragraph 5.12(a)(ii) account for no more than 15% of total credit RWA; and
  - (b) the combined aggregate credit RWA of exposures permanently exempted under paragraph 5.12(a)(ii) and exposures temporarily exempted under paragraph 5.12(b) account for no more than 25% of total credit RWA.
- S** 5.15 Notwithstanding paragraph 5.12, if the Bank deems the capital allocated is insufficient for the risk level of the portfolio and the Bank requires the use of the IRB approach or requires additional capital under Pillar 2 for such exposures allowed to remain on the Standardised Approach, the financial institution shall comply with such requirements.

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<sup>5</sup> This includes equity exposures, equity investment in funds and exposures to central counterparties as defined in the policy document on *Capital Adequacy Framework (Exposures to Central Counterparties)*.

<sup>6</sup> In general, the Bank will consider that an exposure through a consolidated subsidiary cannot be reasonably modelled in situations where modelling difficulties arise due to limited data availability outside the financial institution’s control (e.g. due to it being a new business, or geographical or legal limitations) or where rating systems developed do not result in significant risk differentiation as a result of the nature and complexity of the exposures.

<sup>7</sup> The IRB coverage ratio is not applicable where there is no IRB exposure within the asset or sub-asset class (as the case may be).

## 6 Output floor

- S** 6.1 A financial institution adopting the IRB approach shall, for purposes of determining the Total RWA for the calculation in paragraph 9.1 of the CAF CC PD and CAFIB CC PD, substitute paragraph 9.2(b) and (c) of the CAF CC PD and CAFIB CC PD with the following:
- “(b) total RWA shall be defined as the higher of:
- i. 72.5% of Total Standardised RWA (“output floor”), subject to the transitional arrangements set out in [paragraph 50.2 of this Policy Document];
  - ii. 100% of Total Nominated Approaches RWA,
- where:
- Total Standardised RWA refers to the sum of credit RWA, market RWA, operational RWA, and large exposure risk requirements calculated in accordance with the standardised approaches set out in prevailing policy documents on capital adequacy issued by the Bank in relation to RWA; and
  - Total Nominated Approaches RWA refers to the sum of credit RWA, market RWA, operational RWA, and large exposure risk requirements calculated in accordance with the approaches which the financial institution has been approved to adopt, as set out in prevailing policy documents on capital adequacy issued by the Bank in relation to RWA;
- (c) where applicable, the sum of the credit and market RWAs in paragraph 9.2(b)(i) and (ii) shall be further adjusted for investment accounts which are recognised as risk absorbent in accordance with the requirements as set out in the policy document on *Investment Account*<sup>8</sup>;

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<sup>8</sup> For the avoidance of doubt, any committed but unfunded investment accounts (where actual cash has yet to be received from the investment account holder) shall not qualify as risk absorbent.

**Question 2:**

To reduce excessive variability of RWA and to enhance the comparability of risk-based capital ratios, the Bank is proposing to implement the Basel III requirement of an output floor that is applied to total RWA. The output floor ensures that financial institutions' capital requirements do not fall below a certain percentage of capital requirements derived under standardised approaches.

For the purposes of industry consultation, the Bank would like to solicit views on the application of the output floor as set out in paragraphs 6.1 and 50.2. Upon finalisation, the requirements on the output floor will be inserted into the relevant sections of the CAF CC PD and CAFIB CC PD.

- (a) Which portfolios or business segments are expected to be the top contributors (in terms of impact on your financial institution) arising from the implementation of the output floor? Please provide an estimate of the contributions for each of these portfolios or business segments, along with any relevant commentary.
- (b) Does your financial institution foresee the need to change business strategy or operations arising from the implementation of the output floor? Please provide details on planned actions to be undertaken, where relevant.
- (c) Does your financial institution have any comments on the design and calculation of the output floor, including its transitional arrangements? Please provide supporting data and evidence to support your comments, where relevant.

## PART C ASSET CLASS DEFINITIONS

### 7 Categorisation of exposures

- S** 7.1 A financial institution shall categorise all banking book exposures into one of the following asset classes:
- (a) corporate;
  - (b) sovereign;
  - (c) bank;
  - (d) retail; or
  - (e) equity.
- S** 7.2 A financial institution shall further categorise exposures in the corporate and retail asset classes into prescribed sub-asset classes, where relevant.

### 8 Definition of corporate exposures

- S** 8.1 A corporate exposure shall be a debt obligation (e.g. financing, bonds/*sukuk*, receivables) of a corporation, partnership, proprietorship, or other entity with similar characteristics (e.g. associations, trusts, funds), except those which are categorised elsewhere.
- S** 8.2 A financial institution shall further classify corporate exposures into the following sub-asset classes:
- (a) general corporate;
  - (b) large corporate;
  - (c) corporate small and medium-sized enterprise (SME);
  - (d) non-bank financial institution; or
  - (e) SF.
- S** 8.3 A general corporate exposure shall be a corporate exposure that is not a:
- (a) large corporate exposure;
  - (b) corporate SME exposure;
  - (c) non-bank financial institution exposure; or
  - (d) SF exposure.
- S** 8.4 A large corporate exposure shall be a non-SF exposure to a corporate with total annual revenues exceeding RM2.5 billion. When computing total annual revenues, a financial institution shall base the figures used on either the average amounts calculated over the prior three years, or the latest amounts updated every three years by the financial institution.
- S** 8.5 A corporate SME exposure shall be a non-SF exposure to a corporate with total annual sales of up to RM250 million. For the avoidance of doubt, a corporate SME shall exclude an SME in the retail asset class as referred to in paragraph 11.1(c). Where the total sales is not a meaningful indicator of an SME's size, the financial institution may, subject to the Bank's prior written approval, use total assets of the consolidated group of the SME borrower *in lieu* of total sales.

- S** 8.6 In calculating the total annual revenue and sales for the purposes of paragraphs 8.4 and 8.5, a financial institution shall use figures reported in the financial statements of the corporate, or for a corporate that is part of a consolidated group, the financial statements of the consolidated group<sup>9</sup>.
- S** 8.7 A non-bank financial institution exposure shall be a non-SF exposure to any entity engaged in financial services which does not fall under the category of a bank exposure, as defined in paragraph 10. This may include exposures to entities which are engaged substantively in, or which are acquiring holdings in other entities engaged substantively in, any of the following activities:
- (a) insurance/takaful;
  - (b) provision of credit;
  - (c) securities broking;
  - (d) fund management;
  - (e) asset management; or
  - (f) leasing and factoring.
- S** 8.8 A financial institution shall categorise a corporate exposure as an SF exposure if it exhibits all of the following characteristics, in legal form or economic substance:
- (a) the exposure is to an entity, often a special purpose vehicle (SPV), established specifically to finance and/or operate physical assets;
  - (b) the borrowing entity possesses little or no other material assets or activities, resulting in minimal independent capacity to repay the obligation, apart from the income derived from the asset(s) being financed;
  - (c) the terms of the obligation confer upon the financial institution a substantial degree of control over the asset(s) and the income that it generates; and
  - (d) the primary source of repayment of the obligation is the income produced by the asset(s), rather than the independent capacity of a broader commercial enterprise.
- S** 8.9 A financial institution shall further classify SF exposures as stipulated in paragraph 8.8 into the following sub-classes:
- (a) project finance;
  - (b) object finance;
  - (c) commodities finance;
  - (d) income-producing real estate financing; or
  - (e) high-volatility commercial real estate financing.

### **Project finance**

- S** 8.10 Project finance (PF) shall be a method of funding in which a financier(s) primarily relies on the revenues generated by a single project as both the source of repayment and the security for the exposure.

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<sup>9</sup> Audited financial statements shall be referred to where relevant laws or regulations require that the financial statements of such corporates be audited.

- G** 8.11 In assessing whether an SF exposure is a PF exposure, a financial institution may consider the following:
- (a) PF exposures are typically associated with financing for the construction of large, complex, and capital-intensive installations, or the refinancing of such existing installations (with or without improvements). These may include, but are not limited to power plants, chemical processing facilities, mines, transportation, infrastructure, environmental projects, and telecommunications infrastructure;
  - (b) financiers of PF are usually paid solely or almost exclusively from the money generated by the contracts for the facility's output;
  - (c) the borrower is usually an SPV that is not permitted to perform any function other than those related to the development, ownership and operation of the installation; and
  - (d) the repayment of the PF exposure depends primarily on the project's cash flow and the collateral value of the project's assets.

### **Object finance**

- S** 8.12 Object finance (OF) shall be a method of funding the acquisition of physical assets (e.g. ships, aircraft, satellites, railcars, or fleets) where the repayment of the exposure is dependent on the cash flows generated by the specific assets that have been financed, pledged or assigned to the financier(s).
- G** 8.13 Repayment of an OF exposure is typically derived primarily from cash flows from rental or lease contracts with one or several third parties. In this regard, an OF exposure should be contrasted against a collateralised corporate exposure, where a borrower's financial condition and debt servicing capacity generally enables it to repay the exposure without undue reliance on the specifically pledged assets.

### **Commodities finance**

- S** 8.14 Commodities finance (CF) shall be a structured short-term funding aimed at financing reserves, inventories, or receivables of exchange-traded commodities (e.g. crude oil, metals or crops) where the exposure is repaid from the proceeds of the sale of the commodity and the borrower has no independent capacity<sup>10</sup> to repay the exposure.
- G** 8.15 In determining whether an SF exposure should be deemed as a CF exposure, a financial institution may consider whether the structure of the financing is designed to address the weak credit quality of the borrower. A CF exposure's rating is expected to reflect its self-liquidating nature and the financial institution's expertise in structuring the transaction rather than the credit quality of the borrower.

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<sup>10</sup> This is the case when the borrower has no other activities or material assets on its balance sheet.

### Income-producing real estate financing

- S** 8.16 Income-producing real estate financing (IPRE) shall be a method of funding real estate assets (e.g. office buildings for lease, retail spaces, multi-family residential buildings, industrial or warehouse facilities, hotels) where the prospects for repayment and recovery on the exposure primarily depends on the cash flows generated by the asset (e.g. lease or rental payments).
- G** 8.17 In assessing whether an SF exposure is an IPRE exposure, a financial institution may consider that a distinguishing characteristic of IPRE is the strong positive correlation between the prospects for repayment of the exposure and the prospects for recovery in the event of default, with both being fundamentally linked to the cash flows generated by the property.

### High-volatility commercial real estate financing

- S** 8.18 High-volatility commercial real estate financing (HVCRE) shall be the financing of commercial real estate that exhibits higher loss rate volatility (i.e. greater asset correlation) compared to other types of SF.
- S** 8.19 HVCRE exposures shall include:
- (a) commercial real estate exposures secured by properties as may be specified by the Bank as sharing higher volatilities in portfolio default rates;
  - (b) financing of any of the land acquisition, development, and construction (ADC) phases for HVCRE properties; and
  - (c) financing of ADC for any other properties where, unless the borrower has substantial equity at risk, the source of repayment at origination is either:
    - (i) the future uncertain sale of the property; or
    - (ii) cash flows whose source of repayment is substantially uncertain<sup>11</sup>.

## 9 Definition of sovereign exposures

- S** 9.1 A sovereign exposure shall be an exposure to any of the following counterparties:
- (a) sovereigns and their central banks<sup>12</sup>;
  - (b) PSEs that meet the criteria set out in paragraph 16.2 of the SACR PD;
  - (c) multilateral development banks (MDBs) subject to a 0% risk weight as listed in paragraph 17.1 of the SACR PD; and
  - (d) the Bank for International Settlements, the International Monetary Fund, the European Central Bank, the European Union, the European Stability Mechanism and the European Financial Stability Facility.

<sup>11</sup> For example, the property has not yet been leased to the occupancy rate prevailing in that geographic market for that type of commercial real estate. This would include circumstances where only the booking fees have been obtained, instead of the signing of sales and purchase agreements or rental/lease agreements which would cause this exposure to be classified as IPRE.

<sup>12</sup> In the case of the Bank, this includes securities issued through SPVs established by the Bank.

**10 Definition of bank exposures**

- S** 10.1 A bank exposure shall be a claim on:
- (a) any financial entity that is licensed to take deposits from the public and is subject to appropriate prudential standards and supervision. This includes exposures in the form of financing or senior debt instruments but excludes subordinated debts and equities that are recognised as regulatory capital instruments as specified in paragraph 21 of the SACR PD;
  - (b) domestic PSEs that are eligible for 20% risk weight pursuant to paragraph 16.1 of the SACR PD; or
  - (c) an MDB that is not eligible for a 0% risk weight pursuant to paragraph 17.1 of the SACR PD.
- S** 10.2 For the avoidance of doubt, paragraph 10.1(a) shall include financial institutions (including financial holding companies engaged predominantly in banking or Islamic banking business) and prescribed institutions under the Development Financial Institutions Act 2002 (“prescribed DFIs”).

**11 Definition of retail exposures**

- S** 11.1 A retail exposure shall be an exposure to any of the following customers, subject to meeting the conditions set out in paragraph 11.2:
- (a) an individual;
  - (b) a regulated association or cooperative of individuals that exists solely to grant its members the use of a primary residence, only applicable for residential mortgage exposures; or
  - (c) an SME<sup>13</sup>.
- S** 11.2 A financial institution shall only deem an exposure to a customer set out in paragraph 11.1 as a retail exposure if it meets the following conditions:
- (a) the exposure is one of a large pool of exposures, which are managed by the financial institution on a pooled basis; and
  - (b) in the case of an exposure to an SME:
    - (i) the banking group’s total exposure to the SME (on a consolidated basis) is less than RM5 million<sup>14</sup>;
    - (ii) the SME exposure is treated consistently over time, and in the same manner as other retail exposures in the financial institution’s internal risk management system;
    - (iii) the exposure is originated in a similar manner as other retail exposures; and
    - (iv) the exposure is managed as part of a portfolio segment or pool of exposures with similar risk characteristics, and not

<sup>13</sup> While the definition of an SME may vary from jurisdiction to jurisdiction, for purposes of this Policy Document, an SME in the context of Malaysia shall be a micro-, small- or medium-sized SME, as defined by the SME Corporation Malaysia.

<sup>14</sup> SME financing extended through or guaranteed by an individual are subject to the same exposure threshold.

individually<sup>15</sup> in a manner comparable to corporate exposures, for the purposes of risk assessment and quantification.

- S** 11.3 A financial institution shall further classify retail exposures as stipulated in paragraphs 11.1 and 11.2 into one of the following sub-asset classes:
- (a) residential mortgage exposures, as defined in paragraph 11.4;
  - (b) qualifying revolving retail exposures (QRRE), as defined in paragraph 11.5; or
  - (c) other retail exposures.
- S** 11.4 A residential mortgage exposure shall be an exposure where:
- (a) the borrower is an individual, or a regulated association or cooperative of individuals that exists solely to grant its members the use of a primary residence;
  - (b) the property being financed is a residential property which is zoned for single-family homes, multi-family apartments, townhouses and condominiums and shall exclude shop houses;
  - (c) the property has been completed; and
  - (d) the mortgage is secured by first and subsequent legal charges, deeds of assignment or strata titles on the property.
- S** 11.5 A QRRE exposure shall be a retail exposure that meets all of the following criteria:
- (a) the exposure is revolving<sup>16</sup>, unsecured, and uncommitted (both contractually and in practice);
  - (b) the exposure is to an individual;
  - (c) the banking group's maximum exposure to a single individual in the sub-portfolio is RM500,000;
  - (d) the exposure is part of a pool of exposures that is demonstrated to collectively exhibit low volatility of loss rates, relative to the average level of loss rates, especially within low probability of default (PD) bands<sup>17</sup>;
  - (e) the financial institution retains data on loss rates to allow analysis of the volatility of loss rates; and
  - (f) the treatment of such an exposure as QRRE is consistent with the underlying risk of characteristics of the sub-portfolio.

These criteria shall be applied at a sub-portfolio level consistent with the financial institution's segmentation of its retail activities generally. Segmentation at the national or country level (or below) shall be the general rule.

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<sup>15</sup> This does not preclude retail exposures from being treated individually at some stages of the risk management process. The fact that an exposure is rated individually does not by itself disqualify it from being classified as a retail exposure.

<sup>16</sup> For the purposes of this paragraph, revolving exposures are defined as exposures where a customer's outstanding balances are permitted to fluctuate based on their decision to borrow and repay, up to a limit established by the financial institution.

<sup>17</sup> This is because the asset correlation assumptions for the QRRE risk weight function are markedly below those for the "Other Retail" risk weight function at low PD values.

- S** 11.6 A financial institution shall further classify QRRE exposures into:
- (a) QRRE Transactors, which are QRRE exposures where:
    - (i) in the case of credit facilities such as credit cards and charge cards, the obligor has repaid in full the balance at each scheduled repayment date for the previous 12 months; or
    - (ii) in the case of overdraft facilities, the obligor has not drawn down on the facility over the previous 12 months; and
  - (b) QRRE Revolvers, which are all other QRRE exposures that are not QRRE Transactors (including QRRE exposures with less than 12 months of repayment history).
- S** 11.7 An “other retail” exposure shall be any other retail exposure that is not a residential mortgage exposure or a QRRE exposure.

## **12 Definition of equity exposures**

- S** 12.1 An equity exposure shall be as defined in paragraphs 21.1 to 21.3 of the SACR PD.

## **13 Definition of purchased receivables**

- S** 13.1 Within the retail and corporate asset classes, a financial institution shall further categorise purchased receivables exposures into one of the two following sub-asset classes:
- (a) purchased retail receivables; or
  - (b) purchased corporate receivables.
- S** 13.2 A purchased receivable shall be an exposure from refinancing, factoring or discounting facilities granted by a financial institution based on the security of the debt/financing agreements assigned from the original financier/seller, regardless of whether the facilities are with recourse to the seller or otherwise.
- S** 13.3 A financial institution shall exclude transactions for financing originated by one financial institution and subsequently bought by another financial institution to hold on its books, from the category of purchased receivables.

## PART D DETERMINATION OF CAPITAL REQUIREMENTS

### 14 Available approaches by asset class

- S** 14.1 Subject to meeting the relevant qualifying criteria, a financial institution shall apply the relevant approach in determining capital requirements for credit risk for each asset class defined in Part C as follows:

Asset class		Available approaches
Corporate	General corporate and corporate SME (including purchased corporate receivables)	F-IRB or A-IRB
	Large corporate (including purchased corporate receivables)	F-IRB only
	Non-bank financial institution	F-IRB only
	SF	F-IRB, A-IRB, or SSA
Sovereign		F-IRB or A-IRB
Bank		F-IRB only
Retail (including purchased retail receivables)		A-IRB only
Equity		Standardised Approach only <sup>18</sup>

where:

- Foundation approach (F-IRB) – where, as set out in Part E, a financial institution determines the relevant risk weight of an exposure based on its own internal estimates of PD associated with each borrower grade,

<sup>18</sup> For the avoidance of doubt, the IRB approach for the equity asset class is no longer permitted.

and uses supervisory estimates prescribed by the Bank for the other risk components (LGD, EAD, and M<sup>19</sup>).

- Advanced approach (A-IRB) – where, as set out in Part E, a financial institution, subject to meeting relevant minimum requirements, determines the relevant risk weight of an exposure based on its own internal estimates of PD, LGD, EAD and M<sup>20</sup>.
- Supervisory Slotting Approach (SSA) – where a financial institution applies the treatment as set out in Part F in respect of exposures to the five sub-classes of SF.
- Standardised Approach – where a financial institution applies the treatment set out in the SACR PD.
- Other – where a financial institution applies the treatment as set out in paragraphs 14.13 and 14.14.

### **Equity exposures and equity investments in funds**

- S** 14.2 A financial institution shall apply the treatment set out in paragraph 21.4 of the SACR PD for equity exposures, except for equity investments in funds (including investment account placements with Islamic banks), which shall be subject to the treatment set out in paragraph 29.1 of the SACR PD.

### **Specialised financing**

- S** 14.3 A financial institution shall adopt either one of the following approaches for SF exposures under the corporate asset class:
- (a) the A-IRB approach to derive risk weights for SF exposures if it meets all relevant requirements for the estimation of PD, LGD and EAD; or
  - (b) the F-IRB approach to derive risk weights for SF exposures if it meets all relevant requirements for the estimation of PD.
- S** 14.4 A financial institution that does not meet the requirements for the A-IRB or F-IRB approach for its SF exposures shall apply the SSA, as outlined in Part F.
- G** 14.5 A financial institution may use the SSA for selected SF sub-classes if there are data limitations preventing said sub-classes from being modelled adequately, while using the A-IRB or F-IRB approaches for other SF sub-classes within the corporate asset class.
- S** 14.6 In relation to paragraph 14.3, where the HVCRE sub-class can be modelled adequately and the relevant requirements for the estimation of PD, LGD, and EAD are all met, a financial institution may use the A-IRB approach for this exposure only if it has also done so for material IPRE exposures.

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<sup>19</sup> As per paragraph 19.62, the Bank may require a financial institution under the F-IRB to calculate M in accordance with paragraph 19.57.

<sup>20</sup> The Bank may exempt certain domestic exposures from the calculation of M under the A-IRB approach. For the avoidance of doubt, M is calculated only for non-retail exposures.

**Eligible purchased receivables**

- S** 14.7 A financial institution shall estimate the risk weights for purchased receivables in the manner set out in Part G.
- S** 14.8 Two approaches are available to determine the risk weights for purchased receivables:
- (a) under the “top-down” approach, a financial institution applies the F-IRB or A-IRB approach, as the case may be, to determine the risk weight for the receivables pool by using pool level estimates of expected losses (EL).
  - (b) under the “bottom-up” approach, a financial institution applies the F-IRB or A-IRB approach, as the case may be, on individual obligors.
- S** 14.9 A financial institution may apply the top-down approach to calculate the risk weights for a purchased receivable only if the eligibility requirements set out under paragraph 14.10 are met, otherwise the bottom-up approach shall apply.
- S** 14.10 Purchased receivables that meet the following minimum requirements are eligible for the top-down approach (“eligible purchased receivables”):
- (a) purchased retail receivables that meet the relevant requirements set out in Part G and Part I.
  - (b) purchased corporate receivables<sup>21</sup> that meet the relevant requirements set out in Part G and Part I, and also meet the following criteria:
    - (i) determining the risk weight of the underlying corporate exposures under the IRB approach as required under the bottom-up approach would pose undue burden;
    - (ii) the receivables are purchased from unrelated third-party sellers, and are not originated from the financial institution either directly or indirectly;
    - (iii) the receivables are generated on an arm’s-length basis between the seller and the obligor;
    - (iv) the financial institution has a claim on all proceeds from the pool of receivables or a pro-rata interest in the proceeds; and
    - (v) the receivables do not exceed any of the following concentration limits:
      - the size of the purchased corporate receivables pool does not exceed 10% of the financial institution’s Total Capital; and
      - the size of one individual exposure does not exceed 0.2% of the total pool.
- G** 14.11 The top-down approach for eligible corporate receivables is primarily intended for receivables purchased for inclusion in asset-backed securitisation structures. However, subject to the Bank’s prior written approval, a financial institution may

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<sup>21</sup> The presence of full or partial recourse to the seller does not disqualify a financial institution from using the top-down approach, as long as (i) the cash flows from purchased corporate receivables are the primary protection against default risk; and (ii) the financial institution meets the eligibility criteria and operational requirements.

also use the top-down approach for appropriate on-balance sheet exposures that share the same features.

- S** 14.12 In relation to paragraphs 14.8 and 14.10, a financial institution shall apply the F-IRB or A-IRB approach, as the case may be, as follows:
- (a) for purchased retail receivables, the financial institution shall apply the A-IRB approach consistent with the treatment for retail exposures.
  - (b) for purchased corporate receivables, the financial institution shall apply either the F-IRB or A-IRB approach for exposures to individual corporate obligors that are eligible for A-IRB under paragraph 14.1, while applying the F-IRB treatment for exposures to individual corporate obligors that are eligible for the F-IRB treatment.

#### **Other**

- S** 14.13 A financial institution shall apply a 100% risk weight to an exposure for which no treatment is specified under the IRB approach.
- S** 14.14 Notwithstanding paragraph 14.13, a financial institution shall apply a 0% risk weight to such an exposure if it is also subject to a 0% risk weight under the Standardised Approach.
- S** 14.15 In reference to paragraphs 14.13 and 14.14, a financial institution is not required to calculate EL for these exposures.

## PART E RWA FOR CORPORATE, SOVEREIGN, BANK AND RETAIL EXPOSURES

### 15 Overview

- S** 15.1 This Part sets out the requirements on the methods for determining RWA for corporate, sovereign, bank and retail exposures under the A-IRB and F-IRB approaches.
- S** 15.2 For the purposes of deriving RWA for this Part, a financial institution shall input the parameters as defined in paragraphs 19 and 20 into the relevant risk weight functions set out in paragraphs 16 to 18, guided by the following:
- Probability of default (PD) and loss given default (LGD) are measured as decimals
  - Exposure at default (EAD) is measured in ringgit
  - Effective maturity (M) is calculated in years
  - $\ln$  denotes the natural logarithm
  - $N(x)$  denotes the cumulative distribution function for a standard normal random variable<sup>22</sup>
  - $G(z)$  denotes the inverse cumulative distribution function for a standard normal random variable<sup>23</sup>

### 16 RWA for exposures that are in default

- S** 16.1 A financial institution shall calculate RWA for a defaulted exposure as follows:

$$RWA = K \cdot 12.5 \cdot EAD$$

where the capital requirement, K is equal to the greater of zero, and the difference between its LGD<sup>24</sup> and the financial institution's best estimate of expected loss<sup>25</sup>.

### 17 RWA for corporate, sovereign and bank exposures not in default

- S** 17.1 A financial institution shall calculate RWA for a corporate, sovereign or bank exposure that is not in default as follows:

$$RWA = K \cdot 12.5 \cdot EAD$$

where K is the capital requirement as set out in paragraph 17.2.

- S** 17.2 A financial institution shall calculate the capital requirement, K, for a corporate, sovereign or bank exposure as follows<sup>26</sup>:

<sup>22</sup> i.e. the probability that a normal random variable with a mean of zero and variance of one is less than or equal to x.

<sup>23</sup> i.e. the value of x such that  $N(x) = z$ .

<sup>24</sup> As set out in paragraphs 38.1 and 20 of this Policy Document.

<sup>25</sup> As set out in paragraph 38.10 of this Policy Document.

<sup>26</sup> The expression  $\frac{(1+(M-2.5) \cdot b)}{(1-1.5 \cdot b)}$  in the formula is also referred to as the full maturity adjustment.

$$K = \left[ LGD \cdot N \left[ \frac{G(PD)}{\sqrt{(1-R)}} + \sqrt{\frac{R}{1-R}} \cdot G(0.999) \right] - PD \cdot LGD \right] \cdot \frac{(1 + (M - 2.5) \cdot b)}{(1 - 1.5 \cdot b)}$$

where:

$$\text{Correlation, } R = 0.12 \cdot \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} + 0.24 \cdot \left( 1 - \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} \right)$$

$$\text{Maturity adjustment, } b = [0.11852 - 0.05478 \cdot \ln(PD)]^2$$

- S** 17.3 A financial institution shall apply a multiplier of 1.25 to the correlation parameter for exposures to the following financial service providers<sup>27</sup>:
- a regulated<sup>28</sup> financial service provider which is part of a group whose total consolidated assets (i.e. including the parent company and all its subsidiaries) are greater than or equal to RM450 billion based on the most recent audited financial statements; and
  - an unregulated financial service provider, regardless of size,

such that:

$$R_{FI} = 1.25 \cdot \left[ 0.12 \cdot \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} + 0.24 \cdot \left( 1 - \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} \right) \right]$$

- S** 17.4 A financial institution may incorporate a firm-size adjustment for corporate SME exposures, such that correlation, R is:

$$R_{CSME} = 0.12 \cdot \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} + 0.24 \cdot \left( 1 - \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} \right) - 0.04 \cdot \left( 1 - \frac{(S - 25)}{225} \right)$$

where:

- S is expressed as total annual sales in millions of ringgit, and the range of values for S is:

$$RM25 \text{ million} \leq S \leq RM250 \text{ million}$$

- Reported sales of less than RM25 million shall be treated as equivalent to RM25 million, for the purposes of this firm-size adjustment for corporate SME borrowers.

<sup>27</sup> For the purposes of this paragraph, a “financial services provider” is defined as a parent and its subsidiaries where any substantial legal entity in the consolidated group has as its main business the provision of financial services activities. These financial services activities would include, but are not limited to: the management of financial assets, lending, factoring, leasing, provision of credit enhancements, securitisation, investments, financial custody, central counterparty services and proprietary trading.

<sup>28</sup> For the purposes of this paragraph, a “regulated financial services provider” is one which is supervised by a regulator, whether in Malaysia or otherwise, that imposes prudential requirements consistent with international norms.

- S** 17.5 A financial institution adopting the F-IRB or A-IRB approach for the HVCRE sub-class shall modify the correlation parameter as follows:

$$R_{HVCRE} = 0.12 \cdot \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})} + 0.30 \cdot \left(1 - \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})}\right)$$

## 18 RWA for retail exposures not in default

- S** 18.1 A financial institution shall calculate RWA for a retail exposure that is not in default in the following manner:

$$RWA = K \cdot 12.5 \cdot EAD$$

where K is the capital requirement as set out in paragraph 18.2.

- S** 18.2 A financial institution shall calculate the capital requirement, K, for a retail exposure that is not in default in the following manner:

$$K = \left[ LGD \cdot N \left[ \frac{G(PD)}{\sqrt{(1-R)}} + \sqrt{\frac{R}{1-R}} \cdot G(0.999) \right] - PD \cdot LGD \right]$$

where correlation, R, is as set out in paragraph 18.3.

- S** 18.3 In calculating the capital requirement, K, pursuant to paragraph 18.2, a financial institution shall use the values of correlation, R, specified as follows for each retail sub-asset class:

For secured and unsecured portions of a retail residential mortgage exposure,

$$R_{Retail\ Mortgage} = 0.15$$

For a qualifying revolving retail exposure (QRRE),

$$R_{QRRE} = 0.04$$

For other retail exposures,

$$R_{Other\ Retail} = 0.03 \cdot \frac{(1 - e^{-35 \cdot PD})}{(1 - e^{-35})} + 0.16 \cdot \left(1 - \frac{(1 - e^{-35 \cdot PD})}{(1 - e^{-35})}\right)$$

## 19 Risk components for corporate, sovereign and bank exposures

- S** 19.1 A financial institution shall calculate the risk components (PD, LGD, EAD, M) used in the risk weight functions in paragraphs 16 and 17 for corporate, sovereign and bank exposures in the manner set out in paragraph 19.

- S** 19.2 In calculating these risk components, a financial institution shall not recognise credit risk mitigation (CRM) effects under either the F-IRB or A-IRB approaches unless the legal certainty standards set out in paragraph 46.1 of the SACR PD are met.
- S** 19.3 A financial institution shall ensure that the floors that are applicable to the risk components do not apply to direct exposures to sovereigns and any portion of an exposure covered by a sovereign guarantee. For the avoidance of doubt, any part of the exposure that is not covered by the guarantee shall be subject to the relevant floors.

### **Probability of default (PD)**

- S** 19.4 For a corporate, sovereign or bank exposure, PD shall be the one-year PD associated with the internal borrower grade to which that exposure is assigned, as determined in line with minimum requirements for the derivation of PD estimates associated with each internal borrower grade as outlined in paragraphs 37.1 to 37.13.
- S** 19.5 The PD of a borrower assigned with a default grade(s) shall be 100%, consistent with the reference definition of default.
- S** 19.6 With the exception of the sovereign asset class, the PD for each exposure that is used as input into the risk weight formula and the calculation of expected loss shall not be less than 0.05%.

### **Loss given default (LGD)**

- S** 19.7 A financial institution shall provide an estimate of the LGD for each corporate, sovereign and bank exposure, with the approach to be adopted for deriving the LGD estimate dependent on whether the F-IRB or A-IRB approach is adopted.

#### *LGD under F-IRB*

- S** 19.8 Under the F-IRB, a financial institution shall ensure that:
- (a) a senior claim on a sovereign, bank or non-bank financial institution that is not secured by recognised collateral is assigned an LGD of 45%;
  - (b) a senior claim on other corporates that is not secured by recognised collateral is assigned an LGD of 40%; and
  - (c) a subordinated claim<sup>29</sup> on a corporate, sovereign or bank is assigned a 75% LGD.
- S** 19.9 Notwithstanding paragraph 19.8, an Islamic banking asset structured in a manner similar to debt using a *musharakah* or *mudarabah* contract shall be assigned an LGD of 90%.
- S** 19.10 Under the F-IRB approach, a financial institution shall, in order to recognise eligible financial collateral under the comprehensive approach set out in

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<sup>29</sup> A subordinated claim is a facility that is expressly subordinated to another facility.

paragraph 49 of the SACR PD, meet the operational standards set out in paragraphs 45 and 46 of the SACR PD.

**S** 19.11 Under the F-IRB approach, a financial institution shall, in order to recognise other forms of collateral (“eligible IRB collateral”) which include receivables, specified commercial and residential real estate, and other physical collateral, meet the minimum requirements set out in paragraphs 45.1 to 46.2.

**S** 19.12 The LGD applicable to a collateralised transaction (LGD\*) shall be calculated as the exposure weighted average of the LGD applicable to the unsecured part of an exposure (LGD<sub>U</sub>) and the LGD applicable to the collateralised part of an exposure (LGD<sub>S</sub>), as follows:

$$LGD^* = LGD_U \cdot \frac{E_U}{E \cdot (1 + H_E)} + LGD_S \cdot \frac{E_S}{E \cdot (1 + H_E)}$$

where:

- LGD<sub>U</sub> is the LGD applicable for an unsecured exposure, as set out in paragraph 19.8.
- LGD<sub>S</sub> is the LGD applicable to an exposure secured by the type of collateral used in the transaction, as specified in paragraph 19.14.
- E is the current value of the exposure (i.e. cash lent, or securities lent or posted). In the case of securities lent or posted, the exposure value shall be increased by applying the appropriate haircut (H<sub>E</sub>) according to the comprehensive approach for financial collateral.
- E<sub>U</sub> is the residual value of the exposure that is not covered by a collateral, where  $E_U = E \cdot (1 + H_E) - E_S$ .
- E<sub>S</sub> is the current value of the collateral received after the application of the haircut applicable for the type of collateral (H<sub>C</sub>) and for any currency mismatches between the exposure and the collateral, as specified in paragraphs 19.14 and 19.15. E<sub>S</sub> is capped at the value of  $E \cdot (1 + H_E)$ .

**S** 19.13 For the avoidance of doubt, the terms E<sub>U</sub> and E<sub>S</sub> in paragraph 19.12 shall only be used to calculate LGD\*. A financial institution shall continue to calculate EAD without taking into account the presence of any collateral, unless otherwise specified.

**S** 19.14 A financial institution shall use the following LGDs and haircuts applicable in the formula for LGD\* set out in paragraph 19.12:

Type of collateral	LGD <sub>S</sub>	Haircut
Eligible financial collateral	0%	Haircuts as set out in paragraph 49.33 of the SACR PD.  The haircuts shall be adjusted for different holding periods and non-daily re-margining or revaluation according to paragraphs 49.37 to 49.41 of the SACR PD.

Eligible receivables	20%	40%
Eligible residential real estate or commercial real estate	20%	40%
Other eligible physical collateral	25%	40%
Ineligible collateral	Not applicable	100%

- S** 19.15 When eligible collateral is denominated in a currency which is different to that of the exposure, the haircut for currency risk shall be the same haircut set out in the comprehensive approach in paragraph 49.33 of the SACR PD.
- S** 19.16 A financial institution that lends securities or posts collateral shall calculate capital requirements for both:
- the credit risk or market risk of the securities, if this remains with the financial institution; and
  - the counterparty credit risk arising from the risk that the borrower of the securities may default.

Paragraphs 19.53 and 19.54 set out the calculation of EAD arising from transactions that give rise to counterparty credit risk. For such transactions, the LGD of the counterparty shall be determined by the financial institution using the LGD specified for unsecured exposures, as set out in paragraph 19.8.

- S** 19.17 Where a financial institution has obtained multiple types of collateral, the financial institution shall recognise each individual type of collateral sequentially in the computation of LGD\*. After each sequential step of recognising one individual type of collateral, the financial institution shall reduce the remaining value of the unsecured exposure ( $E_U$ ) by the adjusted value of the collateral ( $E_S$ ) recognised in that step:

$$LGD^* = LGD_U \cdot \frac{E_U}{E \cdot (1 + H_E)} + \sum_i LGD_{Si} \cdot \frac{E_{Si}}{E \cdot (1 + H_E)}$$

where for each collateral type i:

- $LGD_{Si}$  is the LGD applicable to that form of collateral i (as specified in paragraph 19.14);

- $E_{si}$  is the current value of the collateral  $i$  received after the application of the haircut applicable for the type of collateral ( $H_c$ ) (as specified in paragraph 19.14);
- the other parameters are as set out in paragraph 19.12,

and the total of  $E_s$  across all collateral types is capped at the value of  $E \cdot (1 + H_E)$ .

#### LGD under A-IRB

- S** 19.18 A financial institution shall meet the requirements in paragraphs 19.19 to 19.21 and obtain the Bank's prior written approval in order to use its own internal estimates of LGD for corporate and sovereign exposures. LGD shall be the loss given default measured as a percentage of the EAD. A financial institution eligible for the IRB approach that is unable to meet these additional minimum requirements shall utilise the F-IRB LGD treatment described in paragraphs 19.8 to 19.17.
- S** 19.19 The LGDs for each corporate exposure that is used as input into the risk weight formula and the calculation of EL shall be subject to the relevant floors specified in the table below:

<b>LGD parameter floors for corporate exposures</b>	
<b>Unsecured</b>	<b>Secured</b>
25%	Varying by type of collateral: <ul style="list-style-type: none"> <li>• 0% for financial collateral</li> <li>• 10% for receivables</li> <li>• 10% for commercial or residential real estate</li> <li>• 15% for other physical collateral</li> </ul>

- S** 19.20 The LGD floors for secured exposures in the table in paragraph 19.19 shall apply when the exposure is fully secured (i.e. the value of collateral after the application of haircuts exceeds the value of the exposure). A financial institution shall calculate the LGD floor for a partially secured exposure as the weighted average of the unsecured LGD floor for the unsecured portion and the secured LGD floor for the secured portion. That is, the following formula shall be used to determine the LGD floor:

$$Floor = LGD_{U\_floor} \cdot \frac{E_U}{E \cdot (1 + H_E)} + LGD_{S\_floor} \cdot \frac{E_S}{E \cdot (1 + H_E)}$$

where:

- $LGD_{U\_floor}$  and  $LGD_{S\_floor}$  are the floor values for fully unsecured and fully secured exposures respectively, as specified in the table in paragraph 19.19; and
- the other terms are as defined in paragraphs 19.12 and 19.14.

- S** 19.21 Where multiple types of collateral are held against an exposure, the modified formula laid out in paragraph 19.17 shall be applied in determining the LGD floor for A-IRB corporate exposures in line with paragraphs 19.19 and 19.20.
- S** 19.22 In cases where a financial institution has met the conditions to use its own internal estimates of LGD for a pool of unsecured exposures, and takes collateral against one of these exposures, the financial institution may face challenges in modelling the effects of the collateral (i.e. insufficient data to model the effect of the collateral on recoveries). In such cases, the financial institution may apply the formula set out in paragraphs 19.12 to 19.17 with the exception that the LGD<sub>U</sub> term would be the financial institution's own internal estimate of the unsecured LGD. To adopt this treatment, the collateral shall be eligible under the F-IRB approach and the financial institution's estimate of LGD<sub>U</sub> shall not take account of any effects of collateral recoveries.

*Treatment of certain repo-style transactions*

- S** 19.23 Where a financial institution intends to recognise the effects of master netting arrangements on repo-style transactions, the financial institution shall apply the methodology outlined in paragraphs 19.53 to 19.54 when determining E\* for use as the EAD in the calculation of counterparty credit risk for capital purposes.
- S** 19.24 In relation to paragraph 19.23, a financial institution recognising the effects of master netting arrangements under the A-IRB approach may use its own LGD estimates for the unsecured equivalent amount (E\*) used to calculate counterparty credit risk.
- S** 19.25 In addition to counterparty credit risk, a financial institution shall calculate the capital requirements for any credit or market risk to which the financial institution remains exposed to arising from the underlying securities in the master netting agreement.

*Treatment of guarantees and credit derivatives*

- S** 19.26 A financial institution shall not reflect the effects of double default<sup>30</sup> when recognising the effects of CRM. As such, the adjusted risk weight after recognising the effects of CRM shall not be less than that of a comparable direct exposure to the protection provider.
- G** 19.27 A financial institution may choose not to recognise credit protection if it leads to higher capital requirements.

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<sup>30</sup> Refer to paragraph 40.6.

*F-IRB: Treatment of guarantees and credit derivatives*

- S** 19.28 Unless otherwise stated, a financial institution under the F-IRB approach using supervisory LGD shall be subject to the same requirements under paragraphs 51.1 to 51.5 of the SACR PD<sup>31</sup> for the recognition of guarantees and credit derivatives.
- S** 19.29 In addition to recognising the range of eligible guarantors as set out in the SACR PD, a financial institution adopting the F-IRB approach may recognise a corporate that is internally rated and associated with a PD equivalent to a BBB-rating<sup>32</sup> or better.
- S** 19.30 A financial institution shall recognise eligible guarantees from eligible guarantors in the manner laid out as follows<sup>33</sup>:
- (a) for the covered portion of the exposure, the risk weight shall be derived by taking:
    - (i) the risk weight function appropriate to the type of guarantor; and
    - (ii) the PD appropriate to the guarantor's borrower grade;
  - (b) the financial institution may replace the LGD of the underlying transaction with the LGD applicable to the guarantee taking into account seniority and any collateralisation of a guaranteed commitment. For example, when a financial institution has a subordinated claim on the borrower but the guarantee represents a senior claim on the guarantor, this may be reflected by using an LGD applicable for senior exposures (see paragraph 19.8) instead of an LGD applicable for subordinated exposures; and
  - (c) where the financial institution applies the Standardised Approach to direct exposures to the guarantor, the financial institution shall only recognise the guarantee by applying the Standardised Approach to the covered portion of the exposure.
- S** 19.31 A financial institution shall assign the risk weight associated with the obligor to the uncovered portion of the exposure.
- S** 19.32 Any amount for which the financial institution will not be compensated for in the event of loss shall be recognised as retained first loss positions and risk-weighted at 1250% by the financial institution purchasing the credit protection.
- S** 19.33 Where partial coverage exists, or where there is a currency mismatch between the underlying obligation and the credit protection, a financial institution shall split the exposure into a covered and an uncovered amount. The financial institution shall apply the same requirements as those stipulated in paragraphs 51.12 to 51.14 of the SACR PD, depending on whether the cover is proportional or tranchéd.

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<sup>31</sup> The remaining requirements on the approach to guarantees and credit derivatives, as outlined in paragraphs 51.6 to 51.18 of the SACR PD, shall continue to apply unless otherwise specified.

<sup>32</sup> This may be done by mapping the internal rating and associated PD of the protection provider to the financial institution's PD masterscale to ascertain that it approximates a rating of BBB- or better by an eligible external credit assessment institution (ECAI).

<sup>33</sup> As opposed to the treatment specified in paragraph 51.11 of the SACR PD.

*A-IRB: Treatment of guarantees and credit derivatives*

- S** 19.34 Where a financial institution using the A-IRB approach recognises the risk-mitigating effects of guarantees and credit derivatives, the financial institution shall ensure the risk mitigating effect is reflected in a consistent manner for a given guarantee or credit derivative type, either in its PD or LGD estimates.
- S** 19.35 In relation to paragraph 19.34, a financial institution shall not reflect the effect of double default in its PD or LGD adjustments. The financial institution shall ensure the adjusted risk weight is not less than that of a comparable direct exposure to the protection provider.
- S** 19.36 Where a financial institution applies the Standardised Approach to direct exposures to the guarantor, the financial institution shall only recognise the guarantee by applying the Standardised Approach to the covered portion of the exposure.
- S** 19.37 Where a financial institution applies the F-IRB approach to direct exposures to the guarantor, the financial institution shall only recognise the guarantee by determining the risk weight for the comparable direct exposure to the guarantor according to the F-IRB approach for the covered portion of the exposure.
- S** 19.38 A financial institution under the A-IRB approach estimating its own LGD shall:
- (a) employ the F-IRB approach as specified in paragraphs 19.28 to 19.33; or
  - (b) adjust its LGD estimate of the exposure to reflect the effects of guarantee or credit derivative.
- S** 19.39 A financial institution opting to adjust its LGD estimates as set out in paragraph 19.38(b) is not restricted in the range of eligible guarantors, subject to meeting the set of minimum requirements set out in paragraphs 40.10 and 40.11 concerning the type of guarantee.
- S** 19.40 A financial institution shall satisfy the requirements laid out in paragraph 40.17 for the treatment of credit derivatives<sup>34</sup>.
- S** 19.41 Where a financial institution has permission to use its own estimates of LGD, the financial institution shall only recognise the risk mitigating effects of first-to-default credit derivatives, but not those of nth-to-default (e.g. second-to-default) credit derivatives.

**Exposure at default (EAD)**

- S** 19.42 A financial institution shall measure the EAD for each on- and off-balance sheet corporate, sovereign, and bank exposure. In measuring EAD, the financial institution shall ensure that:
- (a) the exposure amount is measured gross of specific provisions or partial write-offs;
  - (b) EAD on drawn amounts is not less than the sum of:

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<sup>34</sup> When credit derivatives do not cover the restructuring of the underlying obligation, the partial recognition set out in paragraph 51.5 of the SACR PD applies.

- (i) the amount by which the financial institution's regulatory capital would be reduced if the exposure were written-off fully; and
    - (ii) any specific provisions and partial write-offs; and
  - (c) EAD for off-balance sheet items include EAD for commitments, as defined in paragraph 26.2 of the SACR PD.
- S** 19.43 In relation to paragraph 19.42, a financial institution shall exclude any discounts<sup>35</sup> in the calculation of the risk-weighted assets.
- S** 19.44 A financial institution shall only be allowed to recognise the on-balance sheet netting of financings and deposits as the basis for determining EAD<sup>36</sup> subject to meeting the conditions set out in paragraphs 50.1 to 50.3 of the SACR PD.
- S** 19.45 A financial institution shall determine the EAD of an off-balance sheet item (with the exception of a derivative) in the following manner:
- (a) under the F-IRB approach, EAD is calculated as the committed but undrawn amount multiplied by a credit conversion factor (CCF); or
  - (b) under the A-IRB approach, EAD for undrawn commitments shall be calculated as the committed but undrawn amount multiplied by a CCF or derived from direct estimates of total facility EAD.
- S** 19.46 Where only the drawn balances of revolving facilities have been securitised, a financial institution shall continue to hold required capital against the undrawn balance associated with those exposures.

#### *EAD under F-IRB*

- S** 19.47 Under the F-IRB approach, a financial institution shall apply the CCFs set out in paragraph 26 of the SACR PD.
- S** 19.48 A financial institution shall determine the EAD of an off-balance sheet exposure by applying the CCFs to the lower of<sup>37</sup>:
- (a) the value of the unused committed credit line; and
  - (b) the value that reflects any possible constraining of the availability of the facility<sup>38</sup>.
- S** 19.49 Where a commitment is obtained on another off-balance sheet exposure, a financial institution under the F-IRB approach shall apply the lower of the applicable CCFs.

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<sup>35</sup> The amount by which an instrument's EAD exceeds the sum of (i) and (ii) in paragraph 19.42(b) of this Policy Document is termed a discount.

<sup>36</sup> Including the circumstance where currency or maturity mismatches exist. The treatment for such exposures is laid out in paragraphs 47 and 48 of the SACR PD.

<sup>37</sup> Only applicable for exposures under the F-IRB approach.

<sup>38</sup> Such as the existence of a ceiling on the potential lending amount which is related to a borrower's reported cash flow. Where a facility is constrained in this manner, a financial institution shall have sufficient line monitoring and management procedures to support this contention. For the avoidance of doubt, monitoring and management procedures that solely rely on the unavailability of documentary evidence (e.g. certifications) is considered insufficient. A financial institution shall also be able to demonstrate that breaches of internal controls or exceptions granted for such facilities in the past, if any, are rare and appropriately justified.

*EAD under A-IRB*

- S** 19.50 In the case of an undrawn revolving commitment<sup>39</sup> to extend credit, purchase assets or issue credit substitutes, a financial institution may use its own estimates of EAD where the A-IRB approach is permitted, subject to:
- (a) meeting the minimum requirements set out in paragraphs 39.1 to 39.22; and
  - (b) the exposure not being subject to a CCF of 100% under the F-IRB approach set out in paragraph 26.4 of the SACR PD.

Where these requirements are not met, the financial institution shall utilise CCFs set out in paragraph 26.4 of the SACR PD.

- S** 19.51 For all other off-balance sheet items (e.g. undrawn non-revolving commitments), a financial institution shall utilise CCFs set out in paragraph 26.4 of the SACR PD.
- S** 19.52 A financial institution shall also ensure that the EAD for each non-sovereign exposure is no less than the sum of:
- (a) the on-balance sheet amount; and
  - (b) 50% of the off-balance sheet exposure using the applicable CCF in paragraph 26.4 of the SACR PD.

*Exposures that give rise to counterparty credit risk*

- S** 19.53 A financial institution shall compute EAD for over-the-counter (OTC) derivatives transactions as follows:
- (a) for an exposure cleared through a central counterparty (CCP), the requirement set out in the Bank's policy document on *Capital Adequacy Framework (Exposures to Central Counterparties)* (CCP PD) applies; and
  - (b) for an exposure not cleared through a CCP, the prevailing counterparty credit risk requirement<sup>40</sup>.
- S** 19.54 For securities financing transactions (SFTs), a financial institution may recognise a reduction in counterparty credit risk arising from the effects of a master netting agreement, providing that it satisfies the criteria set out in paragraph 49.44 to 49.46 of the SACR PD. The financial institution shall calculate E\*, which is the exposure to be used for the counterparty credit risk requirements taking into account collateral received, using the formula set out in paragraph 49.48 of the SACR PD. In calculating the RWA and EL amounts for counterparty credit risk arising from the set of transactions covered by the master netting agreement, E\* shall be used as the EAD of the counterparty.

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<sup>39</sup> A revolving facility is one that lets a borrower obtain a financing where the borrower has the flexibility to decide how often to withdraw from the financing and at what time intervals. A revolving facility allows the borrower to drawdown, repay and re-draw financing advanced to it. Facilities that allow prepayments and subsequent redraws of those prepayments are also considered as revolving.

<sup>40</sup> The Bank plans to issue a policy document on the Standardised Approach for Counterparty Credit Risk, with an exposure draft scheduled for in 2H 2025 to replace the Current Exposure Method (CEM) under the CAF RWA PD.

**Effective maturity (M)**

- S** 19.55 For exposures under the F-IRB approach, a financial institution shall use an effective maturity (M) of 2.5 years for all exposures, except for repo-style transactions which shall be subject to an effective maturity of 0.5 years.
- S** 19.56 Notwithstanding paragraph 19.55, a financial institution intending to internally measure M for an exposure under the F-IRB approach based on the approach set out in paragraph 19.57 shall notify the Bank in writing prior to adopting that approach.
- S** 19.57 For exposures under the A-IRB approach, a financial institution shall measure the M for each facility in the following manner, subject to the cap and floor set out in paragraph 19.58:
- (a) for an instrument subject to a determined cash flow schedule, M shall be determined as:
- $$\text{Effective maturity, } M = \frac{\sum_t t \cdot CF_t}{\sum_t CF_t}$$
- where  $CF_t$  denotes the cash flows (principal, interest payments and fees) contractually payable by the borrower in period  $t$ .
- Where exposures are sufficiently homogenous, a financial institution may estimate M on a pooled basis;
- (b) where a financial institution is unable to calculate M using the formula set out in (a), M shall be the maximum remaining time that the borrower is permitted to take to fully discharge its contractual obligations (i.e. principal, interest, and fees) under the financing agreement<sup>41</sup>;
- (c) for a derivative exposure subject to a master netting agreement, M shall be the weighted average maturity of the transactions (weighted using the notional amount of each transaction) within the netting agreement; and
- (d) for a revolving exposure, M shall be the maximum contractual termination date of the facility (i.e. not the repayment date of the current drawing).
- S** 19.58 The effective maturity, M determined in paragraph 19.57 shall be subject to a floor of one year and a cap of five years (i.e.  $1 \leq M \leq 5$ ), except for the following exposures:
- (a) fully (or nearly-fully) collateralised capital market-driven transactions (i.e. OTC derivatives, margin lending) and repo-style transactions (i.e. repos/reverse repos and securities lending/borrowing) with original maturities of less than one year, and where the documentation of such transactions contain daily re-margining and daily revaluation clauses as well as provisions that allow for prompt liquidation or setoff of collateral in the event of default or failure to re-margin;
- (b) short-term self-liquidating trade finance transactions. Import and export letters of credit and similar transactions shall be accounted for at their actual remaining maturity; and

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<sup>41</sup> Normally, this will correspond to the nominal maturity of the instrument.

- (c) issued as well as confirmed letters of credit that are short-term (i.e. have a maturity below one year) and are self-liquidating.
- S** 19.59 For exposures within the scope of paragraph 19.58(a), M shall be the greater of the actual maturity of the transaction, or one day. For a transaction falling within the scope of paragraph 19.58(a) subject to a master netting agreement, the financial institution shall instead calculate M as the weighted<sup>42</sup> average maturity of the transactions and apply a floor equal to the minimum holding period for the transaction type set out in paragraph 49.38 of the SACR PD. Where the master netting agreement contains more than one transaction type, the financial institution shall apply a floor equal to the longest holding period.
- S** 19.60 A financial institution may exclude the following short-term exposures (i.e. with an original maturity of less than three months) that are not part of the financial institution's ongoing financing of an obligor from the one-year floor:
- (a) other capital market-driven transactions and repo-style transactions that do not fall within the scope of paragraph 19.58(a);
  - (b) other short-term self-liquidating trade finance transactions that do not fall within the scope of paragraph 19.58(b) or 19.58(c);
  - (c) exposures arising from settling securities purchases and sales, including overdrafts arising from failed securities settlements provided that such overdrafts do not continue for more than a short, fixed number of business days;
  - (d) exposures arising from cash settlements by wire transfer, including overdrafts arising from failed transfers provided that such overdrafts do not continue for more than a short, fixed number of business days;
  - (e) exposures to other financial institutions arising from foreign exchange settlements; and
  - (f) short-term financing and deposits.
- S** 19.61 Where no explicit treatment is defined for the computation of M, M shall be set as 2.5 years, except for repo-style transactions in which case an M of 0.5 years shall apply.
- S** 19.62 Notwithstanding the treatment set out in paragraphs 19.55 to 19.61, where the Bank specifies that a financial institution using the fixed method of M specified in paragraph 19.55 to internally measure M for each facility based on the approach set out in paragraph 19.57, the financial institution shall comply with such specification. Conversely, where the Bank requires a financial institution adopting the approach set out in paragraph 19.57 to use the fixed method of M as prescribed in paragraph 19.55 instead, the financial institution shall comply with such requirement.

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<sup>42</sup> The notional amount of each transaction should be used for weighting maturity.

*Treatment of maturity mismatches*

- S** 19.63 A financial institution shall treat maturity mismatches<sup>43</sup> under the IRB approach in the manner stipulated in paragraph 47 of the SACR PD.

**20 Risk components for retail exposures**

- S** 20.1 A financial institution shall calculate the risk components (PD, LGD, EAD) used in the risk weight functions in Part E for retail exposures in the manner set out in this paragraph 20.
- S** 20.2 In calculating these risk components, a financial institution shall not recognise CRM effects under the A-IRB approach unless the legal certainty standards set out in paragraph 46.1 SACR PD are met.
- S** 20.3 A financial institution shall not apply the floors specified in this paragraph 20 to the portion<sup>44</sup> of exposures covered by a guarantee issued by a sovereign.

**Probability of default (PD) and loss given default (LGD)**

- S** 20.4 In determining the inputs to the risk weight function set out in Part E, a financial institution shall provide an estimate of the PD and LGD for each identified pool of retail exposures, subject to the minimum requirements set out in Part I.
- S** 20.5 A financial institution shall estimate the PD of an identified pool of retail exposures as the greater of:
- the one-year PD associated with the pool's internal borrower grade; and
  - 0.1% for QRRE revolvers, or 0.05% for all other exposures.
- S** 20.6 A financial institution shall ensure the LGD for each identified pool of retail exposures is subject to the relevant floors specified as follows:

<b>LGD parameter floors for retail exposures</b>		
<b>Type of exposure</b>	<b>Unsecured</b>	<b>Secured</b>
Mortgages <sup>45</sup>	Not applicable	5%
QRRE (transactors and revolvers)	50%	Not applicable
Other retail	30%	Varying by type of collateral: <ul style="list-style-type: none"> <li>• 0% for financial collateral</li> <li>• 10% for receivables</li> </ul>

<sup>43</sup> A maturity mismatch happens when the residual maturity of a credit protection arrangement (e.g. hedge) is less than that of the underlying exposure.

<sup>44</sup> For the avoidance of doubt, where the exposure is guaranteed in part by a sovereign, the financial institution shall continue to apply the relevant floors to the portion of the exposure not guaranteed by that sovereign.

<sup>45</sup> The LGD floor for residential mortgages is 5%, regardless of the level of collateral.

		<ul style="list-style-type: none"> <li>• 10% for commercial or residential real estate</li> <li>• 15% for other physical collateral</li> </ul>
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- S** 20.7 A financial institution shall apply the formula set out in paragraph 19.20 when determining the LGD floor applicable for partially secured exposures in the “other retail” category.

*Recognition of guarantees and credit derivatives*

- S** 20.8 A financial institution shall only be allowed to reflect the risk-mitigating effects of guarantees and credit derivatives, either on individual obligations or a pool of exposures, subject to meeting the requirements set out in Part I. These effects shall be reflected through an adjustment of either the PD or LGD estimate.
- S** 20.9 Where a financial institution recognises the risk-mitigating effects of guarantees and credit derivatives, the financial institution shall ensure the risk-mitigating effect is reflected in a consistent manner for a given guarantee or credit derivative type, either in its PD or LGD estimate.
- S** 20.10 Where a financial institution applies the Standardised Approach to direct exposures to a guarantor, the financial institution shall only be allowed to recognise the guarantee by applying the Standardised Approach to the covered portion of the exposure.
- S** 20.11 In reflecting the risk-mitigating effects of guarantees and credit derivatives, a financial institution shall not reflect the effect of double default in its PD or LGD adjustments. The financial institution shall ensure the adjusted risk weight is not less than that of a comparable direct exposure to the protection provider.
- G** 20.12 A financial institution may choose not to recognise credit protection if it leads to higher capital requirements.

**Exposure at default (EAD)**

- S** 20.13 A financial institution shall measure the EAD for each on- and off-balance sheet retail exposure. In measuring EAD, the financial institution shall ensure that:
- (a) EAD is measured gross of specific provisions or partial write-offs;
  - (b) EAD on drawn amounts is not less than the sum of:
    - (i) the amount by which the financial institution’s regulatory capital would be reduced if the exposure were written-off fully; and
    - (ii) any specific provisions and partial write-offs; and
  - (c) EAD for off-balance sheet items include EAD for commitments, as defined in paragraph 26.2 of the SACR PD.

- S** 20.14 In relation to paragraph 20.13, a financial institution shall exclude any discounts<sup>46</sup> in the calculation of RWA.
- S** 20.15 A financial institution shall only be allowed to recognise the on-balance sheet netting of financings and deposits as the basis for determining EAD<sup>47</sup> subject to meeting the conditions set out in paragraphs 50.1 to 50.3 of the SACR PD.
- S** 20.16 A financial institution shall use its own estimates of EAD where the following conditions are met:
- (a) the exposure is an undrawn revolving commitment to extend credit, purchase assets or issue credit substitutes;
  - (b) the exposure is not subject to a CCF of 100% in the F-IRB approach set out in paragraph 26.4 of the SACR PD; and
  - (c) the financial institution meets the minimum requirements for the use of own estimates of EAD.
- S** 20.17 A financial institution shall utilise F-IRB CCFs for all other off-balance sheet items (e.g. undrawn non-revolving commitments), or where the minimum requirements stipulated in paragraphs 39.1 to 39.23 are not met.
- S** 20.18 A financial institution shall ensure that the EAD on retail exposures is not lower than the sum of:
- (a) the on-balance sheet amount; and
  - (b) 50% of the off-balance sheet exposure using the applicable CCF in the Standardised Approach.
- S** 20.19 For retail exposures with uncertain future drawdown such as credit cards, a financial institution shall take into account its history and expectations of additional drawings prior to default in its overall calibration of loss estimates.
- S** 20.20 A financial institution shall reflect the likelihood of additional drawings on undrawn lines prior to default in either its LGD or EAD estimates.
- S** 20.21 Where only the drawn balances of revolving retail facilities have been securitised, a financial institution shall continue to hold required capital against the undrawn balances associated with such exposures.
- S** 20.22 Notwithstanding paragraph 20.16, a financial institution shall apply the method set out in paragraphs 26 and 27 in the SACR PD to calculate foreign exchange and interest or profit rate commitments residing within its retail portfolio for IRB purposes.

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<sup>46</sup> The amount by which an instrument's EAD exceeds the sum of (i) and (ii) in paragraph 20.13(b) of this Policy Document is termed a discount.

<sup>47</sup> Including the circumstance where currency or maturity mismatches exist. The treatment for such exposures is laid out in paragraphs 47 and 48 under Part G: Credit Risk Mitigation of the SACR PD.

## PART F SUPERVISORY SLOTTING APPROACH FOR SPECIALISED FINANCING

### 21 General requirements

- S** 21.1 A financial institution applying the SSA for its SF exposures shall map its internal ratings to the five supervisory categories based on the applicable descriptors in Appendix 4<sup>48</sup>, and in turn, calculate RWA and EL in the manner set out in paragraphs 22 and 23, respectively.

### 22 Calculation of RWA

- S** 22.1 A financial institution shall calculate the RWA for an SF exposure under the SSA in the following manner:

$$RWA = RW \cdot EAD$$

where:

- RW is the relevant risk weight stipulated in paragraph 22 corresponding to the relevant supervisory category; and
  - EAD is as calculated under paragraphs 19.42 to 19.46.
- S** 22.2 Subject to paragraph 22.3, a financial institution shall apply the following risk-weights to determine RWA for PF, OF, CF and IPRE exposures:

Supervisory category	Strong	Good	Satisfactory	Weak	Default
Risk weight	70%	90%	115%	250%	0%

- S** 22.3 A financial institution shall apply the following preferential risk-weights to determine RWA for PF, OF, CF and IPRE exposures under the “strong” and “good” category provided that:
- (a) the exposure has a remaining maturity of less than 2.5 years; or
  - (b) the project construction is completed.

Supervisory category	Strong	Good
Risk weight	50%	70%

- S** 22.4 Commercial ADC financing that are not classified as HVCRE financing based on certainty of repayment or borrower equity as defined in paragraph 8.19 shall

<sup>48</sup> A financial institution should consider the potential impact of climate-related financial risks (e.g. estimations of the future demand, transition risk) and any associated risk mitigations (e.g. taking insurance coverage against physical climate risks) when assigning obligors to individual categories for each subfactor component.

not be eligible for the additional reductions for SF exposures as set out under paragraph 22.3.

- S** 22.5 A financial institution shall apply the following risk weights to determine RWA for HVCRE exposures:

Supervisory category	Strong	Good	Satisfactory	Weak	Default
Risk weight	95%	120%	140%	250%	0%

### 23 Calculation of expected losses (EL)

- S** 23.1 A financial institution shall calculate the EL for an SF exposure under the SSA in the following manner:

$$EL = EAD \cdot RW \cdot 8\%$$

where:

- RW is the relevant risk weight stipulated in paragraph 23 corresponding to the relevant supervisory category; and
- EAD is as calculated under paragraphs 19.42 to 19.46.

- S** 23.2 A financial institution shall apply the following risk weights to determine EL for PF, OF, CF and IPRE exposures:

Supervisory category	Strong	Good	Satisfactory	Weak	Default
Risk weight	5%	10%	35%	100%	625%

- S** 23.3 A financial institution applying the preferential risk weights to determine RWA for PF, OF, CF and IPRE exposures under paragraph 22.3 shall apply the following risk weights to determine EL:

Supervisory category	Strong	Good
Risk weight	0%	5%

- S** 23.4 A financial institution shall apply the following risk weights to determine EL for HVCRE exposures:

Supervisory category	Strong	Good	Satisfactory	Weak	Default
Risk weight	5%	5%	35%	100%	625%

## PART G RWA FOR PURCHASED RECEIVABLES

### 24 General requirements

- S** 24.1 The RWA for a purchased receivable exposure shall be the sum of the exposure's RWA for default risk and RWA for dilution risk, as set out in paragraphs 25 and 26, respectively.

### 25 RWA for default risk

- S** 25.1 For purchased receivables that belong to one asset class, a financial institution shall compute the IRB risk weight for default risk based on the risk weight function applicable to that exposure type, subject to meeting the relevant qualification requirements for that particular risk weight function<sup>49</sup>.
- S** 25.2 For hybrid pools of purchased receivables comprising a mixture of exposure types, a financial institution shall identify and separate the exposures within the pool by exposure type, and apply the relevant IRB risk weight function applicable to that exposure type to compute the IRB risk weight for default risk. Where the financial institution is unable to identify and separate exposures within the pool by exposure type, the financial institution shall use the risk weight function of the exposure types within the pool that results in the highest capital requirement.

#### Default risk for purchased retail receivables

- S** 25.3 A financial institution shall meet the risk quantification standards for retail exposures in order to determine the IRB risk weight for default risk for purchased retail receivables, with the flexibility to use internal or external reference data when estimating PD and LGD for purchased retail receivables.
- S** 25.4 PD, LGD and EL estimates, where applicable, shall be determined by the financial institution on a stand-alone basis, without regard to any assumption of recourse or guarantee from the seller or other parties.
- S** 25.5 A financial institution shall reduce total EAD by the capital charge for dilution prior to the CRM ( $K_{\text{Dilution}}$ ).

#### Default risk for purchased corporate receivables

- S** 25.6 Unless otherwise approved by the Bank, a financial institution shall calculate the risk weight for default risk for purchased corporate receivables using the bottom-up approach, as defined in paragraph 14.8.
- S** 25.7 Under the bottom-up approach, a financial institution shall reduce total EAD by  $K_{\text{Dilution}}$ .

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<sup>49</sup> For example, if a financial institution cannot comply with the standards for QRRE defined in paragraph 11.5, it shall use the risk weight function for other retail exposures.

- S** 25.8 A financial institution shall only calculate the risk weight for default risk for purchased corporate receivables using the top-down approach subject to obtaining prior written approval from the Bank and meeting the conditions specified under paragraph 14.10.
- S** 25.9 Under the top-down approach, a financial institution shall determine the risk weight for default risk of purchased corporate receivables by applying pool-level inputs into the risk weight function for corporate exposures in accordance with the following sequence<sup>50, 51</sup>:
- (a) the financial institution shall first estimate the pool's one-year EL for default risk, expressed as a percentage of the exposure amount<sup>52</sup>. The estimate of the EL of the pool shall be on a stand-alone basis, without regard to any assumption of recourse or guarantees from the seller or other parties; and
  - (b) the financial institution shall then decompose EL into its PD and LGD components where external and internal data may be used to estimate PDs and LGDs.

*F-IRB treatment under the top-down approach for purchased corporate receivables*

- S** 25.10 A financial institution adopting the F-IRB approach for purchased corporate receivables that is able to estimate PD in a reliable manner shall determine the risk weight by applying the estimated PD and the relevant LGD, M, and treatment of guarantees under the F-IRB approach as outlined in paragraphs 19.8 to 19.17, paragraphs 19.23 to 19.33, and paragraph 19.55 respectively, into the corporate risk weight function.
- S** 25.11 A financial institution adopting the F-IRB approach for corporate receivables that is unable to decompose EL into its PD and LGD components in a reliable manner shall determine the risk weight by inputting the following parameters into the corporate risk weight function:

<b>Parameter</b>	<b>Financial institution can demonstrate that exposures are exclusively senior claims to corporate borrowers</b>	<b>Financial institution cannot demonstrate that exposures are exclusively senior claims to corporate borrowers</b>
PD	EL divided by LGD	EL
LGD	40%	100%

<sup>50</sup> The firm-size adjustment for SMEs, as defined in paragraph 17.4, shall be the weighted average by individual exposures of the pool of purchased corporate receivables. If the financial institution lacks the necessary information to determine the average size of the pool, the firm-size adjustment shall not be applied.

<sup>51</sup> A financial institution using the F-IRB approach for its corporate exposures shall not apply the A-IRB approach for purchased corporate receivables.

<sup>52</sup> Refers to the EAD amount to the financial institution by all obligors in the receivables pool.

EAD	<ul style="list-style-type: none"> <li>• For revolving purchase facilities, sum of the current amount of receivables purchased plus 40% of any undrawn purchase commitment less <math>K_{Dilution}</math>.</li> <li>• For all other exposures, outstanding amount less <math>K_{Dilution}</math>.</li> </ul>
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*A-IRB treatment under the top-down approach for purchased corporate receivables*

- S** 25.12 A financial institution adopting the A-IRB approach for purchased corporate receivables shall determine the risk weight using its estimated PD and LGD as inputs to the corporate risk weight function, while applying the following specifications:

Parameter	
EAD	<ul style="list-style-type: none"> <li>• For a revolving purchase facility, the sum of the current amount of receivables purchased plus 40% of any undrawn<sup>53</sup> purchase commitment less <math>K_{Dilution}</math>.</li> <li>• For all other exposures, the outstanding amount less <math>K_{Dilution}</math>.</li> </ul>
M	<ul style="list-style-type: none"> <li>• For drawn purchase commitments, the pool's exposure-weighted average effective maturity as defined in paragraphs 19.55 to 19.62.</li> <li>• For undrawn purchase commitments, either the same value of M for undrawn amounts that meet the specified conditions in paragraph 25.15; or the value based on the calculation specified in paragraph 25.16 if effective protections are not available.</li> </ul>

- S** 25.13 A financial institution that is able to reliably estimate either the pool's default-weighted average loss rate given default consistent with paragraphs 38.1 to 38.5 or average PD shall use such estimates to infer the other parameter based on an estimate of the expected long-run loss rate as follows:
- using an appropriate PD estimate to infer the long-run default-weighted average loss rate given default; or
  - using a long-run default-weighted average loss rate given default to infer the appropriate PD.
- S** 25.14 For the avoidance of doubt, the LGD applied in the IRB capital calculation for purchased receivables shall not be less than the long-run default-weighted average loss rate given default and shall be consistent with the principles outlined in paragraphs 38.1 to 38.5.
- S** 25.15 A financial institution shall apply the same value of M for both drawn and undrawn amounts under a committed purchase facility provided that the facility contains effective covenants, early amortisation triggers, or other protective features that safeguard the financial institution against significant deterioration

<sup>53</sup> For the avoidance of doubt, a financial institution using the A-IRB approach is not permitted to use its internal EAD estimates for undrawn purchase commitments.

in the quality of future receivables that it is required to purchase over the facility's term.

- S** 25.16 In cases where effective protections as referred to in paragraph 25.15 are not present, a financial institution shall calculate M for undrawn amounts as the sum of:
- (a) the longest-dated potential receivable under the purchase agreement; and
  - (b) the remaining maturity of the purchase facility.

## **26 RWA for dilution risk**

- S** 26.1 A financial institution shall calculate the dilution risk for purchased corporate and retail receivables, unless it can demonstrate to the Bank that the dilution<sup>54</sup> risk is immaterial.
- S** 26.2 A financial institution shall determine the RWA for dilution risk by inputting into the corporate risk weight function (regardless as to whether the underlying receivables are corporate or retail exposures) the following parameters:
- (a) PD shall be set equal to the estimated one-year EL for dilution risk, expressed as a percentage of the receivables amount, estimated either at the pool level (top-down approach) or the individual receivables level (bottom-up approach). The estimate shall be calculated on a stand-alone basis under the assumption of no recourse or support from the seller or third-party guarantors using either external or internal data;
  - (b) LGD shall be set at 100%; and
  - (c) an appropriate maturity treatment<sup>55</sup> shall be used.
- S** 26.3 For the avoidance of doubt, the treatment in paragraph 26.2 for dilution risk shall be equally applicable to all purchased receivables exposures regardless of whether the risk weights for default risk are computed using the standard IRB treatments, or the top-down approach for corporate receivables as described in paragraphs 25.9 to 25.16.

## **27 Recognition of credit risk mitigants**

- S** 27.1 A financial institution shall meet the rules set out in paragraphs 19.26 to 19.41<sup>56</sup>, in order to recognise a guarantee for a purchased receivable provided by the seller or a third party as a credit risk mitigant.

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<sup>54</sup> Dilution refers to the possibility that the receivable amount is reduced through cash or non-cash credits to the receivable's obligor. Examples include offsets or allowances arising from returns of goods sold, disputes regarding product quality, possible debts of the borrower to a receivable obligor, and any payment or promotional discounts offered by the borrower (e.g. a credit for cash payments within 30 days).

<sup>55</sup> Where a financial institution can demonstrate that the dilution risk is appropriately monitored and managed to be resolved within one year, the Bank may allow a financial institution to assume a one-year maturity.

<sup>56</sup> A financial institution may recognise guarantors that are internally rated and associated with a PD equivalent to BBB- or better under the F-IRB approach for purposes of determining the capital requirements for dilution risk.

- S** 27.2 A financial institution shall, in order to substitute the risk weight for an exposure with that of the guarantor, observe the following:
- (a) the risk weight of an exposure to the guarantor shall be applied instead of the pool's total risk weight for both default and dilution risk if the guarantee covers both the pool's default risk and dilution risk;
  - (b) the risk weight for an exposure to the guarantor shall be applied instead of the pool's risk weight for the corresponding risk if the guarantee only covers either the default risk or dilution risk. The capital requirement for the other risk component which is not covered by the guarantee shall then be added; and
  - (c) the uncovered portion shall be treated according to the CRM rules for proportional coverage<sup>57</sup> if the guarantee covers only a portion of default or dilution risk.

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<sup>57</sup> The risk weights of the uncovered risk components will be added to the risk weights of the covered risk components.

## PART H TREATMENT OF EXPECTED LOSSES AND PROVISIONS

### 28 General requirements

- S** 28.1 A financial institution using the IRB approach shall compare the total amount of eligible provisions as set out in paragraph 30.1 against the total EL amount calculated based on the IRB approach as set out in paragraph 29.1. Based on the comparison, the financial institution shall:
- (a) where the total EL amount exceeds total eligible provisions, deduct the difference in the calculation of CET1 Capital in accordance with paragraph 25.1 of the CAF CC PD and CAFIB CC PD; or
  - (b) where the total EL amount is less than the total eligible provisions, only recognise the difference via Tier 2 Capital up to a maximum of 0.6% of total credit RWA in accordance with paragraph 14.1(d)(i) of the on CAF CC PD and CAFIB CC PD.
- S** 28.2 For the avoidance of doubt, a financial institution shall not calculate EL for exposures subject to the 100% and 0% risk weight as set out under paragraphs 14.13 and 14.14.
- G** 28.3 For residual exposures where the Standardised Approach to credit risk is applied, a financial institution may include the general provisions<sup>58</sup> attributed to the Standardised Approach set out in paragraph 30.2 in the calculation of Tier 2 Capital.

### 29 Calculation of EL

- S** 29.1 A financial institution shall sum the EL amounts<sup>59</sup> associated with exposures where the IRB approach is applied<sup>60</sup> to arrive at the total EL amount.
- S** 29.2 For corporate, sovereign, bank and retail exposures, a financial institution shall calculate the EL as follows:
- (a) for exposures that are not in default, EL is calculated by multiplying PD with LGD; or
  - (b) for exposures that are in default:
    - (i) under the F-IRB approach, EL is the LGD specified in paragraphs 19.8 to 19.17; or
    - (ii) under the A-IRB approach, EL is the financial institution's best estimate of expected loss as defined in paragraph 38.10.
- S** 29.3 For exposures where the SSA is applied, a financial institution shall calculate the EL in the manner set out in paragraphs 23.1 to 23.4.

<sup>58</sup> General provisions refer to the definition set out in paragraph 5.1 of the SACR PD.

<sup>59</sup> Defined as EL multiplied by EAD.

<sup>60</sup> Excluding the amount associated with securitisation exposures.

**30 Calculation of provisions**

- S** 30.1 A financial institution shall sum all eligible provisions<sup>61, 62</sup> that are attributed to exposures under the IRB approach.
- S** 30.2 Where the Standardised Approach is applied for a portion of the credit risk exposures, a financial institution shall determine the portion of general provisions attributed to the Standardised or IRB treatment of provisions as follows:
- (a) a financial institution shall attribute total general provisions on a pro rata basis according to the proportion of credit RWA subject to the Standardised and IRB approaches; and
  - (b) where an entity within the financial institution uses the Standardised Approach exclusively in determining credit RWA, the general provisions booked within the entity may be attributed to the Standardised Approach.

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<sup>61</sup> This includes, for example all loss allowances as defined under Malaysia Financial Reporting Standard 9 (and regulatory reserves, if any), specific provisions, partial write-offs, portfolio-specific general provisions such as country risk provisions, or general provisions and any discounts as defined in footnotes 35 and 46 on defaulted assets.

<sup>62</sup> Excluding general and specific provisions associated with securitisation exposures.

## PART I MINIMUM REQUIREMENTS TO USE THE IRB APPROACH

### 31 Overview

- G** 31.1 Part I sets out the minimum requirements for financial institutions to use the IRB approach. It sets out the requirements that a financial institution's risk rating system shall fulfil, focusing on the financial institution's ability to rank order and quantify risk in a consistent, reliable and valid manner. The requirements in this Part also embed other key elements of model risk management, including the requirements on rating system operations, governance and oversight, validation and the maintenance of model inventory.
- S** 31.2 A financial institution which either has been approved to adopt an IRB approach or is seeking the Bank's prior written approval to adopt an IRB approach shall ensure that it has in place a comprehensive framework<sup>63</sup> for model implementation that meets the requirements in this Part I at the outset and on an ongoing basis. In line with the objective specified in paragraph 31.1, the financial institution's rating and risk estimation systems and processes shall provide for:
- (a) a meaningful assessment of borrower and transaction characteristics;
  - (b) a meaningful differentiation of risks; and
  - (c) a reasonably accurate and consistent quantitative estimates of risk.
- S** 31.3 A financial institution shall ensure that the systems and processes in place are consistent with the internal use of these estimates.
- S** 31.4 Unless otherwise specified, the minimum requirements set out in this Part I shall apply to all asset classes.
- S** 31.5 For the avoidance of doubt, standards related to the process of assigning exposures to borrower or facility grades (and the related oversight, validation, etc.) shall apply equally to the process of assigning retail exposures to pools of homogenous exposures, unless specified otherwise.
- S** 31.6 Unless otherwise specified, the minimum requirements set out in this Part I shall apply to both F-IRB and A-IRB approaches, including the SSA.
- S** 31.7 A financial institution shall also meet requirements on credit risk management standards, as set out in the policy documents on *Risk Governance* and *Credit Risk*, as well as other relevant policy documents and supervisory communication.
- S** 31.8 In cases where there are differences between the IRB rules and regulations imposed by the Bank and the home regulator, a locally-incorporated foreign financial institution shall adopt and comply with the more stringent rules and regulations.

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<sup>63</sup> The framework shall cover all policies, process and procedures required for the effective implementation of risk rating systems within the financial institution.

- S** 31.9 A financial institution that is not in full compliance with the relevant requirements shall immediately notify the Bank in writing of the fact. Subsequent to the immediate notification of non-compliance to the Bank, the financial institution shall provide a written report, no later than 30 days from the initial notification, explaining the causes and factors leading to the non-compliance and effects of such non-compliance<sup>64</sup>, and a rectification plan for the timely return to full compliance.
- S** 31.10 Based on the Bank's assessment of a notification issued pursuant to paragraph 31.9, the financial institution shall comply with steps as required by the Bank which may include maintaining additional capital under Pillar 2 or any other appropriate supervisory action imposed by the Bank.
- S** 31.11 Where the non-compliance results in material underestimation in the RWA and/or EL amounts for any particular rating system, a financial institution shall quantify a Post Development Model Adjustment (PDMA) as set out in paragraphs 43.1 to 43.7 to offset the impact of the non-compliance in relation to RWA and/or EL amounts.

## **32 Rating system design**

- S** 32.1 A rating system adopted by a financial institution shall encompass all of the methods, processes, controls, and data collection and IT systems that support the assessment of credit risk, the assignment of internal risk ratings, and the quantification of default and loss estimates.
- G** 32.2 A financial institution may utilise multiple rating methodologies or systems within each asset class<sup>65</sup>.
- S** 32.3 Where multiple rating methodologies or systems are employed, a financial institution shall ensure that a borrower is assigned to a rating system in a manner that best reflects the level of the risk of the borrower. The rationale for assigning borrowers to rating systems shall be clearly documented.
- S** 32.4 A financial institution shall not allocate borrowers across rating systems with the objective of minimising regulatory capital requirements<sup>66</sup>.
- S** 32.5 A financial institution shall demonstrate that each rating system used for IRB purposes is in compliance with the minimum requirements at the outset and on an ongoing basis.

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<sup>64</sup> Including demonstrating whether the effect of such non-compliance is temporary and immaterial or otherwise to the financial institution.

<sup>65</sup> For example, a financial institution may have customised rating systems for specific industries or market segments (e.g. middle market, and large corporate).

<sup>66</sup> Also referred to as cherry-picking by choice of rating system.

**Rating dimensions: Standards for corporate, sovereign and bank exposures**

- S** 32.6 A financial institution's rating system for corporate, sovereign and bank exposures shall have two separate and distinct dimensions:
- (a) the risk of borrower default, as described in paragraphs 32.8 and 32.9; and
  - (b) transaction-specific factors, as described in paragraphs 32.10 to 32.12.
- S** 32.7 Notwithstanding paragraph 32.6, a financial institution using the SSA is exempted from the two distinct dimension requirement for SF exposures given the interdependence between borrower and transaction characteristics for such exposures. In such cases, the financial institution shall satisfy the requirement through a single dimension that reflects EL by incorporating both borrower strength (PD) and loss severity (LGD) considerations<sup>67</sup>.
- S** 32.8 A financial institution shall assign separate exposures to the same borrower to the same borrower grade, irrespective of any differences in the nature of each specific transaction, except:
- (a) where country transfer risk is present<sup>68</sup>; or
  - (b) where the treatment of associated guarantees to a facility are reflected.

In either case of sub-paragraphs (a) or (b), separate exposures may result in multiple grades for the same borrower.

- S** 32.9 A financial institution shall articulate in its credit policy:
- (a) the relationship between borrower grades in terms of the level of risk each grade implies, where the perceived and measured risk shall increase as credit quality declines from one grade to the next; and
  - (b) the risk of each grade in terms of both a description of the probability of default risk typical for borrowers assigned the grade and the criteria used to distinguish that level of credit risk.
- S** 32.10 A financial institution's rating system shall reflect transaction-specific factors including but not limited to collateral, seniority and product type.
- S** 32.11 For exposures under the F-IRB approach, the requirement in paragraph 32.10 shall be considered as fulfilled by the existence of a facility dimension, which reflects both borrower and transaction-specific factors<sup>69</sup>. Where a rating dimension reflects EL and does not separately quantify LGD, the financial institution shall use supervisory estimates of LGD.

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<sup>67</sup> For the avoidance of doubt, a financial institution that applies the general corporate F-IRB or A-IRB approach for the SF sub-class is not exempted from the rating dimension requirements.

<sup>68</sup> A financial institution may assign different borrower grades depending on whether the facility is denominated in local or foreign currency.

<sup>69</sup> For example, a rating dimension that reflects EL by incorporating both borrower strength (PD) and loss severity (LGD) considerations would qualify. A rating system that exclusively reflects LGD would also qualify.

- S** 32.12 A financial institution using the A-IRB approach shall ensure that facility ratings exclusively reflect LGD<sup>70</sup>. Borrower characteristics shall only be included as LGD rating criteria to the extent they are predictive of LGD.
- S** 32.13 A financial institution shall only alter the factors that influence facility grades across segments of the portfolio if it has received the Bank's prior written approval. In seeking the Bank's approval for an alteration, the financial institution shall demonstrate that the alteration of factors improves the relevance and precision of estimates.

### **Rating dimensions: Standards for retail exposures**

- S** 32.14 A financial institution shall ensure that its rating systems for retail exposures are oriented to both borrower and transaction risk, and that it captures all relevant borrower and transaction characteristics.
- S** 32.15 A financial institution shall assign each exposure that falls within the definition of retail for IRB purposes into a particular pool.
- S** 32.16 For purposes of paragraph 32.17, a financial institution shall demonstrate that the process of assigning exposure to a particular pool:
- (a) provides for a meaningful differentiation of risk;
  - (b) provides for a grouping of sufficiently homogenous exposures; and
  - (c) allows for accurate and consistent estimation of loss characteristics at the pool level.
- S** 32.17 For each pool, a financial institution shall estimate PD, LGD, and EAD. Multiple pools may share identical PD, LGD and EAD estimates.
- S** 32.18 In assigning a retail exposure to a pool, a financial institution shall consider, at minimum, the following risk drivers:
- (a) borrower risk characteristics (including borrower type, demographics such as age or occupation);
  - (b) transaction risk characteristics, including product and/or collateral types (including financing to value measures, seasoning<sup>71</sup>, guarantees, and seniority (first vs. second lien)). A financial institution shall explicitly address cross-collateral provisions where present<sup>72</sup>; and
  - (c) delinquency of exposure. A financial institution shall separately identify exposures that are delinquent and those that are not.

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<sup>70</sup> These ratings can reflect any and all factors that can influence LGD including, but are not limited to, the type of collateral, product, industry, and purpose.

<sup>71</sup> For each pool, the financial institution shall analyse the representativeness of the age of the facilities (in terms of time since origination for PD and time since the date of default for LGD) in the data used to derive the estimates of the financial institution's actual facilities. As default rates may peak several years after origination or recovery rates show a low point several years after default, the financial institutions shall adjust the estimates with an adequate margin of conservatism to account for the lack of representativeness as well as anticipated implications of rapid exposure growth.

<sup>72</sup> In cases where single or multiple collateral is used to secure multiple exposures, a financial institution shall have a methodology of apportioning the collateral to the appropriate exposures according to seniority and other factors. This shall be reflected in how exposures are assigned to pools.

**Rating structure: Standards for corporate, sovereign and bank exposures**

- S** 32.19 A financial institution shall ensure that its rating systems for corporate, sovereign and bank exposures have a meaningful distribution of exposures across grades with no excessive concentrations, on both borrower-rating and facility-rating scales.
- S** 32.20 For purposes of paragraph 32.19, a financial institution shall ensure that its rating systems have a minimum of seven borrower grades for non-defaulted borrowers and one for those that have defaulted.
- S** 32.21 A borrower grade shall be an assessment of borrower risk on the basis of a specified and distinct set of rating criteria, from which estimates of PD are derived.
- S** 32.22 The grade definition shall include both a description of the degree of default risk typical for borrowers assigned the grade and the criteria used to distinguish that level of credit risk. For this purpose, “+” or “-” modifiers to alpha or numeric grades shall only qualify as distinct grades if the financial institution has developed complete rating descriptions and criteria for their assignment, and separately quantified PDs for these modified grades.
- S** 32.23 Where financing portfolios are concentrated in a particular market segment and range of default risk, a financial institution shall have enough grades within that range to avoid undue concentrations of borrowers in particular grades.
- S** 32.24 Where there are significant concentrations<sup>73</sup> within a single grade or grades, a financial institution shall demonstrate with empirical evidence that:
- (a) the grade or grades cover reasonably narrow PD bands; and
  - (b) the default risk posed by all borrowers in a grade fall within that band.
- S** 32.25 For a financial institution using the A-IRB approach for estimating LGD, there shall be no specific minimum number of facility grades. The financial institution shall however ensure that there is a sufficient number of facility grades to avoid grouping facilities with widely varying LGDs into a single grade. The financial institution shall ensure that the criteria used to define facility grades are supported by empirical evidence.
- S** 32.26 A financial institution using the SSA shall have at least four grades for non-defaulted exposures, and one for defaulted borrowers<sup>74</sup>.

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<sup>73</sup> Undue concentration also includes cases where bunching is evident in the lower grades from the application of policy grades (e.g. in instances where exposures are moved to a certain borrower grade as a result of the financial institution’s internal policy trigger) or downgrades over time.

<sup>74</sup> For the avoidance of doubt, the requirements for SF exposures that qualify for the corporate F-IRB and A-IRB approaches are the same as those for general corporate exposures.

**Rating structure: Standards for retail exposure**

- S** 32.27 A financial institution shall provide quantitative measures of loss characteristics (PD, LGD, and EAD) for each identified retail pool. In doing so, the financial institution shall also ensure:
- (a) that the number of exposures in a given pool is sufficient to allow for meaningful quantification and validation of the loss characteristics at the pool level;
  - (b) a meaningful distribution of borrowers and exposures across pools; and
  - (c) that no single pool includes an undue concentration of the financial institution's total retail exposure.

**Rating criteria**

- S** 32.28 A financial institution shall have specific rating definitions, processes and criteria for assigning exposures to grades within a rating system.
- S** 32.29 A financial institution shall ensure that the rating definitions and criteria are plausible, intuitive, and result in a meaningful differentiation of risk. The rating definition and criteria shall meet the following conditions:
- (a) the grade descriptions and criteria shall be sufficiently detailed to allow those charged with assigning ratings to consistently assign the same grade to borrowers or facilities posing similar risk across lines of business, departments and geographic locations. Where rating criteria and procedures differ for different types of borrowers or facilities, the financial institution shall monitor for possible inconsistencies, and shall alter rating criteria to improve consistency when appropriate<sup>75</sup>;
  - (b) written rating definitions shall be clear and detailed enough to allow third parties<sup>76</sup> to understand the assignment of ratings, to replicate rating assignments and evaluate the appropriateness of the grade/pool assignments; and
  - (c) the criteria shall be consistent with the financial institution's internal lending standards and its policies for handling troubled borrowers and facilities.
- S** 32.30 A financial institution shall use all relevant and material information<sup>77</sup> in assigning ratings to borrowers and facilities.
- S** 32.31 Where a financial institution has less information<sup>78</sup>, it shall be more conservative in its assignments of exposures to borrower and facility grades or pools.

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<sup>75</sup> This can be achieved through back-testing or by having a controlled, independent group to rate a sample of the borrowers.

<sup>76</sup> Such as internal audit, other independent function within the financial institution or supervisors.

<sup>77</sup> This includes consideration of climate-related financial risks (i.e. physical and transition risks) that the borrower is exposed to, as well as measures undertaken to mitigate such risks.

<sup>78</sup> This includes situations where climate-related financial risk is judged to be material but where information is insufficient to estimate the impact of such risk.

- S** 32.32 Where a financial institution uses an external rating as the primary factor in determining an internal rating assignment, the financial institution shall also consider other relevant information.
- S** 32.33 A financial institution shall periodically review rating criteria and procedures to ensure their continued relevance, and that resulting ratings are reflective of the current portfolio and external conditions.

#### **Rating criteria: Exposures subject to the SSA**

- S** 32.34 A financial institution using the SSA for SF exposures shall assign exposures to internal rating grades based on its own criteria, systems and processes, in accordance with Part F.
- S** 32.35 A financial institution shall map these internal rating grades of SF exposures into the five supervisory rating categories set out in Appendix 4.
- S** 32.36 Where an internal grade definition results in an asset being slotted into two possible supervisory categories, a financial institution shall assign the exposure to the riskier category<sup>79</sup>.
- S** 32.37 A financial institution shall demonstrate that its mapping process has resulted in an alignment of grades which is consistent with the characteristics in the respective supervisory category. The financial institution shall ensure that any override of internal criteria<sup>80</sup> does not render the mapping process ineffective.

#### **Rating assignment horizon**

- S** 32.38 A financial institution shall document and articulate to the Bank the philosophy of the rating assignment for each of its rating systems. In addition, the financial institution shall document how movements in the economic cycle affect the migration of borrowers across rating grades, and conduct adequate stress tests on the financial institution's portfolio as specified under paragraphs 33.26 to 33.33.
- G** 32.39 A rating system may exhibit characteristics of a "through-the-cycle" (TTC) rating philosophy, a "point-in-time" (PIT) rating philosophy, or a "hybrid" rating philosophy. The rating philosophy of a rating system is typically dependent on the characteristics of underlying factors used to assign borrowers into risk grades.
- G** 32.40 A financial institution whose ratings are used primarily for underwriting purposes are likely to adopt TTC rating systems, which assigns ratings that remain more-or-less constant as macroeconomic conditions change over time. On the other hand, a financial institution whose ratings are used for pricing purposes or to track the current portfolio risk are more likely to adopt PIT rating systems, where ratings tend to adjust quickly to changes in the economic environment. In

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<sup>79</sup> For example, if the internal rating system has one rating that describes both the supervisory "strong" and "satisfactory" categories, the exposures should be slotted into the "satisfactory" category.

<sup>80</sup> Overrides include changes in grades as a result of any structured or unstructured overlays.

practice, financial institutions usually adopt a hybrid rating system which embodies characteristics of both TTC and PIT rating philosophies.

- G** 32.41 For capital computation purposes, a financial institution is free to adopt the rating philosophy suitable to its own business processes and strategy.
- S** 32.42 A financial institution shall understand the effects of ratings migration on capital requirements and ensure that sufficient capital is maintained across all phases of the economic cycle.
- S** 32.43 A financial institution shall assign ratings based on a time horizon longer than one year.
- S** 32.44 A financial institution shall ensure that a borrower rating represents the financial institution's assessment of the borrower's ability and willingness to contractually perform, despite adverse economic conditions or the occurrence of unexpected events. In doing so, the financial institution shall:
- (a) assess the borrower under a range of economic conditions<sup>81</sup> that is consistent with current conditions and those that are likely to occur over a business cycle within the respective industry/geographic region; and
  - (b) design its rating systems such that idiosyncratic or industry-specific changes are drivers of migration from one rating category to another<sup>82</sup>.
- S** 32.45 Where a borrower is highly leveraged or whose assets are predominantly traded assets, a financial institution's PD estimates for such borrowers shall reflect the performance of the underlying assets based on periods of stressed volatilities.
- S** 32.46 A financial institution shall adopt a conservative view of projected information, and a conservative bias to its analysis in cases where limited data is available<sup>83</sup>.

### **Use of models**

- S** 32.47 The requirements in paragraphs 32.49 to 32.50 shall apply to statistical models and other mechanical methods used to assign borrower or facility ratings or in the estimation of PDs, LGDs, or EADs.
- G** 32.48 Credit scoring models and other mechanical rating procedures generally use only a subset of available information. Although mechanical rating procedures may sometimes avoid some of the idiosyncratic errors made by rating systems in which human judgement plays a large role, mechanical use of limited information is also a source of rating errors. Credit scoring models and other mechanical procedures are permissible as the primary or partial basis of rating assignments, and may play a role in the estimation of loss characteristics.

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<sup>81</sup> This includes any potential materialisation of climate-related financial risk, both physical and transition risks.

<sup>82</sup> Business cycle effects may also be used as a driver.

<sup>83</sup> Given the difficulties in forecasting future events and potential impact it will have on a particular borrower's condition.

- S** 32.49 A financial institution shall ensure that the use of models<sup>84</sup> is appropriate in assigning borrower or facility rating or deriving PD, LGD and EAD estimates. The use of models shall be supplemented by sufficient human judgement and human oversight to ensure that all relevant and material information, including those outside the scope of the model, is taken into consideration, and to ensure that the model is used appropriately.
- S** 32.50 In adopting a model, a financial institution shall:
- (a) ascertain that the model or procedure has good predictive power and that regulatory capital requirements will not be distorted as a result of its use. The financial institution shall review the model or procedure where the financial institution is unable to demonstrate this requirement is met to the satisfaction of the Bank, and such model or procedure is rejected by the Bank;
  - (b) ascertain that the variables that are inputs to the model form a reasonable set of predictors;
  - (c) establish that the model is accurate on average across the range of borrowers or facilities to which the financial institution is exposed to and that there are no known material biases;
  - (d) establish a process for vetting data inputs into a statistical default or loss prediction model, which includes an assessment of the accuracy, completeness and appropriateness of the data specific to the assignment of an approved rating;
  - (e) demonstrate that the data used to build the model are representative of the population of the financial institution's actual borrowers or facilities;
  - (f) put in place written guidance describing how human judgement and model results are to be combined;
  - (g) establish procedures for human review of model-based rating assignments<sup>85</sup>; and
  - (h) establish a regular cycle of model validation that includes monitoring model performance and stability, reviewing model relationships, and testing model outputs against outcomes.

### **Documentation of rating system design**

- S** 32.51 A financial institution shall document its rating system design and operational details, with the objective of setting out evidence of the financial institution's compliance with the minimum standards.
- S** 32.52 The documentation shall also address topics such as portfolio differentiation, rating criteria, responsibilities of parties that rate borrowers and facilities, definition of what constitutes a rating exception, parties that have authority to approve exceptions, frequency of rating reviews, and management oversight of the rating process. A financial institution shall document the rationale for its choice of internal rating criteria, including the analyses demonstrating that rating

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<sup>84</sup> Applicable to any statistical models such as credit scoring models or other mechanical methods, for example mechanical rating procedures.

<sup>85</sup> Such procedures should focus on finding and limiting errors associated with known model weaknesses and ongoing efforts to improve the model's performance.

criteria and procedures are likely to result in ratings that meaningfully differentiate risk.

- S** 32.53 A financial institution shall periodically review the rating criteria and procedures to determine whether they remain fully applicable to the current portfolio and to external conditions.
- S** 32.54 A financial institution shall document a history of major changes in the risk rating process, and such documentation shall support identification of changes made to the risk rating process subsequent to the last review by the Bank.
- S** 32.55 A financial institution shall also document the organisation of rating assignments, including the internal control structure.
- S** 32.56 A financial institution shall document the specific definitions of default and loss used internally, in line with the reference definitions set out in paragraphs 36.12 to 36.14 and 36.32 to 36.33.
- S** 32.57 Where a statistical model is used in the rating process, a financial institution shall document the methodologies applied. The documentation shall:
- (a) outline in detail the theory, assumptions and/or mathematical and empirical basis of the assignment of estimates to grades, individual obligors, exposures, or pools, and the data source(s) used to estimate the model;
  - (b) establish a rigorous statistical process (including out-of-time and out-of-sample performance tests) for validating the model; and
  - (c) indicate any circumstances under which the model does not work effectively.
- S** 32.58 In relation to paragraph 32.57, a financial institution shall ensure that the documentation is sufficiently detailed so that an independent third party with relevant expertise is able to understand how the model operates and is able to replicate any parameter estimation and model result.
- S** 32.59 A financial institution shall also document key information relating to data used within the model, which includes but are not limited to the following:
- (a) the description of data sources or data proxies used; and
  - (b) the results of data quality, accuracy and relevance tests.
- S** 32.60 A financial institution shall also document and be able to explain to the Bank the role of external models and the extent to which they are used within the institution's processes, and how risk estimates are derived and validated. This includes the underlying rationale for choosing external models over internally developed models and data, as well as alternative solutions that were considered and how the results compare with the output of the external models.

**Use of external (vendor) models**

- S** 32.61 A financial institution shall retain in-house expertise on the external models for as long as the models are used for IRB purposes and be able to demonstrate a thorough understanding of external models, which include but are not limited to the following:
- (a) methodological underpinnings and the basic construction of the external models, including an understanding of the models' capabilities, limitations and appropriateness for use in developing IRB risk estimates for the financial institution's own portfolio of exposures;
  - (b) the effect and significance of proprietary elements in the external models; and
  - (c) the rationale behind any adjustment made to the external model's input data sets as well as output.
- S** 32.62 A financial institution shall document and be able to demonstrate the appropriateness of the external models used under the IRB approach. There shall be clear linkages and a reasonable degree of consistency and comparability between the external model inputs, data sets and estimates and the financial institutions' own portfolio characteristics and risk rating methodologies.
- S** 32.63 A financial institution shall ensure that any external model is consistent with the requirements for IRB, particularly in relation to data history, definitions of default and validation. In this regard, the financial institution shall only use a model obtained from a third-party vendor subject to the financial institution satisfying the Bank that the model complies to the requirements set out in Part I.

**33 Rating system operations****Coverage of ratings**

- S** 33.1 For corporate, sovereign and bank exposures, as part of the financing approval process, a financial institution shall:
- (a) assign a rating to each borrower and all recognised guarantors; and
  - (b) ensure that each exposure is associated with a facility rating.
- S** 33.2 For retail exposures, a financial institution shall, as part of the financing approval process, assign each retail exposure to a pool.
- S** 33.3 A financial institution shall rate each separate legal entity which it has exposure to separately.
- S** 33.4 Where a borrower belongs to a group, a financial institution shall only recognise group support in assigning ratings provided that the financial institution has in place:
- (a) policies regarding the treatment of individual entities in a connected group, including the circumstances under which the same rating may or may not be assigned to some or all connected entities; and

- (b) established governance and control procedures surrounding the adjustments made to the ratings as a result of group support.
- S** 33.5 Where a financial institution intends to account for group support in the assignment of ratings, the financial institution shall consider, at minimum, the following factors<sup>86</sup>:
  - (a) the borrower shall be an integral part of the group; and
  - (b) the support provider is able to demonstrate the willingness and capacity to support the borrower<sup>87</sup>.
- S** 33.6 A financial institution shall have in place policies to identify specific wrong way risk for each legal entity which a financial institution is exposed to.

**Integrity of rating process: Standards for corporate, sovereign and bank exposures**

- S** 33.7 A financial institution shall ensure that rating assignments and periodic rating reviews are undertaken and completed by a party that does not stand to benefit from the credit approval. In this regard, the financial institution shall document and incorporate the rating assignment process (including the operational procedures) which help to achieve the independence of the rating assignment process in its policies. The financial institution shall also ensure that credit policies and underwriting procedures reinforce and foster the independence of the rating process.
- S** 33.8 A financial institution shall refresh ratings of all borrowers and facilities at least annually, and not later than six months after the publication of the borrower's financial year end financial statements. However, higher risk borrowers and problem exposures<sup>88</sup> shall be subject to more frequent review. In addition, a financial institution shall initiate a new rating review if material information on the borrower or facility comes to light.
- S** 33.9 A financial institution shall have an effective process to obtain relevant and material information on the borrower's financial condition and other characteristics that affect PDs, LGDs and EADs. The financial institution shall have in place established procedures to update the borrower's rating in a timely manner upon receipt of the information. The financial institution shall establish policies to address stale or outdated ratings.

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<sup>86</sup> Group support that has been provided via verbal communication or letters of comfort will not be recognised by the Bank.

<sup>87</sup> For example, a parent company may have a past history of providing material support to the borrower in the form of financing facilities or cash placements.

<sup>88</sup> A financial institution shall have in place policies which define and identify higher risk borrowers/exposures.

- S** 33.10 Notwithstanding paragraph 33.8, a financial institution shall only conduct rating reviews less frequently than annually where:
- (a) the exposures are fully collateralised by cash or fixed deposits; or
  - (b) the exposures are immaterial and are part of a portfolio which the financial institution is downsizing due to the withdrawal from a business line or a discontinued business relationship<sup>89</sup>.

### **Integrity of rating process: Standards for retail exposures**

- S** 33.11 A financial institution shall review the loss characteristics and delinquency status of each identified risk pool at least annually.
- S** 33.12 A financial institution shall also review the status of individual borrowers within each pool on an ongoing basis to ensure that exposures continue to be assigned to the appropriate pool<sup>90</sup>.

### **Integrity of data input**

- S** 33.13 In the process of assigning ratings, a financial institution shall have in place a process for vetting data inputs which includes an assessment of the accuracy, completeness and appropriateness of the data.

### **Overrides**

- S** 33.14 Where a rating is assigned based on expert judgement, a financial institution shall clearly articulate in its policies the situations under which outputs of the rating process can be overridden, including how and to what extent such overrides can be used and by whom.
- S** 33.15 For model-based ratings, a financial institution shall have policies and procedures in place for monitoring cases where:
- (a) the model ratings have been overridden by human judgement;
  - (b) variables have been excluded; or
  - (c) inputs have been altered.
- S** 33.16 For purposes of paragraphs 33.14 and 33.15, the financial institution shall identify overrides and separately track their performances over time, with the view to demonstrate that the overrides improve the overall predictive power of the rating system. The financial institution shall also ensure that the policies identify the relevant personnel responsible for approving overrides.
- S** 33.17 A financial institution shall also specify a threshold expressed in terms of a percentage of ratings overridden, above which an automatic review of the rating model and process would be triggered.

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<sup>89</sup> Exposures arising from a discontinued business relationships shall be considered on a collective basis to determine materiality.

<sup>90</sup> This requirement may be satisfied by review of a representative sample of exposures in the pool.

**Data maintenance**

- S** 33.18 A financial institution shall collect and store data on key borrowers and facility characteristics to support the internal credit risk measurement and management process, to enable the financial institution to meet the other requirements in this Policy Document, and to serve as a basis for supervisory reporting. In doing so, the financial institution shall ensure that the data collected is sufficiently detailed to facilitate retrospective re-allocation of borrowers and facilities to grades<sup>91</sup>. Data collected on various aspects of internal ratings shall also facilitate Pillar 3 reporting.
- S** 33.19 For the purpose of paragraph 5.9, data captured for Islamic banking assets shall enable a financial institution to assess the performance of the model on the Islamic portfolio<sup>92</sup>.

**Data maintenance: Standards for corporate, sovereign and bank exposures**

- S** 33.20 A financial institution shall maintain the rating history of a borrower and guarantor, including but are not limited to the following details:
- (a) rating since the borrower/guarantor was assigned an internal grade;
  - (b) date(s) ratings were assigned;
  - (c) methodology and key data used to derive the rating(s); and
  - (d) personnel and/or model responsible for assigning the rating(s).
- S** 33.21 A financial institution shall maintain the identity of borrowers and facilities that default, and timing and circumstance of such defaults. The financial institution shall also retain data on PDs and realised default rates associated with rating grades and ratings migration so as to track the predictive power of the borrower rating system.
- S** 33.22 A financial institution using the A-IRB approach shall also maintain the following:
- (a) complete history on LGD and EAD estimates associated with each facility;
  - (b) methodology and key data used to derive the estimate;
  - (c) personnel and/or model responsible for the most recent rating;
  - (d) data on the estimated and realised LGDs and EADs associated with each defaulted facility; and
  - (e) information on the components of loss and recovery for each defaulted exposure<sup>93</sup>.

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<sup>91</sup> For example, if increasing sophistication of the internal rating system suggests that finer segregation of portfolios can be achieved.

<sup>92</sup> For example, data on the type of underlying Shariah contract is necessary to enable an assessment of the loss characteristics of exposures under a particular Shariah contract and establish if the exposures exhibit risk profiles that are comparable to the portfolio as a whole.

<sup>93</sup> These include but are not limited to (i) amounts recovered, (ii) source of recovery (e.g. collateral, liquidation proceeds and guarantees), (iii) time period required for recovery, and (iv) administrative costs.

- S** 33.23 A financial institution using the A-IRB approach where the LGD reflects the credit risk mitigating effects of guarantees or credit derivatives shall also retain the LGD data on the facility before and after evaluation of the effects of the guarantee or credit derivative.
- S** 33.24 A financial institution using the F-IRB approach shall retain relevant loss data, notwithstanding the use of supervisory estimates<sup>94</sup>.

#### **Data maintenance: Standards for retail exposures**

- S** 33.25 A financial institution shall retain the following:
- (a) data used to allocate retail exposures to pools, including:
    - (i) data on borrower and transaction risk characteristics used either directly or through use of a model; and
    - (ii) data on delinquency;
  - (b) data on the estimated PDs, LGDs and EADs associated with pools of retail exposures; and
  - (c) for defaulted exposures:
    - (i) data on the pools to which the exposure was assigned over the year prior to default;
    - (ii) identity of obligors and facilities that default;
    - (iii) information about the components of loss and recovery for each defaulted exposure, including information relating to amounts and source of recoveries (e.g. collateral, liquidation process and guarantees), timing of cash flows and administrative costs; and
    - (iv) the realised outcomes on LGD and EAD.

#### **Stress tests used in assessment of capital adequacy**

- S** 33.26 A financial institution shall establish a sound stress testing process for the assessment of capital adequacy, with the view to assess whether Pillar 1 capital requirements for credit risk under the IRB approach<sup>95</sup> adequately capture the risks that the financial institution is exposed to. This includes to assess any potential underestimation of risk due to limitations of data inputs or weaknesses in model structures.
- S** 33.27 Specifically, a financial institution shall conduct the following stress tests:
- (a) General stress test – As specified in the *Stress Testing* policy document, a financial institution shall perform stress tests to identify possible events or future changes in economic conditions that could have unfavourable effects on the financial institution's credit exposures, and in turn, assess the financial institution's ability to withstand such changes; and
  - (b) Credit risk stress test – A financial institution shall perform credit risk stress tests to assess the effects of certain specific conditions on its IRB

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<sup>94</sup> Relevant data would include data on loss and recovery experience for corporate exposures under the F-IRB, and data on realised losses for exposures under the SSA.

<sup>95</sup> A financial institution should iteratively and progressively consider climate-related financial risks that affect the range of possible future economic conditions in its stress testing processes, particularly those that may significantly impact the financial institution's credit exposures within the assessment period.

regulatory capital requirement. The financial institution shall determine the credit risk stress test to be employed, subject to the Bank's review. The test employed shall be meaningful, reasonably conservative and relevant to the financial institution's circumstances, and consider at minimum the effects of mild recession scenarios.

- S** 33.28 In both types of stress tests as set out in paragraph 33.27, a financial institution shall consider the following sources of information:
- (a) the financial institution's own data supporting the estimation of the ratings migration of its exposures;
  - (b) information about the impact of smaller deterioration in the credit environment on the financial institution's ratings, with the objective of indicating the likely effect of more severe stress circumstances; and
  - (c) evaluation of the evidence of ratings migration in external ratings. This would require the financial institution to broadly match its buckets to the external rating categories.
- S** 33.29 A financial institution operating in several markets shall ensure that stress tests are carried out on portfolios representing the vast majority of its total exposures<sup>96</sup>.
- S** 33.30 A financial institution shall, in conducting the credit risk stress test set out in paragraph 33.27(b) also assess a range of sensitivity tests which shall include, but are not limited to:
- (a) the effect of not recognising the firm-size adjustment for corporate SME exposures under paragraph 17.4;
  - (b) the effect of not recognising any group support which is allowed under paragraphs 33.4 and 33.5; and
  - (c) where a financial institution adopts estimates as set by the Bank<sup>97</sup>, the difference in realised LGDs and EADs with such estimates as required in paragraph 42.37.
- S** 33.31 In the event where there is a difference between the results of the credit risk stress test and those calculated under the IRB rules, a financial institution shall assess the reasonableness of the difference (including the magnitude thereof) and take further action where necessary.
- S** 33.32 In line with paragraph 8 of the policy document on *Risk-Weighted Capital Adequacy Framework (Basel II) – Internal Capital Adequacy Assessment Process (Pillar 2)*, a financial institution shall assess whether it has adequate capital to meet Pillar 1 capital requirements and any shortfalls arising from the stress tests conducted as part of paragraph 33.27.
- S** 33.33 Where the Bank, pursuant to paragraph 12.1 of the *Risk-Weighted Capital Adequacy Framework (Basel II) – Internal Capital Adequacy Assessment Process (Pillar 2)*, requires a financial institution to take corrective action, including to specify a higher minimum capital adequacy ratio pursuant to

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<sup>96</sup> In other words, the financial institution need not stress test all the portfolios in all the markets it operates in.

<sup>97</sup> For example, under the F-IRB approach.

paragraph 10.2 of the CAF CC PD and CAFIB CC PD, to require that risk be reduced and/or, to require that additional provisions be held, the financial institution shall comply with such requirement(s).

## 34 Governance and oversight

### Board of directors

- S** 34.1 The board shall exercise effective oversight of a financial institution's implementation of the IRB approach. In doing so, the board shall ensure that the financial institution has in place an effective rating system that provides for robust and reliable assessments of credit risk which are used to determine IRB regulatory capital requirements.
- S** 34.2 The board shall also ensure that senior management implements the IRB approach effectively, in line with the requirements in this Policy Document. In fulfilling this responsibility, the board shall:
- (a) consider, provide challenge, and where appropriate, approve material aspects of the ratings and estimation process;
  - (b) possess a general understanding of the financial institution's risk rating system and detailed comprehension of its associated management reports;
  - (c) ensure that adequate resources have been allocated to develop and maintain the rating system, and that senior management has identified and allocated responsibility clearly and effectively, in line with the requirements in the policy document on *Responsibility Mapping*.
  - (d) be kept up to date on IRB implementation progress<sup>98</sup>; and
  - (e) regularly review relevant reports from senior management.
- S** 34.3 The board shall have an adequate understanding of the key principles and features of the financial institution's IRB systems to make well-informed, high-level decisions in relation to its responsibilities (e.g. specifying acceptable risk tolerance levels using IRB results and approving risk management strategies). The requisite information or knowledge shall include but not be limited to the following:
- (a) basic information about the rating system (e.g. objective, coverage, broad rating structure and definitions);
  - (b) operating boundaries<sup>99</sup> and limitations of the rating system;
  - (c) uses of rating systems in the financial institution;
  - (d) overall results of validation and back-testing performed on the rating systems and corresponding actions taken;
  - (e) information on the rating systems' compliance with the Bank's policies; and
  - (f) stress test design, assumptions and results.

<sup>98</sup> Including IRB roll-out plan, and rating system enhancements and implementation.

<sup>99</sup> Refers to the condition under which the rating system performance is expected to be acceptable.

- S** 34.4 Where the board has delegated certain functions to a designated board committee, the board shall remain accountable for the decisions of such a committee.

### **Senior management**

- S** 34.5 Senior management shall be responsible for implementing the IRB approach in a financial institution, in line with the requirements in this Policy Document.
- S** 34.6 Senior management shall seek the board's approval on material aspects in relation to the financial institution's rating system. At minimum, these include:
- (a) major rating system policies, including but not limited to ownership, uses of rating systems and the exception framework;
  - (b) material changes or replacement of rating systems<sup>100</sup>; and
  - (c) changes or exceptions from established policies, and the resulting impact on the financial institution's rating systems.
- S** 34.7 Senior management shall ensure that rating systems function properly on an ongoing basis. In doing so, senior management shall ensure that sufficient resources<sup>101</sup> are assigned to critical aspects of the rating system. Senior management shall also have regular touch points with the credit control function to discuss the performance of the rating process, areas requiring improvement, and the status of rectification plans.
- S** 34.8 Consistent with paragraph 34.2(c), senior management shall clearly delineate and assign responsibilities and accountabilities for effective operations of rating systems to key personnel<sup>102</sup> within the financial institution. Senior management shall ensure that responsibilities of each individual personnel are specific and clearly defined, and that incentive structure are tied to measurable performance standards in line with the responsibilities<sup>103</sup>. Senior management shall determine the model owner<sup>104</sup> for each IRB risk model, who shall be accountable for the risk model's development, implementation, use, and ensuring model performance remain within expectations. The model owner shall periodically monitor model performance<sup>105</sup> and take prompt action where model deteriorations are identified.
- S** 34.9 Senior management shall ensure that it regularly receives, and reviews reports on the performance of its internal ratings systems, which shall include, at minimum:

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<sup>100</sup> Including recalibration, reselection of factors, reweighting, master scale rebanding, change of approach or any adjustment that would significantly impact the rating system output.

<sup>101</sup> Including qualified and skilled personnel.

<sup>102</sup> Including personnels from business unit, credit control unit, finance, IT, operations and other support or control functions where relevant.

<sup>103</sup> For example, performance measures of personnel responsible for rating assignment may include the number and frequency of rating errors, significant of rating errors, and proper and consistent application of rating criteria.

<sup>104</sup> The model owner may be the risk-taking unit, the team responsible for developing the underlying risk models, or other appropriate persons or unit.

<sup>105</sup> For the avoidance of doubt, the model owner shall not solely rely on assessments conducted by the validation function.

- (a) distribution of credit/sectoral exposures by grades;
- (b) rating migration;
- (c) estimation of the relevant parameters per grade; and
- (d) model performance and back-testing.

**G** 34.10 Reporting frequencies may vary with the significance and type of information as well as the specific roles expected of the recipients.

### **Credit risk control**

**S** 34.11 A financial institution shall have one or several independent credit risk control functions that are responsible for the design or selection, implementation and performance of its internal rating systems.

**S** 34.12 The financial institution shall ensure that the credit risk control functions are independent from the personnel and management functions responsible for originating the exposures<sup>106</sup>.

**S** 34.13 The credit risk control function shall be responsible for:

- (a) testing and monitoring internal grades;
- (b) producing and analysing summary reports from the financial institution's rating system<sup>107</sup>;
- (c) providing assurance to senior management that rating definitions are consistently applied throughout the financial institution, including across business lines, functions and geographic areas;
- (d) reviewing and documenting changes to the rating process, including the reasons of such changes; and
- (e) reviewing the rating criteria to ensure it remain predictive of risk<sup>108</sup>.

**S** 34.14 The credit risk control function shall also assume oversight and supervision responsibilities for any models used in the rating process, and responsibility for the ongoing review and modifications to rating models.

### **Independent review**

**S** 34.15 A financial institution shall ensure that its rating system and operations<sup>109</sup> are reviewed by an independent party at least annually. The independent party, either the internal audit function, an equally independent function or an external party, shall be qualified and competent<sup>110</sup> to conduct the review.

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<sup>106</sup> Consistent with the relevant paragraphs in the policy document on *Credit Risk*.

<sup>107</sup> The information shall include historical default data sorted by rating at the time of default and one year prior to default, grade migration analyses, and monitoring of trends in key ratings criteria.

<sup>108</sup> Changes to the rating process shall be documented and submitted to the Bank upon request.

<sup>109</sup> Including the operations of the credit function, systems implementation of rating systems and the estimation of PDs, LGDs and EADs.

<sup>110</sup> Including possessing the necessary skill sets and a good understanding of the internal rating systems.

- S** 34.16 For purposes of paragraph 34.15, the scope of the review shall also include evaluating the adherence to all applicable minimum requirements as set out in this Policy Document.
- S** 34.17 For the avoidance of doubt, the validation process described in paragraph 42 is also subject to independent review. In relation to paragraph 42.59, the qualitative review process is also subject to independent review<sup>111</sup>.
- S** 34.18 A financial institution shall ensure that the outcome of the review is reported to the board audit committee.
- S** 34.19 In cases where reviews by internal audit are found to be inadequate and the Bank requires an external auditor to review the financial institution's internal rating systems, any costs associated with such review shall be borne by the financial institution.

### **35 Use of internal ratings**

- S** 35.1 A financial institution shall ensure that internal ratings, default and loss estimates are integral in its credit approval, risk management, internal capital allocations, and corporate governance functions ("use test").
- S** 35.2 For the avoidance of doubt, a financial institution shall not design and implement ratings systems and estimates that are solely used to qualify for the IRB approach or to provide IRB inputs for regulatory capital purposes.
- S** 35.3 A financial institution shall ensure that internal ratings and loss estimates are used as direct input in all of the following processes<sup>112, 113</sup>:
- (a) credit approval;
  - (b) capital management (including internal capital allocations);
  - (c) credit policies;
  - (d) reporting;
  - (e) pricing; and
  - (f) limit setting.
- G** 35.4 A financial institution may use internal ratings and loss estimates as indirect input to other processes, which include, but are not limited to provisioning decisions, profitability measures, the performance and compensation framework, other elements of the credit process (not only credit approval) and strategy.
- G** 35.5 For the avoidance of doubt, internal ratings are not required to have an exclusive or primary role in the processes set out in paragraphs 35.1 to 35.3 or to preclude consideration of other factors.

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<sup>111</sup> Where the qualitative review is performed by internal audit, the independent review can be conducted by a separate independent internal audit team.

<sup>112</sup> Regardless of any exemption from IRB application granted to a business unit or asset class under paragraph 5.12, although the degree of reliance on internal ratings and loss estimates in these circumstances may differ.

<sup>113</sup> Potential evidence of likely compliance with these areas are described in Appendix 2.

- S** 35.6 Notwithstanding paragraph 35.1, while the same estimates may not be necessarily used for IRB and all other internal purposes, for example, pricing models are likely to use PDs and LGDs relevant to the life of the asset, a financial institution shall document and demonstrate their reasonableness in cases where there are such differences.
- S** 35.7 A financial institution shall maintain a credible track record in the use of internal ratings information. Specifically, the financial institution shall demonstrate that its internal rating system meets the minimum requirements in this Part for at least three years prior to qualification.
- S** 35.8 A financial institution approved to adopt the A-IRB approach or seeking the Bank's prior written approval to adopt the A-IRB approach shall demonstrate that its estimation and use of LGDs and EADs meets the minimum requirements for at least three years prior to qualification.
- G** 35.9 For the avoidance of doubt, improvements to a financial institution's rating system will not render the financial institution non-compliant with the three-year requirement in paragraphs 35.7 and 35.8.

## **36 Risk quantification (General)**

- S** 36.1 A financial institution shall estimate a PD<sup>114</sup> for each internal borrower grade for corporate, sovereign, and bank exposures.
- S** 36.2 In the case of retail exposures, a financial institution shall estimate PD for each pool.
- S** 36.3 A financial institution's PD estimates shall be the long-run average of one-year default rates for borrowers in the grade with the exception of retail exposures as set out in paragraph 37.16.
- S** 36.4 A financial institution adopting the advanced IRB approach shall:
- (a) estimate an appropriate LGD for each facility or retail pool; and
  - (b) estimate an appropriate long-run default-weighted average EAD for each facility.
- S** 36.5 A financial institution shall incorporate all relevant, material and available data, information and methods in estimating internal PD, LGD and EAD.
- S** 36.6 Where a financial institution utilises internal data or external data from external sources (including pooled data), the financial institution shall demonstrate that its estimates are representative of the long-run experience.
- S** 36.7 A financial institution shall ensure that estimates used are grounded in historical experience and empirical evidence, and not based purely on subjective or judgemental considerations. The financial institution shall ensure that the estimates:

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<sup>114</sup> A financial institution is not required to produce its own estimates of PD for exposures subject to the SSA.

- (a) take into account changes in lending practice or process for pursuing recoveries over the observation period;
  - (b) promptly reflect the implications of technical advances, new data and other information; and
  - (c) are reviewed at least annually.
- S** 36.8 In relation to paragraphs 36.6 and 36.7, a financial institution shall ensure that the population of exposures in the data used for estimation, lending standards in use when the data were generated, and other relevant characteristics are closely matched to or at least comparable to the financial institution's exposures and standards.
- S** 36.9 In addition, a financial institution shall also ensure that:
- (a) economic or market conditions that underlie the data are relevant to current and foreseeable conditions;
  - (b) the number of exposures in the sample and the data period used for quantification shall be sufficient to provide confidence in the accuracy and robustness of the estimates; and
  - (c) the estimation technique performs well in out-of-sample tests.
- S** 36.10 A financial institution's estimates of PD, LGD, and EAD shall incorporate a margin of conservatism<sup>115</sup>. Where methods and data are less satisfactory and the likely range of errors is larger<sup>116</sup>, the margin of conservatism shall be larger<sup>117</sup>.
- S** 36.11 In the case of data collected prior to when a financial institution started adopting the IRB approach and where flexibility is required in order to meet the requirements in Part I, the financial institution shall only use such data subject to demonstrating to the Bank that appropriate adjustments have been made to achieve broad equivalence to the data without such flexibility. Data collected beyond the date to which the financial institution has adopted IRB shall conform to the minimum standards unless specifically stated.

### Definition of default

- S** 36.12 A financial institution shall categorise an obligor as having defaulted if any of the following events have occurred:
- (a) any material credit obligation is due for more than 90 days, except for:
    - (i) securities, where a default occurs immediately upon a breach of the contractual repayment schedule;
    - (ii) overdrafts, where a default occurs when the obligor has breached the approved limits or has been advised of a limit smaller than the current outstanding for more than 90 days; and

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<sup>115</sup> This is to account for the likely range of unpredictable errors in the estimation of PDs, LGDs and EADs.

<sup>116</sup> Likely range of errors may be represented by confidence intervals established around PD, LGD or EAD estimates.

<sup>117</sup> The impact of climate-related financial risks should be considered in estimation of risk parameters. A financial institution shall consider the extent to which climate-related data deficiencies such as poor data quality, data scarcity or insufficient data reliability affect the likely range of errors.

- (iii) repayments that are scheduled every three months or longer, where a default occurs immediately upon a breach of the contractual repayment schedule;
  - (b) any material credit obligation is on non-accrued status (e.g. the financing that a financial institution no longer recognises accrued interest/profit as income or, if recognised, makes an equivalent amount of provisions);
  - (c) a write-off or account-specific provision is made as a result of a significant perceived decline in credit quality;
  - (d) any credit obligation is sold at a material credit-related economic loss;
  - (e) a distressed restructuring and rescheduling of any credit obligation (i.e. a restructuring that may result in a diminished financial obligation caused by the material forgiveness, or diminished financial obligation caused by the postponement, of principal, interest or where relevant, fees) is agreed by the financial institution;
  - (f) a bankruptcy or similar order has been filed against the obligor in respect of his/her credit obligations to the banking group;
  - (g) the obligor has sought or has been placed in bankruptcy or similar protection where this would avoid or delay repayment of any of the credit obligations to the financial institution's group; or
  - (h) any other situation where the financial institution considers that the obligor is unlikely to pay its credit obligations in full without recourse by the financial institution to actions such as realising security.
- S** 36.13 In relation to paragraph 36.12(h), a financial institution shall deem the following elements as being indications of unlikeliness to repay:
- (a) the financial institution is uncertain about the collectability of a credit obligation which has already been recognised as revenue and subsequently, the uncollectible amount is recognised as an expense;
  - (b) the default of a related obligor. A financial institution shall review all related obligors in the same group to determine if the default of a related obligor is an indication of unlikeliness to pay by any other related obligor. This can be ascertained by assessing the degree of economic interdependence between the obligor and its related entities;
  - (c) acceleration of an obligation;
  - (d) the obligor is in significant financial difficulty. This could be triggered by a significant downgrade of the obligor's credit rating; or
  - (e) default by the obligor on credit obligations to other financial creditors, e.g. other financial institutions, bond-holders/sukuk-holders.
- S** 36.14 A financial institution adopting a more stringent definition internally than the definition specified in paragraphs 36.12 and 36.13 shall apply that definition for the purposes of risk estimation under the IRB approach.
- G** 36.15 For retail exposures, a financial institution may apply the definition of default at the level of a particular facility, and not at the level of the obligor. As such, a default on one credit obligation by an obligor need not entail the financial institution treating all other credit obligations to the same obligor as defaulted. Notwithstanding the above, a financial institution should be vigilant and consider a borrower's cross-default of facilities if a default on one facility is representative of his incapacity to fulfil other obligations.

- S** 36.16 A default by a corporate obligor shall trigger a default on all of its other credit obligations.
- S** 36.17 A financial institution shall record actual defaults for each exposure using the reference definition in paragraphs 36.12 to 36.14.
- S** 36.18 A financial institution shall also use the same definition for its estimation of PDs, and LGDs and EADs, where relevant, except in the following cases:
- (a) in cases where a financial institution uses external data which employs definition of default that differs from the reference definition in paragraphs 36.12 to 36.14 in arriving at estimates, the financial institution shall demonstrate that appropriate adjustments have been made to the data to achieve broad equivalence with the reference definition; or
  - (b) in cases where a financial institution uses internal data prior to 1 January 2010 to arrive at estimates, the requirement as specified in paragraph 36.18(a) applies. For the avoidance of doubt, internal data after 1 January 2010 used in such estimates shall be consistent with the reference definition.
- G** 36.19 Administrative defaults include cases where exposures become overdue because of oversight on the part of the obligor and/or the financial institution.
- S** 36.20 A financial institution shall only exclude instances of administrative defaults from the historical default count subject to appropriate policies and procedures established by the financial institution to evaluate and approve such cases.
- S** 36.21 Where circumstances in paragraphs 36.12 and 36.14 are no longer present for a previously defaulted exposure, a financial institution shall rate the obligor and estimate LGD as it would for a non-defaulted facility.
- S** 36.22 Notwithstanding paragraph 36.21, where the definition is subsequently triggered for the same obligor, a second default shall be deemed to have occurred.

**Question 3:**

The Bank is proposing to refine the definition of default under the IRB approach to bring it closer into alignment with the SACR PD. As a result, the flexibility given previously under the Bank's Basel II IRB rules for hire purchase financings that are past due for more than 120 days and default residential mortgages that are past due for more than 180 days will no longer be available. Does your institution expect this refined definition to result in any implementation issues?

*Re-ageing*

- S** 36.23 A financial institution shall put in place policies on the counting of days past due, in particular with respect to re-ageing of the facilities and the granting of extensions, deferrals, renewals and rewrites to existing accounts.

- S** 36.24 A financial institution shall set out in the re-ageing policy the following, at minimum:
- (a) governance arrangements, including the senior officer responsible for approving re-ageing and reporting requirements;
  - (b) minimum age of a facility before it is eligible for re-ageing;
  - (c) delinquency levels of facilities that are eligible for re-ageing;
  - (d) maximum number of re-ageing per facility; and
  - (e) a reassessment of the borrower's capacity to repay.
- S** 36.25 A financial institution shall also ensure that the re-ageing policy is applied consistently over time and supports the 'use test', as set out in paragraphs 35.1 to 35.9<sup>118</sup>.

#### *Treatment of overdrafts*

- S** 36.26 Authorised overdrafts shall be subject to a credit limit set by a financial institution and brought to the knowledge of the client. Any breach of this limit shall be monitored.
- S** 36.27 A financial institution shall categorise an overdraft as being in default if the credit limit for the account is breached, and the account is not brought under the limit after 90 days (subject to the applicable past-due trigger).
- S** 36.28 A financial institution shall categorise a non-authorised overdraft<sup>119</sup> as being past due once credit is granted to an unauthorised customer.
- S** 36.29 A financial institution shall have in place rigorous internal policies for assessing the creditworthiness of customers who are offered overdraft accounts.

#### *More than one default count in a year*

- S** 36.30 For quantification purposes, only the first of two or more defaults occurring within twelve months shall be counted as default. For the purpose of PD measurement, only one default event shall be recorded.
- S** 36.31 Accordingly, for A-IRB, the EAD measure shall be defined with reference to the first default event, and the LGD measure shall express the economic loss in reference to the first default event, but including losses incurred at any time after this default event until the exposure is reduced to zero.

#### **Definition of loss for all asset classes**

- S** 36.32 A financial institution shall ensure that its estimates of LGD are based on economic loss (and not accounting losses), with economic loss determined based on a consideration of all relevant factors including material discount

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<sup>118</sup> For example, where a financial institution treats a re-aged exposure in a similar fashion to other delinquent exposures more than the past-due cut off point, this exposure shall be recorded as a default.

<sup>119</sup> Those are associated with zero credit limit for IRB purpose.

effects and material direct and indirect costs associated with collecting on the exposure.

- S** 36.33 A financial institution shall only reflect in its LGD estimates the effects of its own workout and collection expertise, subject to such estimates being conservative until the financial institution has sufficient internal empirical evidence of the impact of its expertise.

### **37 Risk quantification (PD)**

#### **PD estimation: Corporate, sovereign, and bank exposures**

- S** 37.1 For corporate, sovereign, and bank exposures, a financial institution shall use information and techniques that take appropriate account of the long-run experience when estimating the average PD for each rating grade.
- S** 37.2 In doing so, a financial institution shall use one or more of the following techniques (set out in paragraphs 37.9 to 37.13):
- (a) internal default experience;
  - (b) mapping to external data<sup>120</sup>; or
  - (c) statistical default methods.
- G** 37.3 The financial institution may employ a primary technique and use other techniques as a point of comparison and to support any potential adjustments.
- S** 37.4 A financial institution shall supplement the application of a technique with supporting analyses, while also exercising judgemental considerations in combining results of techniques and making adjustments for limitations of techniques and information.
- S** 37.5 A financial institution shall estimate a PD for each rating grade based on the observed historical average one-year default rate that is a simple average based on number of obligors (count-weighted) irrespective of the chosen method or combination thereof.
- S** 37.6 A financial institution shall not use weighting approaches, such as EAD weighting.
- S** 37.7 A financial institution shall ensure that the underlying historical observation period is at least five years for at least one source (external, internal or pooled data source), irrespective of the specific data source or combination thereof chosen for PD estimation.

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<sup>120</sup> Where a financial institution maps its internal grades to a scale used by an ECAI, the financial institution should consider whether the scale used by the ECAI reflects material climate-related financial risks. Where the scale used by the ECAI incorporates material climate-related financial risks, the financial institution should review the models and methods used to judge climate-related financial risks given the challenges with data sources, data granularity and historical time series that often apply to data on climate-related financial risks. Where the scale used by the ECAI does not incorporate consideration of climate-related financial risks, the financial institution should consider whether adjustments are appropriate to mitigate this limitation.

- S** 37.8 In cases where a longer observation period is available for any source and the data is relevant and material, a financial institution shall use the longer observation period. A financial institution shall ensure that the data used for estimation includes a representative mix of good and bad years.

*Internal default experience*

- S** 37.9 A financial institution shall, in using data on internal default experience for the estimation of PD:
- (a) demonstrate that the estimates are reflective of underwriting standards and of any differences in the rating system that generated the data and the current rating system; and
  - (b) apply an additional margin of conservatism in its PD estimation, where limited data is available or where the underwriting standards or rating systems have changed.
- S** 37.10 Where pooled data across financial institutions is used, a financial institution shall demonstrate that the internal rating systems and criteria of other financial institutions in the pool are comparable with its own.

*Mapping to external data*

- S** 37.11 A financial institution that maps its internal grades to the scale used by an external credit assessment institution or similar institution (“external institution”) and then attribute the default rate observed for the external institution’s grades to the financial institution’s internal grades shall consider the comparison of its internal rating criteria with the criteria used by the external institutions (including a comparison of the definition of default used<sup>121</sup>) as well as the comparison of the internal and external ratings assigned of any common borrowers. In doing so, the financial institution shall:
- (a) document the basis for the mapping;
  - (b) avoid biases or inconsistencies in the mapping approach or underlying data; and
  - (c) ensure that the external institution’s criteria underlying the data used for quantification is oriented to the risk of the borrower<sup>122</sup>.

*Statistical default methods*

- S** 37.12 A financial institution using statistical default method shall ensure the default probability models meet the standards specified under paragraphs 32.47 to 32.50.
- G** 37.13 A financial institution may use a simple average of default-probability estimates for individual borrowers in a given grade, where such estimates are drawn from statistical default prediction models.

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<sup>121</sup> In line with the requirements under paragraphs 36.12 to 36.22.

<sup>122</sup> Excluding transaction characteristics.

**Requirements specific to PD estimation: Retail exposures**

- S** 37.14 For retail exposures, a financial institution shall use internal data as the primary source of information for estimating loss characteristics.
- S** 37.15 A financial institution shall in order to use external data or statistical models for quantification, ensure that a strong link can be demonstrated between:
- (a) the financial institution's process of assigning exposures to a pool and the process used by external data sources; and
  - (b) the financial institution's internal risk profile and the composition of the external data.

In any event, the financial institution shall use all relevant and material data sources as points of comparison.

- S** 37.16 A financial institution may derive the long-run average estimate of PD or default-weighted average loss rate given default based on an estimate of the expected long-run loss rate in the following manner:
- (a) using an appropriate PD estimate to infer the long-run default-weighted average loss rate given default; or
  - (b) using a long-run default-weighted average loss rate given default to infer the appropriate PD.

In any event, the financial institution shall ensure that the LGD used for IRB purposes is not less than the long-run default-weighted average loss rate given default and is consistent with the concepts defined in paragraphs 38.1 to 38.12.

- S** 37.17 A financial institution shall ensure that the underlying historical observation period is at least five years for at least one source (external, internal or pooled data source), irrespective of the specific data source or combination thereof chosen for estimation of loss characteristics.
- S** 37.18 In cases where a longer observation period is available for any source and the data is relevant, a financial institution shall use the longer observation period. A financial institution shall ensure that the data used for estimation includes a representative mix of good and bad years of the economic cycle relevant for the portfolio.
- S** 37.19 A financial institution shall estimate the PD based on the observed historical average one-year default rate.

**38 Risk quantification (LGD)****Own-LGD estimation: Standards for all asset classes**

- S** 38.1 A financial institution shall estimate an LGD for each facility in such a manner that reflects economic downturn conditions to capture the relevant risks.
- S** 38.2 The LGD estimates shall be equal to, or more than the long-run default-weighted average loss rate given default calculated based on the average economic loss of all observed defaults within the data source for that type of facility.

- S** 38.3 A financial institution shall take into account the potential for the LGD of the facility being higher than the defaulted-weighted average during a period when credit losses are substantially higher than average.
- S** 38.4 For certain types of exposures, loss severities may not exhibit such cyclical variability and LGD estimates may not differ materially from the long-run default-weighted average. For other exposures, a financial institution shall incorporate the cyclical variability in loss estimates into its LGD estimates.
- G** 38.5 For the purpose of estimating LGD, a financial institution may make reference to the averages of loss severities observed during periods of high credit losses, forecasts based on appropriately conservative assumptions, or other similar methods. In doing so, the financial institution may use either internal and/or external data.
- S** 38.6 A financial institution shall assess the extent of any dependence between the risk of a borrower and that of the collateral or collateral provider. Where dependence is assessed to be significant, a financial institution shall address such risk in a conservative manner.
- S** 38.7 A financial institution shall consider and treat conservatively any currency mismatch between the underlying obligation and the collateral in its assessment of LGD.
- S** 38.8 A financial institution shall ensure LGD estimates are grounded in historical recovery rates and, when applicable, not solely based on the collateral's estimated market value<sup>123</sup>. Where LGD estimates take into account collateral, the financial institution shall establish relevant internal requirements for collateral management, operational procedures, legal certainty and risk management process consistent with those required of the F-IRB approach.
- S** 38.9 A financial institution shall ensure that the LGD assigned to a defaulted asset reflects the possibility that the financial institution would have to recognise additional, unexpected losses during the recovery period.
- S** 38.10 For each defaulted asset, a financial institution shall also construct its best estimate of the expected loss on that asset based on current economic circumstances and the status of the facility.
- S** 38.11 The amount, if any, by which the LGD of a defaulted asset exceeds a financial institution's best estimate of expected loss on that asset represents the capital requirement for that asset, and shall be set by the financial institution on a risk-sensitive basis in accordance with paragraph 16.1.
- S** 38.12 A financial institution shall document instances where the best estimate of expected loss on a defaulted asset is less than the sum of specific provisions

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<sup>123</sup> This is to recognise the potential inability of a financial institution to gain both control of their collateral and liquidate it expeditiously.

and partial charge-offs on that asset, and shall justify the fact to the Bank when requested.

### **Rate for discounting recoveries**

- S** 38.13 In estimating LGDs, a financial institution shall ensure measures of recovery rates reflect the costs of holding defaulted assets over the workout period, including an appropriate risk premium.
- S** 38.14 When recovery streams are uncertain and involve risk that cannot be diversified away, a financial institution shall ensure net present value (NPV) calculations reflect the time value of money and a risk premium appropriate to the undiversifiable risk<sup>124</sup>.
- S** 38.15 In estimating LGDs, a financial institution shall assume risk premiums that reflect economic downturn conditions, mindful of the uncertainties in recovery cash flows associated with defaults that arise during the economic downturn conditions.
- S** 38.16 When there is certainty in recovery streams (e.g. recoveries derived from cash collateral), a financial institution shall ensure that the NPV calculations only reflect the time value of money and hence a risk-free discount rate is appropriate.
- G** 38.17 In relation to the paragraphs 38.13 to 38.16, measures of recovery rates can be computed in several ways, for example:
- (a) by discounting the stream of recoveries and the stream of workout costs by a risk adjusted discount rate which is the sum of the risk-free rate and a spread appropriate for the risk of the recovery and cost cash flows;
  - (b) by converting the stream of recoveries and the stream of workout costs to certainty equivalent cash flows and discounting these by the risk-free rate;
  - (c) by a combination of adjustments to the discount rate, the stream of recoveries and the stream of workout costs that are consistent with the principle of reflecting the costs of holding defaulted assets over the workout period<sup>125</sup>; or
  - (d) other methods for recovery estimation/LGD estimates including observed market value of defaulted bonds, implied value of defaulted bonds or implied LGD based on EL and PD.
- G** 38.18 A financial institution may use the cost of capital<sup>126</sup> as a proxy for the funding cost of defaulted assets, which itself is not observable in the absence of a liquid market for such assets.

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<sup>124</sup> Most approaches to quantifying LGDs either implicitly or explicitly involve the discounting of streams of recoveries received after a facility goes into default in order to compare the NPV of recovery streams as of a default date with a measure of exposure at default.

<sup>125</sup> A financial institution using the “effective interest rate” in accordance with MFRS 9 as the discount rate shall adjust the stream of net recoveries in a manner consistent with this principle.

<sup>126</sup> A financial institution may use the weighted average cost of capital (WACC) incurred for funding defaulted assets provided that the financial institution is able to demonstrate to the Bank that the method of computation and the inputs used to derive the WACC are robust.

- G** 38.19 Different discount rates per asset type would not be required if a financial institution uses the cost of capital, as the cost of capital is a sufficiently conservative measure. If a financial institution decides against using the cost of capital, a discount rate higher than the contractual or effective interest rate for exposures other than those that are secured by a low-risk collateral may be used (for such lower-risk exposures, a lower discount rate may be used, e.g. the risk-free rate for cash-collateralised exposures is acceptable).

**Own-LGD estimation: Additional standards for corporate and sovereign exposures**

- S** 38.20 For corporate and sovereign exposures, a financial institution shall ensure that estimates of LGD are based on a minimum data observation period that covers at least one complete economic cycle, but shall in any case be no shorter than seven years for at least one source. Where a longer observation period is available and the data is relevant, the financial institution shall use the longer period.

**Own-LGD estimation: Additional standards for retail exposures**

- S** 38.21 For retail exposures, a financial institution shall ensure that the estimates of LGD are based on a minimum data observation period of no less than five years. The less data the financial institution possesses, the more conservative the estimate shall be.

**39 Risk quantification (EAD)**

**Requirements specific to own-EAD estimates: Standards for all asset classes**

- S** 39.1 For on-balance sheet items, a financial institution shall estimate EAD at no less than the drawn amount, subject to recognising the effects of on-balance sheet netting as specified in the F-IRB approach. For the avoidance of doubt, the minimum requirements for the recognition of netting shall be the same as those under the F-IRB approach.
- S** 39.2 A financial institution adopting the A-IRB approach shall establish procedures for estimating EAD for off-balance sheet items (excluding transactions that expose the financial institution to counterparty credit risk as set out in paragraphs 19.53 and 19.54). The procedures shall:
- (a) specify the estimates of EAD to be used for each facility type;
  - (b) reflect the possibility of additional drawings by the borrower up to and after the time a default is triggered; and
  - (c) clearly and unambiguously delineate the facilities, where EAD estimates differ by facility type.
- S** 39.3 Under the A-IRB approach, a financial institution shall assign an EAD estimate for each eligible facility. The EAD estimate shall be an estimate of the long-run default-weighted average EAD for similar facilities and borrowers over a sufficiently long period of time, but with a margin of conservatism appropriate to the likely range of errors in the estimate.

- S** 39.4 Where a positive correlation can reasonably be expected between the default frequency and the magnitude of EAD, a financial institution shall ensure its EAD estimates incorporate a larger margin of conservatism.
- S** 39.5 For exposures for which EAD estimates are volatile over the economic cycle, a financial institution shall instead use EAD estimates that are appropriate for an economic downturn, provided that these are more conservative than the long-run average.
- G** 39.6 Where a financial institution develops its own EAD model, the financial institution may consider the cyclical nature, if any, of the drivers of such models in determining whether EAD estimates may be volatile over the economic cycle. A financial institution with insufficient internal data to examine the impact of previous recession(s) may make conservative use of external data.
- S** 39.7 Where a financial institution relies on external data, or uses alternative measures of central tendency (e.g. the median or a higher percentile estimate) or 'downturn' data only as bases for EAD estimates, the financial institution shall confirm that in line with paragraph 39.5, the EAD estimates do not fall below a conservative estimate of the long-run default-weighted average EAD for similar facilities.
- S** 39.8 The criteria that a financial institution uses in deriving EAD estimates shall be plausible and intuitive, represent the material drivers of EAD, and be supported by credible internal analysis.
- S** 39.9 A financial institution shall be able to provide a breakdown of its EAD experience by the drivers of EAD.
- S** 39.10 A financial institution shall use all relevant and material information to derive EAD estimates.
- S** 39.11 A financial institution shall review its estimates of EAD across facility types when material new information comes to light, but no less frequently than annually.
- S** 39.12 A financial institution shall give due consideration to its specific policies and strategies adopted in respect of account monitoring and payment processing.
- S** 39.13 A financial institution shall consider its ability and willingness to prevent further drawings in circumstances short of payment default, such as covenant violations or other technical default events.
- S** 39.14 A financial institution shall have adequate systems and procedures in place to monitor facility amounts, current outstanding balances against committed lines, and changes in outstanding balances per borrower and per grade. In addition, a financial institution shall have the ability to monitor outstanding balances on a daily basis.

- S** 39.15 A financial institution shall ensure that its EAD estimates are developed using a 12-month fixed-horizon approach, such that for each observation in the reference data set, default outcomes are linked to relevant obligor and facility characteristics twelve months prior to default.

**Question 4**

Please indicate if your financial institution would face operational challenges to meet the requirement for EAD estimates using the 12-month fixed-horizon approach, as required under BCBS Basel III IRB rules.

- S** 39.16 A financial institution shall ensure that the EAD estimates applied to particular exposures are not based on data that comingle the effects of disparate characteristics or data from exposures that exhibit different characteristics<sup>127, 128</sup>. In doing so, the financial institution shall ensure that the estimates are based on appropriately homogenous segments. Alternatively, the estimates shall be based on an estimation approach that effectively disentangles the impact of the different characteristics exhibited within the relevant dataset.
- G** 39.17 Practices that generally do not comply with paragraph 39.16 include, but are not limited to, the use of estimates based or partly based on the following:
- (a) SME/midmarket data being applied to large corporate obligors;
  - (b) data from commitments with 'small' unused limit availability being applied to facilities with 'large' unused limit availability;
  - (c) data from obligors already identified as problematic at reference date being applied to current obligors with no known issues (e.g. customers at reference date who were already delinquent, watchlisted by the financial institution, subject to recent bank-initiated limit reductions, blocked from further drawdowns or subject to other types of collections activity); or
  - (d) data that has been affected by changes in obligors' mix of borrowing and other credit-related products over the observation period unless that data has been effectively mitigated for such changes (e.g. by adjusting the data to remove the effects of the changes in the product mix). For such cases, a financial institution should demonstrate a detailed understanding of the impact of changes in customer product mix on EAD reference data sets (and associated estimates) and that the impact is immaterial or has been effectively mitigated within the financial institution's estimation process. For the avoidance of doubt, effective mitigation would not include: setting floors to credit conversion factor (CCF) or EAD observations; use of obligor-level estimates that do not fully cover the relevant product transformation options or inappropriately combine products with very different characteristics (such as revolving and non-revolving products); adjusting only material observations affected by product transformation; and generally excluding observations affected by

<sup>127</sup> This is to ensure that EAD estimates are based on reference data that reflect the obligor, facility and financial institution's management practice characteristics of the exposures to which the estimates are applied.

<sup>128</sup> For example, same broad product grouping but different customers that are managed differently by the financial institution.

product profile transformation which thereby potentially distorting the representativeness of the remaining data.

- S** 39.18 In the case where the undrawn limit factor (ULF)<sup>129</sup> approach is adopted to estimate CCFs, a financial institution shall ensure that EAD estimates are effectively quarantined from the potential effects of the region of instability associated with facilities close to being fully drawn at reference date. In doing so, a financial institution may:
- (a) use an estimation method that avoids the instability by not using potentially small undrawn limits that could approach zero in the denominator; or
  - (b) switch to a method other than the ULF (e.g. a limit factor, balance factor or additional utilisation factor approach) as the region of instability is approached<sup>130</sup>.

The financial institution shall, in mitigating the effect associated with the region of instability, avoid ineffective approaches, such as capping and flooring reference data (e.g. observed CCFs at 100% and zero respectively) or omitting observations that are judged to be affected.

- S** 39.19 A financial institution shall not cap the EAD reference data to the principal amount outstanding or facility limits. Accrued interest, other due payments and limit excesses shall be included in EAD reference data.
- S** 39.20 For transactions exposing a financial institution to counterparty credit risk, the financial institution shall ensure the EAD estimates fulfil the requirements specified in the counterparty credit risk requirements in Appendix VIII (Counterparty Credit Risk and Current Exposure Method) of the CAF (RWA) PD or Appendix VI (Counterparty Credit Risk and Current Exposure Method) of the CAFIB (RWA) PD, as the case maybe.

<sup>129</sup> The ULF is a specific type of CCF, where predicted additional drawings in the lead-up to default are expressed as a percentage of the undrawn limit that remains available to the obligor under the terms and conditions of a facility, i.e.  $EAD = B_0 = B_t + ULF * [L_t - B_t]$ , where  $B_0$  = facility balance at date of default;  $B_t$  = current balance (for predicted EAD) or balance at reference date (for observed EAD);  $L_t$  = current limit (for predicted EAD) or limit at reference date (for realised/observed EAD).

<sup>130</sup> A limit factor (LF) is a specific type of CCF, where the predicted balance at default is expressed as a percentage of the total limit that is available to the obligor under the terms and conditions of a credit facility, i.e.  $EAD = B_0 = LF * [L_t]$ , where  $B_0$  = facility balance at date of default;  $B_t$  = current balance (for predicted EAD) or balance at reference date (for observed EAD);  $L_t$  = current limit (for predicted EAD) or limit at reference date (for realised/observed EAD). A balance factor (BF) is a specific type of CCF, where the predicted balance at default is expressed as a percentage of the current balance that has been drawn down under a credit facility, i.e.  $EAD = B_0 = BF * [B_t]$ . An additional utilisation factor (AUF) is a specific type of CCF, where predicted additional drawings in the lead-up to default are expressed as a percentage of the total limit that is available to the obligor under the terms and conditions of a credit facility, i.e.  $EAD = B_0 = B_t + AUF * [L_t]$ .

**Requirements specific to own-EAD estimates: Additional standards for corporate and sovereign exposures**

- S** 39.21 For corporate and sovereign exposures, a financial institution's data observation period for estimation of EAD shall be based on a time period no shorter than seven years<sup>131</sup>. Where longer observation periods are available for any source and the data remains relevant, the longer period shall be used.
- S** 39.22 A financial institution shall estimate EAD using a default-weighted average and not a time-weighted average.

**Requirements specific to own-EAD estimates: Additional standards for retail exposures**

- S** 39.23 For retail exposures, a financial institution's data observation period for estimation of EAD shall be based on a time period no shorter than five years. The less data the financial institution has, the more conservative the financial institution shall be in its estimation.

**40 Risk quantification (Guarantees and credit derivatives)****Requirements for assessing effect of guarantees: Standards for corporate and sovereign exposures where own-LGD estimates are used and standards for retail exposures**

- S** 40.1 A financial institution shall reflect the risk-mitigating effect of guarantees on corporate and sovereign exposures through an adjustment to LGD (if it has been approved to use own estimates of LGD) or to PD.
- S** 40.2 A financial institution shall reflect the risk-reducing effect of a guarantees on retail exposures (whether in support of an individual obligation or a pool of exposures) either through its PD or LGD estimates provided that this is done consistently.
- S** 40.3 In relation to paragraphs 40.1 and 40.2 financial institution shall adopt a consistent approach over time and across all types of guarantees.
- S** 40.4 A financial institution shall assign a borrower rating to both the borrower and all recognised guarantors at the outset and on an ongoing basis. In doing so, the financial institution shall comply with the minimum requirements for assigning borrower ratings set out in this Policy Document<sup>132</sup>. The financial institution shall also retain all relevant information on the borrower on a standalone basis (i.e. excluding the guarantee and the guarantor), consistent with the requirements set out in paragraphs 33.20 to 33.23.

<sup>131</sup> Where possible, a financial institution's time period for the data estimates should cover the complete economic cycle.

<sup>132</sup> Including the regular monitoring of the guarantor's condition, ability and willingness to honour its obligations.

- S** 40.5 For retail guarantees, the requirements in paragraphs 33.20 to 33.23 shall also be applicable to the assignment of an exposure to a pool and the estimation of PD.
- S** 40.6 A financial institution shall not assign the guaranteed exposure an adjusted PD or LGD in such a manner that results in the adjusted risk weight being lower than that of a comparable, direct exposure to the guarantor. The rating criteria and processes shall not consider possible favourable effects of imperfect expected correlation between default events for the borrower and guarantor for regulatory capital purposes. As such, the adjusted risk weight shall not reflect the risk mitigation of “double default”.
- S** 40.7 In cases where a financial institution applies the Standardised Approach for direct exposures to the guarantor, the guarantee shall only be recognised by treating the covered portion of the exposure as a direct exposure to the guarantor under the Standardised Approach.
- S** 40.8 Where a financial institution applies the F-IRB approach to direct exposures to the guarantor, the guarantee shall only be recognised by applying the F-IRB approach to the covered portion of the exposure.
- G** 40.9 A financial institution may choose to not recognise the effect of guarantees on its exposures.
- S** 40.10 While there are no restrictions on the types of eligible guarantors, a financial institution shall establish internal criteria for the types of guarantors that will be recognised for regulatory capital purposes.
- S** 40.11 A financial institution shall ensure that a guarantee meets the following requirements for it to be recognised for regulatory capital purposes:
- (a) the guarantee shall be evidenced in writing, non-cancellable on the part of the guarantor and in force until the debt is satisfied in full (to the extent of the amount and tenure of the guarantee);
  - (b) the guarantee shall be legally enforceable against the guarantor in a jurisdiction where the guarantor has assets to attach and enforce a judgement; and
  - (c) the guarantee shall be unconditional.
- There shall be no clauses in the protection contract outside the direct control of the financial institution that could prevent the protection provider from being obliged to pay out in a timely manner in the event the original counterparty fails to make the payment(s) due.
- S** 40.12 Notwithstanding paragraph 40.11, a financial institution adopting the A-IRB approach may recognise guarantees that solely cover losses remaining after the financial institution has first pursued the original obligor for payment and has completed the workout process.
- S** 40.13 For guarantees where a financial institution applies the Standardised Approach to the covered portion of the exposure, the scope of guarantors and the minimum requirements as set out under the SACR PD shall apply. For the avoidance of

doubt, a financial institution shall not recognise the risk mitigating effect of these guarantors in PD or LGD estimates if the minimum requirements are not met.

- S** 40.14 A financial institution shall specify criteria for adjusting borrower grades or LGD estimates (or in the case of retail and eligible purchased receivables, the process of allocating exposures to pools) to reflect the impact of guarantees for regulatory capital purposes.
- S** 40.15 For the purpose of paragraph 40.14, the criteria shall:
- (a) be plausible and intuitive, and address the guarantor's ability and willingness to perform under the guarantee;
  - (b) address the likely timing of any payments and the degree to which the guarantor's ability to perform under the guarantee is correlated with the borrower's ability to repay;
  - (c) consider the extent to which residual risk to the borrower remains, for example a currency mismatch between the guarantee and the underlying exposure;
  - (d) be as detailed as the criteria for assigning exposures to grades consistent with paragraphs 32.28 to 32.33; and
  - (e) comply with all minimum requirements for assigning borrower or facility ratings set out in this Policy Document.
- S** 40.16 In adjusting borrower grades or LGD estimates (or in the case of retail and eligible purchased receivables, the process of allocating exposures to pools), a financial institution shall take all relevant available information into account.

**Requirements for assessing the effect of credit derivatives: Standards for corporate and sovereign where own-LGD estimation are used and standards for retail exposures**

- S** 40.17 A financial institution shall, in order to reflect the risk-mitigating effect of credit derivatives meet the requirements for guarantees set out in paragraphs 40.1 to 40.16, and ensure that the criteria used in assigning adjusted borrower grades or LGD estimates for exposures hedged with credit derivatives:
- (a) requires that the reference asset<sup>133</sup> is not different from the underlying asset, unless the conditions specified in the F-IRB approach are met; and
  - (b) address the payout structure of the credit derivatives and conservatively assess its impact on the level and timing of recoveries.

The financial institution shall also consider the extent to which other forms of residual risk remain.

**Requirements for assessing the effect of guarantees and credit derivatives: Standards for F-IRB Approach LGD estimates**

- S** 40.18 A financial institution using the F-IRB approach for LGD estimates shall, in order to reflect the risk-mitigating effect of guarantees and credit derivatives, meet the requirements set out in paragraphs 40.1 to 40.17, subject to the following modifications:
- (a) an LGD-adjustment option shall not be used; and

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<sup>133</sup> Referring to the asset on which the protection is based.

- (b) the range of eligible guarantees and guarantors is limited to those specified in paragraphs 19.28 to 19.29.

#### **41 Risk quantification (Purchased receivables)**

##### **Requirements for estimating PD and LGD (or EL) for qualifying purchased receivables**

- S** 41.1 A financial institution using the top-down approach for default risk under paragraph 25 and/or IRB treatment for dilution risk under paragraph 26 for purchased corporate or retail receivable exposures shall ensure that the following minimum requirements for risk quantification are met:
  - (a) the purchased receivables shall be grouped into sufficiently homogenous pools so that accurate and consistent estimates of PD and LGD (or EL) for default losses and EL estimates of dilution losses can be determined by the purchasing financial institution<sup>134</sup>;
  - (b) the methods and data used to estimate PD, LGD and EL shall comply with the risk quantification standards for retail exposures as set out in paragraphs 36 to 39; and
  - (c) the risk quantification shall reflect all information available on the quality of underlying receivables, including data for similar pools provided by the seller, by the purchasing financial institution or by other external sources. The purchasing financial institution shall determine whether the data provided by the seller is consistent with expectations agreed upon by both the purchasing financial institution and the seller, for example, with regards to the type, volume and on-going quality of receivables purchased. Where this is not the case, the purchasing financial institution shall obtain or rely upon more relevant data.
- S** 41.2 A financial institution purchasing receivables shall satisfy itself that current and future advances can be repaid from the liquidation or collections against, the receivable pool. To qualify for the top-down approach for default risk, a financial institution shall closely monitor and control the receivable pool and overall lending relationship. Specifically, the financial institution shall comply with paragraphs 41.3 to 41.7.

##### *Legal certainty*

- S** 41.3 A financial institution shall design the structure of the facility in a way that the financial institution has an effective ownership and control of the cash remittances from the receivables under all foreseeable circumstances, including incidences of seller or servicer distress and bankruptcy. Where the obligor makes direct payments to a seller or servicer, a financial institution shall regularly verify that payments are forwarded completely and within the contractually agreed terms. The financial institution shall ensure that its ownership over the receivables and cash receipts is protected against bankruptcy stays or legal

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<sup>134</sup> In general, the risk bucketing process should reflect the seller's underwriting practices and the heterogeneity of its customers.

challenges that could materially delay the financier's ability to liquidate or assign the receivables, or to retain control over cash receipts.

### *Monitoring systems*

- S** 41.4 A financial institution shall monitor both the quality of the receivables and the financial condition of the seller and servicer. In particular, the financial institution shall:
- (a) assess the correlation among the quality of the receivables and the financial condition of both the seller and servicer; and
  - (b) establish internal policies and procedures that provide adequate safeguards to protect against such contingencies, including the assignment of an internal risk rating for each seller and servicer;
  - (c) establish clear and effective policies and procedures to determine eligibility of the seller and servicer. The financial institution or its agent shall ensure that periodic reviews on the sellers and servicers are conducted to verify the accuracy of reports received from them, detect fraud or operational weaknesses, and verify the quality of the seller's credit policies and servicer's collection policies and procedures. The findings from such periodic reviews shall be documented;
  - (d) have the ability to assess the characteristics of the receivables pool, including in respect of:
    - (i) over-advances;
    - (ii) history of the seller's arrears, bad debts, and bad debt allowances;
    - (iii) payment terms; and
    - (iv) potential contra accounts;
  - (e) ensure that effective policies and procedures are in place to monitor on an aggregate basis single-obligor concentrations both within and across receivables pools; and
  - (f) ensure that it receives timely and sufficiently detailed reports of receivables ageings and dilutions to:
    - (i) ensure compliance with the financial institution's eligibility criteria and advancing policies governing purchased receivables; and
    - (ii) provide an effective means with which to effectively monitor and confirm the seller's terms of sale such as invoice date ageing and dilution.

### *Work-out systems*

- S** 41.5 A financial institution shall ensure that systems and procedures are established to detect any deterioration in the seller's financial condition and deterioration in the quality of the receivables at an early stage, and also to proactively address emerging problems. In particular, a financial institution shall have clear and effective policies, procedures and information systems for:
- (a) monitoring compliance with all contractual terms of the facility (including covenants, advancing formulas, concentration limits, early amortisation triggers, etc.), as well as the financial institution's internal policies governing advance rates and receivables eligibility including the tracking of covenant violations and waivers as well as exceptions to established policies and procedures;

- (b) detecting, approving, monitoring and correcting over advances to limit inappropriate draws; and
- (c) dealing with financially weakened sellers or servicers and/or deterioration in the quality of receivable pools. These include, but are not limited to, early termination triggers in revolving facilities and other covenant protections, a structured and disciplined approach to dealing with covenant violations, and clear and effective policies and procedures for initiating legal actions and dealing with problem receivables.

*Systems for controlling collateral, credit availability and cash*

- S** 41.6 A financial institution shall have in place policies and procedures governing the control of receivables, credit and cash. In doing so, the financial institution shall ensure that:
- (a) written internal policies specify all material elements of the receivables purchase programme including the advancing rates, eligible collateral, necessary documentation, concentration limits and how cash receipts are to be handled<sup>135</sup>; and
  - (b) internal systems ensure that funds are advanced only against specified supporting collateral and documentation such as servicer attestations, invoices, shipping documents *etc.*

*Compliance with internal policies and procedures*

- S** 41.7 A financial institution shall ensure that there is an effective internal process for assessing compliance with internal policies and procedures. The process shall encompass:
- (a) regular internal and/or external audits of all critical phases of the financial institution's receivables purchase programme;
  - (b) verification of the separation of duties:
    - (i) between the assessment of the seller/servicer and the assessment of the obligor; and
    - (ii) between the assessment of the seller/servicer and the field audit of the seller/servicer; and
  - (c) evaluations of back-office operations, with particular focus on evaluating qualifications, experience, staffing levels and supporting systems.

**42 Validation of rating systems and internal estimates**

- S** 42.1 A financial institution shall establish a robust framework to validate the accuracy and consistency across rating systems<sup>136</sup>, processes, and the estimation of all relevant risk components. A financial institution shall demonstrate to the Bank that the internal validation process allows for a consistent and meaningful assessment of the performance of internal rating and risk models<sup>137</sup>.

<sup>135</sup> These elements should take appropriate account of all relevant and material factors, including the seller's/servicer's financial condition, risk concentrations, and trends in the quality of the receivables and the seller's customer base.

<sup>136</sup> Rating system as defined in paragraph 32.1.

<sup>137</sup> Risk models refer to all relevant models, including PD, LGD and EAD models unless otherwise specified.

- S** 42.2 A financial institution shall fully document the validation framework, the results of validation and subsequent review or changes made to the framework.
- S** 42.3 A financial institution shall ensure that the validation framework covers the following:
- (a) roles and responsibilities for validation;
  - (b) scope and methodology of validation;
  - (c) reporting and approval procedures;
  - (d) frequency of validation; and
  - (e) internal tolerance thresholds and management actions.

### **Roles and responsibilities for validation**

- S** 42.4 A financial institution shall ensure that validation is conducted by a validation function that is independent from the personnel involved in risk-taking and the development of the underlying risk models, which shall exclude individuals who would benefit directly from any adjustments made to the rating system.
- S** 42.5 A financial institution shall ensure that the validation function has sufficient authority within the organisation to meaningfully provide effective challenge, report limitations and escalate concerns over the risk models to the board and relevant board committees, if applicable, in a prompt and timely manner.
- S** 42.6 A financial institution shall ensure that individuals performing the validation possess the requisite technical expertise for the model review and sufficient familiarity with the relevant line of business in which the model is intended to be used to allow for effective challenge.

### **Scope and methodology of validation**

#### *Overall scope and methodology requirements*

- S** 42.7 A financial institution shall ensure the scope of validation covers both the quantitative and qualitative aspects of the rating system. The financial institution shall modify or expand the validation scope as appropriate based on findings identified throughout each validation.
- S** 42.8 The validation function of the financial institution shall identify if there are any general modelling errors or omissions that are present in the model development process, including in data inputs, associated codes used for data extraction and manipulation, the application of model theory, algorithm use, assumptions applied, simplifications and approximations that may lead to inaccurate output.
- S** 42.9 The validation function shall provide independent evaluation on all aspects detailed in subsequent sections, including any judgment and justifications provided as part of model development.
- S** 42.10 The validation function shall evaluate whether margins of conservatism applied are adequate after taking into account all relevant information, including the likely range of errors due to methodology and data used, as well as any potential

residual risks arising from information which may be not apparent within the data used for assessment.

- S** 42.11 The validation function shall perform its own tests for all material aspects of the model, including on data quality, data representativeness, data modifications and model performance. The own testing shall also be conducted on aspects that have already been performed by model developers (such as model performance during development data period) to ensure validation assessment is truly independent.
- S** 42.12 The validation function shall base the validation opinion primarily on tests conducted using the reference definition of default and loss as set out in paragraphs 36.12 to 36.14 and 36.32 to 36.33 respectively.
- G** 42.13 Where alternative definitions of defaults or loss are used for model development<sup>138</sup> or internal risk management purposes, the validation function may also consider tests conducted using those definitions.

*Quantitative review: Review of model design*

*(i) Model choice and conceptual soundness*

- S** 42.14 The validation function shall review the model design which includes evaluating the conceptual soundness and the logic of the rating system's theory and methodology. The validation function shall review documentation and empirical evidence supporting the methods used.
- S** 42.15 In assessing the appropriateness of model design, the validation function shall assess if the choice of modelling methodology is supported by published research, where available, or generally accepted industry practice where appropriate. The validation function shall also consider the implications of any limitations highlighted in the associated research to the overall model.

*(ii) Representativeness and potential bias*

- S** 42.16 The validation function shall evaluate the analysis and statistical tests made during the development phase to assess representativeness of internal data and other available information including external data, against the financial institution's own portfolio.
- S** 42.17 The validation function shall assess if the model design is appropriate for its intended use and whether it has any material biases, which may include but not be limited towards a particular customer segment, asset size or economic cycle. This includes any potential bias arising from the underlying data used to develop the model.

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<sup>138</sup> For instance, PD model scorecards may be developed using broader default definitions or longer default horizon.

- S** 42.18 The validation function shall also assess and where applicable, evaluate the impact of the representativeness of the data used to build the model in relation to the population of actual borrowers or facilities<sup>139</sup>.

*(iii) Data modification and processing*

- S** 42.19 The validation function shall evaluate the impact of any modification to the underlying dataset (e.g. removal of selected information from each observation or removal of entire observations) during model development. Any data modification shall be accompanied by sound justification, especially where large number of observations are involved.
- S** 42.20 The validation function shall evaluate if the use of statistical techniques (e.g. sampling, smoothing, binning and sample truncation to remove outliers) in the preparation of development data sets and in the operations of internal rating systems are justified and based on sound scientific methods. The validation function shall also evaluate whether the properties and limitations of the statistical techniques used, and the applicability of these techniques to different types of data are fully understood by key personnel of the financial institution.
- S** 42.21 The validation function shall also assess if there are any potential biases introduced due to data modification or applied statistical techniques in data preparation as described in paragraphs 42.19 and 42.20 and evaluate the extent to which such biases have been mitigated.
- S** 42.22 The validation function shall evaluate whether occurrences of incomplete or missing data are random and if they have systematic relationships with default events or credit losses. Where it is necessary to remove observations with incomplete data, the validation function shall assess if sound justification is provided, as these observations may contain important information on default events or credit losses. Where large number of observations with incomplete data are removed, the validation function shall evaluate the impact of such removal and its associated justification.

*(iv) Variable selection*

- S** 42.23 The validation function shall assess the variables selected in the design and estimation of the risk models, to verify whether variables used as inputs to the system form a reasonable set of predictors.
- S** 42.24 The validation function shall evaluate the performance of individual variables selected and the overall performance during development, which may include assessments of discriminatory and predictive ability where applicable.
- S** 42.25 The validation function shall analyse the interaction between variables<sup>140</sup> and their associated implications on model parameters and output when assessing the reasonableness of the inclusion of each variable.

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<sup>139</sup> For instance, a financial institution may compute the population stability index to determine if the data is representative.

<sup>140</sup> Such as the correlation between variables.

- S** 42.26 The validation function shall assess if the variables and their interactions are both well founded in relevant economic and financial theory as well as in established empirical relationships, rather than being based off spurious relationships which are purely driven by the underlying data. Valid explanations shall be provided on why particular risk factors are included in the rating system.
- S** 42.27 The validation function shall analyse the empirical distribution of observed default rates, realised LGDs and realised EAD for each variable used in the final model for risk differentiation or segmentation, in order to detect potential issues related to data outliers and temporal homogeneity.
- S** 42.28 Where third-party data or model output are used as a variable in the rating system, the validation function shall assess the availability and effectiveness of contingency plans for instances where these data or models are either no longer available, no longer serviced, or are no longer reliable.
- (v) *Judgmental decisions in modelling*
- S** 42.29 The validation function shall assess the adequacy and efficacy of documentation outlining judgmental decisions or expert opinions engaged in the determination and selection of methods, criteria and characteristics.
- S** 42.30 The validation function shall evaluate if adequate margins of conservatism have been reflected in the risk estimates where such adjustments are made to address limitations in models. The validation function shall also evaluate the effectiveness of plans put in place to address such model limitations.

*Quantitative review: Performance testing*

(i) *Discriminatory power and calibration*

- S** 42.31 A financial institution shall evaluate the discriminatory power or relative risk-ranking ability of risk models on a regular basis and over time in order to monitor trends and stability. The evaluation shall be done at the overall rating system level, going down to the detailed component level. Where a risk model is applicable to portfolio segments of distinct risk characteristics<sup>141</sup>, the evaluation shall be performed for each distinct segment. Where rating systems have been specifically customised<sup>142</sup> for distinct segments, a separate evaluation shall also be done for each of those segments.
- S** 42.32 At a minimum, a financial institution shall use the Accuracy Ratio (AR) as a common test for discriminatory power for PD models. For the avoidance of doubt, the financial institution shall also use other measures in addition to AR where relevant.

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<sup>141</sup> For instance, a global corporate model may be applicable to multiple countries. The evaluation should be performed individually for major countries.

<sup>142</sup> Examples include having different scorecards (e.g. Application scorecard and Behavioural scorecard) or having custom weights for different segments (e.g. Segments with credit bureau data and segments without credit bureau data).

- S** 42.33 A financial institution shall perform a comparison between realised default rates and estimated PDs for each risk grade to demonstrate that the realised default rates are within the expected range for that risk grade. At a minimum, this comparison shall be done at the overall portfolio level to assess the PD calibration or the anchor point of the model. The financial institution using the A-IRB approach shall complete such analyses on their estimates of LGDs and EADs. Such comparisons shall make use of the historical data that are over as long a period as possible. The methods and data used in such comparisons shall be clearly documented.
- S** 42.34 A financial institution shall assess if there are any deterioration in credit quality over time in assessing if there are risks of potential underestimation. In identifying changes in credit quality, the financial institution shall conduct vintage analysis for PD models, and analyse historical realised LGDs and EADs trends by default year where applicable.
- S** 42.35 A financial institution adopting own estimates of LGDs shall complete analyses described in paragraphs 42.33 and 42.34 on recent data periods, including for data points where workout window is limited.
- S** 42.36 A financial institution shall ensure that the analysis set out in paragraph 42.35 is adjusted for comparability, such as by considering LGDs based on similar workout windows or by employing extrapolation methodologies. Where deteriorations in recoveries trends are observed, the financial institution shall consider whether the downturn requirement for own-LGD estimation is met.
- S** 42.37 Where supervisory estimates of risk parameters, rather than internal ones are being used, a financial institution shall compare the realised LGDs and EADs to the supervisory estimates set by the Bank. The information on realised LGDs and EADs shall form part of the financial institution's assessment of internal capital.
- G** 42.38 A financial institution may consider developing challenger models using alternative theories or approaches, where possible, to be used as comparison against the performance of the developed risk models.

*(ii) Benchmarking*

- S** 42.39 In the context of validation, benchmarking refers to the comparison of a financial institution's internal estimates of credit risk components with estimates obtained through other estimation techniques (the "benchmarks").
- G** 42.40 A financial institution may conduct benchmarking against relevant external (whether public or non-public) or internal data sources<sup>143</sup>. Benchmarking may be conducted for individual components of each rating system, including the underlying credit scorecard output, internal ratings, calibrated estimates such as PDs, LGDs, EADs as well as migration matrices.

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<sup>143</sup> This may include outputs from credit bureaus, rating agencies, external market-based models, peer entities for similar portfolios and internal experts.

- S** 42.41 Where benchmarking is performed, a financial institution shall ensure that the benchmarks are based on data that are appropriate to the portfolio, updated regularly, and cover a relevant observation period.
- S** 42.42 Where relevant third-party benchmarks are publicly available for a specific portfolio, a financial institution is required to use third party benchmarks appropriately and effectively. Where such third-party benchmarks are not used, a financial institution shall provide valid justifications.

*(iii) Stability*

- S** 42.43 A financial institution shall assess the stability of rating systems in terms of discriminatory power for PD models, and stability of realised outputs for EAD and LGD models. The analysis shall be conducted at overall level, at segmentation level and down to variable level where relevant.
- S** 42.44 For in-sample validation, a financial institution shall analyse the stability across different time periods. In addition to in-sample validation, a financial institution shall also assess stability for PD models at minimum on an out-of-sample and out-of-time basis.
- S** 42.45 For cases where a financial institution is unable to employ typical out-of-sample and out-of-time validations due to data constraints, a financial institution shall employ other statistical techniques such as k-fold cross validation or bootstrapping tests for this purpose. When a financial institution uses these statistical techniques, the financial institution shall be able to demonstrate the rationale and the appropriateness of the chosen techniques and understand the limitations of these techniques.
- S** 42.46 A financial institution shall quantify and assess the relative shift in obligor distribution between the data used to build the model in relation to the population of actual borrowers or facilities<sup>144</sup>. The analysis shall be conducted at overall level, at segmentation level and down to variable level where relevant.
- S** 42.47 In relation to paragraph 42.46, where development data is no longer representative of an existing portfolio, a financial institution shall conduct additional analysis to determine whether a model redevelopment is required.

*Quantitative review: Additional considerations*

*(i) Requirements relating to validation techniques*

- S** 42.48 Regardless of the method chosen for validation, a financial institution shall explain the rationale and the appropriateness of the chosen validation techniques, when requested by the Bank. The financial institution shall also be able to demonstrate an understanding of the limitations, if any, of such techniques.

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<sup>144</sup> For instance, a financial institution may compute the population stability index to quantify the relative shift.

- S** 42.49 In addition, a financial institution shall demonstrate to the Bank that the underlying characteristics of the rating system (including rating philosophy) and the underlying portfolio are well understood and properly considered when determining which validation tools and techniques are applied. This applies to both the choice of validation methods for assessing the discriminatory power, accuracy and stability of a rating system, and the choice of methods for assessing the appropriateness of the stress tests applied.
- S** 42.50 Where the Bank requires an application of any specific validation technique to a portfolio, the financial institution shall comply with such requirement.
- S** 42.51 A financial institution's internal assessments of rating systems performance shall be based on long data histories, covering a range of economic conditions, and ideally one or more complete business cycles. The assessment shall establish whether rating systems are able to perform over the long run as well as for more recent data periods.
- S** 42.52 A financial institution shall demonstrate that the adopted quantitative testing methods and other validation methods do not vary systematically with the economic cycle. The financial institution shall justify and clearly document changes in methods and data (both data sources and periods covered).
- S** 42.53 A financial institution shall review and improve validation techniques in response to changing markets and practices in the industry as more data becomes available.
- S** 42.54 A financial institution shall notify the Bank in writing where it makes major changes to existing validation methods, applicability of existing validation methods, or validation thresholds. For the avoidance of doubt, introducing new validation methods and their associated thresholds are not considered a change to existing validation methods.
- S** 42.55 If an outcome of a validation method on a particular portfolio or segment is unreliable or inconclusive because of the lack or total absence of internal default data, a financial institution shall consider other methods and techniques. The validation function shall not consider validation test outcomes that are unreliable or inconclusive when forming opinions on rating system's performance.
- S** 42.56 A financial institution shall rely on alternative data sources and data-enhancing tools for quantification, and alternative techniques for validation in cases where transparency of the model's development is inadequate or where there is scarcity of internal performance data. Several of these tools and techniques, most of which are especially relevant for low default portfolios (LDPs) (and for PDs in particular), are described in Appendix 3. The Bank also recognises that there are circumstances in which a financial institution will legitimately lack sufficient default history to compare realised default rates with parameter estimates that may be based in part on historical data. In such cases, greater reliance shall be placed on other validation techniques, including those described in Appendix 3.

- S** 42.57 For non-retail LDPs, a financial institution shall conduct expert ranking or expert rating exercises in addition to any existing validation tests. Where external ratings are available for exposures within non-retail LDPs, a financial institution shall conduct benchmarking against external ratings.

*(ii) Requirements on external models*

- S** 42.58 A financial institution shall periodically assess the performance of any external models used in its IRB processes to ensure the models continue to function as intended. Since external model parameters and weights may have been calibrated using external data, the financial institution shall test the performance of the external models against its own portfolio of exposures. In addition, the financial institution shall also undertake procedures to verify the accuracy and consistency of any external data used within its IRB risk quantification processes. This can be done, among other ways, by comparing the results obtained using the external data to the results obtained using its own portfolio data in the same risk rating, segmentation, or parameter estimation models or methods.

*Qualitative review*

- S** 42.59 Apart from the more technical and quantitative review of the rating system components (data, models, etc.), a financial institution shall also review the adequacy and effectiveness of rating system processes, the oversight structure and control procedures to ensure the forward-looking accuracy of the IRB estimates. At a minimum, the review shall cover rating system documentation, rating operations (including rating coverage, data inputs, rating assignment, rating reviews, overrides and data maintenance), data systems and controls, the governance (including level of understanding and training of personnel in key oversight roles) as well as control (including independence) framework and internal use of ratings.

**Reporting and approval procedures**

- S** 42.60 The validation function shall deliberate validation results with the development team and business units, and bring the results before the board or its designated board-level committee for deliberation and approval.
- S** 42.61 The validation function shall periodically track and report validation results, particularly model issues and their resolution progress, until they are fully resolved. This progress shall be clearly documented. A financial institution shall explicitly report validation issues outstanding over one year to the board or its designated board-level committee on a periodic basis.

**Frequency of validation**

- S** 42.62 A financial institution's internal policies shall establish the frequency or cycle of the validation exercise and the scope of validation for each cycle. The internal policies shall also address situations that may call for validation outside the normal cycle.

- S** 42.63 A financial institution shall conduct validation of internal estimates prior to the adoption of IRB rating systems. Validation shall also be conducted at least annually for implemented IRB rating systems, as well as for IRB rating systems that have been granted prior written approval by the Bank but have yet to be rolled-out.
- S** 42.64 A financial institution shall also conduct validation after making material changes to its rating systems.

### **Internal tolerance thresholds and management actions**

- S** 42.65 A financial institution shall have clearly written and properly documented internal standards on the following:
- (a) tolerance thresholds and limits for assessing the discriminatory power of rating systems, as well as for back-testing deviations in realised PDs, LGDs and EADs from expectations; and
  - (b) associated response and remedial actions to be taken based on the results of the tests of discriminatory power and back-testing. This may include requiring more detailed analysis (such as more detailed analysis of discriminatory power of model drivers), increase in validation frequency, or revisions to the rating system (ranging from redesigning, recalibration, or full replacement of the estimates or model). The remedial actions shall be taken in a timely manner.
- S** 42.66 The internal standards for back-testing shall take into account business cycles and similar systematic variability in default experiences. Where realised values continue to be higher than expected values, a financial institution shall revise estimates upward to reflect higher default and loss experience.
- S** 42.67 Where the Bank requires a financial institution to adopt specific tolerance thresholds, a financial institution shall comply with such requirement.

### **Supervisory approach to validation**

- S** 42.68 The validation of models adopted by a financial institution is ultimately the financial institution's responsibility. The financial institution shall be able to satisfy the Bank that a model has good predictive power and that regulatory capital will not be under-estimated as a result of its adoption.
- S** 42.69 The Bank shall review the results of the validation and independent reviews conducted by a financial institution. In reviewing the results, the Bank might carry out its own statistical tests on a financial institution's data, require financial institutions to conduct additional validation tests or require an external validator to review the financial institution's models where necessary. Any costs associated with the reviews shall be borne by the financial institution.

## **43 Post development model adjustments**

- S** 43.1 Post-development model adjustments (PDMAs) shall be defined as any non-permanent adjustments applied on top of existing IRB rating systems which may affect computation of RWA or EL. PDMAs are typically introduced to address

model limitations where risk and uncertainties are not adequately reflected in existing IRB rating systems.

- S** 43.2 A financial institution shall establish a robust framework on the use of PDMA, which shall cover at least the following:
- (a) governance and control framework for reviewing and supporting the use of PDMA;
  - (b) processes involved in the design and estimation of PDMA; and
  - (c) circumstances in which PDMA is to be introduced, modified or removed.
- S** 43.3 Where a financial institution intends to apply PDMA, the financial institution shall ensure the following:
- (a) PDMA are clearly documented, supported by senior management and approved by an appropriate level of authority;
  - (b) PDMA are applied in a systemic and transparent manner;
  - (c) PDMA are time-bound; and
  - (d) the impact of PDMA is made clear when model outputs are reported for use in decision making, with model results being presented with and without PDMA.
- S** 43.4 Notwithstanding the application of PDMA, a financial institution shall produce a rectification plan to address the underlying issue which necessitates the application of PDMA. For the avoidance of doubt, the financial institution shall not consider the existence of PDMA to justify maintenance of non-compliant rating systems.
- S** 43.5 A financial institution shall notify the Bank in writing prior to introducing, modifying or removing any PDMA with at least the following implementation details:
- (a) the rationale for the PDMA;
  - (b) design of the PDMA;
  - (c) data and methodology used in derivation of the PDMA;
  - (d) impact on RWA and EL; and
  - (e) effective period of the PDMA.
- S** 43.6 A financial institution shall subject PDMA to regular independent review, which shall cover at least the following:
- (a) rationale to support the use of PDMA as opposed to more permanent remedial actions;
  - (b) assessment of the continued relevance of PDMA given the rationale; and
  - (c) qualitative reasoning and quantitative analysis in relation to derivation and adequacy of the PDMA.
- S** 43.7 A financial institution shall put in place PDMA to offset any potential material underestimation of RWA and/or EL when identified for any particular rating system.

#### **44 Model inventory and tiering**

- S** 44.1 A financial institution shall maintain an up-to-date model inventory for all models used for capital computation at minimum. This includes models implemented for

use, models pending implementation but approved by the Bank for use, and models that have been decommissioned. The model inventory shall at minimum include the following details for each model:

- (a) name of the model;
- (b) scope of the model and materiality of the associated exposures:
  - (i) portfolios or products covered;
  - (ii) IRB asset-class or sub-class; and
  - (iii) materiality (IRB EAD and RWA) of the exposures covered by the model, at both entity and group level;
- (c) model implementation status<sup>145</sup>;
- (d) general model details, including:
  - (i) IRB credit risk components produced;
  - (ii) brief description of the modelling methodology used;
  - (iii) key assumptions and limitations of the model, especially where related to operating boundaries of the model; and
  - (iv) model owner; and
- (e) details relating to validation and audit:
  - (i) outcome of latest review;
  - (ii) date of latest review;
  - (iii) individuals responsible for latest review; and
  - (iv) key review findings and remediation progress.

- G** 44.2 A comprehensive model inventory serves as a central tool for model risk management which enables a financial institution to have a comprehensive overview of all models in use. The financial institution may also employ risk-based tiering approaches to prioritise resources for validation activities, model rectifications and other risk controls.

#### Question 5

Please provide any feedback, including if your financial institution would face implementation challenges to meet the requirements with regards to validation, post development model adjustment and model inventory.

### 45 Supervisory LGD and EAD estimates

- S** 45.1 A financial institution adopting the F-IRB approach shall, in order to receive recognition for eligible financial collateral, meet the requirements of paragraphs 45, 46 and 49 of the SACR PD. Additionally, the financial institution shall meet the requirements in this paragraph to receive recognition for additional collateral type (i.e. eligible commercial/residential real estate, financial receivables, other physical assets).

<sup>145</sup> For example, whether it is implemented for use, approved by the Bank but pending FI's implementation or have been decommissioned.

**Eligibility of commercial and residential real estate as collateral**

- S** 45.2 A financial institution shall, in order to deem a commercial or residential real estate as eligible collateral for corporate, sovereign, and bank exposures, ensure that:
- (a) the risk of the borrower is not materially dependent upon the performance of the underlying property or project, but rather on the underlying capacity of the borrower to repay the debt from other sources<sup>146</sup>; and
  - (b) the value of the collateral pledged is not materially dependent on the performance of the borrower<sup>147</sup>.
- S** 45.3 For the avoidance of doubt, a financial institution shall not deem IPRE under the SF asset class as eligible collateral.
- S** 45.4 In addition to the requirements under paragraph 45.2, a financial institution shall meet all the following operational requirements:
- (a) *Legal enforceability*: Any claim on collateral taken shall be legally enforceable in all relevant jurisdictions and properly filed in a timely manner. The financial institution shall ensure that all legal requirements for establishing the claim have been fulfilled<sup>148</sup>. In addition, the collateral agreement and legal process shall enable the financial institution to realise the value of the collateral within a reasonable timeframe;
  - (b) *Objective market value*: Collateral shall be valued no more than the current fair value under which the property could be sold under private contract between a willing seller and an arm's length buyer on the date of valuation;
  - (c) *Frequent revaluation*: The financial institution shall monitor the value of collateral regularly and at minimum once a year<sup>149, 150</sup>. A qualified professional shall evaluate the property when information indicates that the value of the collateral may have declined materially or when a credit event, such as default occurs; and
  - (d) *Treatment of junior lien*: A financial institution shall only recognise junior lien if all earlier liens are made by the same financial institution. In addition, the financial institution shall be able to demonstrate that such junior lien is enforceable and that there have been precedent cases where the financial institution has been able to recoup the residual value. Where a financial institution recognises junior lien, it shall first take the value of the collateral after the appropriate haircuts, then reduce it by the sum of

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<sup>146</sup> As such, repayment of the facility is not materially dependent on any cash flow generated by the underlying commercial or residential real estate serving as collateral.

<sup>147</sup> This requirement is not intended to preclude situations where purely macro-economic factors affect both the value of the collateral and the performance of the borrower.

<sup>148</sup> In line with the requirements in paragraph 46.1 of SACR PD.

<sup>149</sup> More frequent monitoring is encouraged where the market is subject to significant changes in conditions.

<sup>150</sup> A financial institution may use statistical methods of evaluation (e.g. reference to house price indices, sampling) to update estimates or to identify collateral that may have declined in value and that may need re-appraisal.

all financings with liens that rank higher than the junior lien. The remaining value is the collateral that supports the financing with the junior lien<sup>151</sup>.

### Question 6

The Bank proposes to mandate the revaluation of property to be conducted by a qualified professional where conditions are met in line with the requirements set out in paragraph 45.4(c). Please indicate feedback (if any) with regards to this proposal.

- S** 45.5 Additionally, a financial institution shall have in place and implement robust processes for collateral management. This includes to:
- (a) document the types of commercial and residential real estate collateral accepted and the lending policies such as advance rates when this type of collateral is taken;
  - (b) take steps to ensure that the property taken as collateral is adequately insured against damage or deterioration;
  - (c) monitor the extent of any permissible prior claims (e.g. tax) on the property on an ongoing basis; and
  - (d) monitor risk of environment liability arising in relation to the collateral<sup>152</sup>.

### Financial receivables

- S** 45.6 A financial institution may recognise claims with an original maturity of less than or equal to one year where repayment will occur through the commercial or financial flows related to the underlying assets of the borrower as eligible financial receivables<sup>153</sup>. However, the financial institution shall not recognise receivables associated with securitisations, sub-participations or credit derivatives as eligible collateral.
- S** 45.7 A financial institution shall also meet all of the operational requirement described in paragraphs 45.8 and 45.13 to recognise eligible financial receivables as collateral.
- S** 45.8 A financial institution shall ensure that the legal mechanism by which collateral is given is robust and that it ensures that the financial institution has clear rights over the proceeds from the collateral. This includes ensuring that:
- (a) the local requirements in respect of enforceability of security interest are met<sup>154</sup>;

<sup>151</sup> Where there are liens held by third parties that are ranked *pari passu* with the lien of the financial institution, only the proportion of the collateral (after the application of haircuts and reductions due to the value of financings with liens that rank higher than the lien of the financial institution) that is attributable to the financial institution may be recognised.

<sup>152</sup> For example, the presence of toxic material on a property.

<sup>153</sup> This includes both self-liquidating debt arising from the sale of goods or services linked to a commercial transaction and general amounts owed by buyers, suppliers, renters, national and local government authorities, or other non-affiliated parties not related to the sale of goods or services linked to a commercial transaction.

<sup>154</sup> For example, by registering a security interest with a registrar.

- (b) there is a framework that allows the potential financier to have a perfected first priority claim over the collateral;
  - (c) all documentation used in collateralised transactions is legally binding and enforceable against all parties in all relevant jurisdictions. The financial institution shall conduct sufficient legal review to verify this and have a well-founded legal basis to reach this conclusion, and undertake such further review as necessary to ensure continuing enforceability;
  - (d) collateral arrangements are properly documented, and contains clear procedures for the timely collection of collateral proceeds;
  - (e) any legal conditions required for declaring the default of the customer and timely collection of collateral are observed; and
  - (f) where an obligor is in default or financial distress, the financial institution shall have legal authority to sell or assign the receivables to other parties without consent of the receivables' obligors.
- S** 45.9 A financial institution shall have a sound process to determine the credit risk in the receivables. The process shall, at minimum, include an analysis of the borrower's business and industry<sup>155</sup>, and the types of customers with whom the borrower has financial transaction or business. Where the financial institution relies on a borrower to ascertain the credit risk of its customers, the financial institution shall review the borrower's credit policy to ascertain its soundness and credibility.
- S** 45.10 A financial institution shall reflect all appropriate factors, including cost of collection, concentration within the receivables pool pledged by an individual borrower and potential concentration risk across the financial institution's financing portfolio, within the margin between the amount of the exposure and the value of the receivables.
- S** 45.11 A financial institution shall maintain a process for continuously monitoring the exposures attributable to the financial receivables utilised as a risk mitigant. The process shall be appropriate for the specific type of exposures<sup>156</sup>. This process shall include regular monitoring of compliance against the financial institution's overall concentration limits, as well as regular reviews of compliance with financing covenants, environmental restrictions, and other legal requirements.
- S** 45.12 A financial institution shall ensure that the receivables pledged by a borrower are diversified, and are not unduly correlated with that borrower. Where correlation between the collateral and the borrower is high<sup>157</sup>, the financial institution shall take into account the attendant risks in the setting of margins for the collateral pool as a whole. However, the financial institution shall not

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<sup>155</sup> For example, effects of the business cycle.

<sup>156</sup> A financial institution may employ relevant processes and analyses, among others including, ageing reports, control of trade documents, borrowing base certificates, frequent audits of collateral, confirmation of accounts, control of proceeds of accounts paid, analyses of dilution (credits given by the borrower to the issuers) and regular financial analysis of both the borrowers and the issuers of the receivables, especially in the case when a small number of large-sized receivables are taken as collateral.

<sup>157</sup> Such as situations where the issuers of the receivables are reliant on the borrower for their viability, or the borrower and the issuers belong to a common industry.

recognise receivables from persons and entities affiliated with the borrower (e.g. subsidiaries, employees) as risk mitigants.

- S** 45.13 A financial institution shall have a documented process for collecting receivable payments in distressed situations and put in place the requisite facilities for such collections, even when the financial institution normally looks to the borrower for collections.

#### **Other physical collateral**

- S** 45.14 In order to recognise the credit risk mitigating effects of certain other physical collateral, a financial institution shall satisfy the Bank that:
- (a) there are liquid markets for disposal of collateral in an expeditious and economically efficient manner. The financial institution shall carry out a reassessment of this condition periodically and as and when information indicates material changes in the market; and
  - (b) there are well established, publicly available market prices for the collateral. The financial institution shall demonstrate that the amount they receive when collateral is realised does not deviate significantly from these market prices.
- S** 45.15 A financial institution intending to recognise additional physical collateral shall meet the operational requirements spelled out in paragraph 45.4, and have in place and implement robust processes for collateral management in line with paragraph 45.5, subject to the following modifications:
- (a) only first liens on, or charges over, collateral are permissible;
  - (b) the financing agreement shall include detailed descriptions of the collateral and the right to examine and revalue the collateral whenever this is deemed necessary;
  - (c) the types of physical collateral accepted and policies and practices in respect of the appropriate amount of each type of collateral relative to the exposure amount shall be documented in internal credit policies and procedures and available for examination and/or audit review;
  - (d) the financial institution's credit policies with regard to the transaction structure shall address appropriate collateral requirements relative to the exposure amount, the ability to liquidate the collateral readily, the ability to establish objectively a price or market value, the frequency with which the value can readily be obtained (including a professional appraisal or valuation), and the volatility of the value of the collateral. The periodic revaluation process shall pay particular attention to "fashion-sensitive" collateral to ensure that valuations are appropriately adjusted downward of fashion, or model-year, obsolescence as well as physical obsolescence or deterioration; and
  - (e) in cases of inventories<sup>158</sup> and equipment, the periodic revaluation process shall include physical inspection of the collateral.

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<sup>158</sup> For example, raw materials, work-in-process, finished goods, dealers' inventories of vehicles.

- S** 45.16 Where a registered claim of a company's assets<sup>159</sup> include both assets that are not eligible and those that are eligible under F-IRB approach, a financial institution shall only be allowed to recognise the latter subject to compliance with the operational requirements set out in paragraphs 45.1 to 45.15.

## **46 Leases**

- S** 46.1 A financial institution shall only be allowed to treat a lease exposure that does not expose the financial institution to residual value risk as collateralised by the same type of collateral if:
- (a) the minimum requirements for the specific collateral type are met (commercial or residential real estate or other collateral);
  - (b) the lessor possesses robust risk management with respect to the location and the use of the asset, its age, and planned obsolescence;
  - (c) the lessor's legal ownership and its ability to exercise its rights as owner in a timely manner is established by a robust legal framework; and
  - (d) the difference between the rate of depreciation of the physical asset and the rate of amortisation of the lease payments shall not be so large as to overstate the CRM attributed to the asset.
- S** 46.2 For leases that expose the financial institution to residual value risk<sup>160</sup>, the financial institution shall assign:
- (a) an appropriate risk weight to the discounted lease payment stream for the lessee's financial strength (PD) and supervisory or own estimate of LGD, whichever is appropriate; and
  - (b) a risk weight of 100% to the residual value.

## **47 Disclosure**

- S** 47.1 A financial institution shall meet the disclosure requirements in the policy document on *Risk Weighted Capital Adequacy Framework (Basel II) – Disclosure Requirements (Pillar 3)*.

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<sup>159</sup> For example, General Security Agreements, and other forms of floating charge could provide the lending financial institution with a registered claim over a company's assets.

<sup>160</sup> Refers to leases where the financial institution is exposed to potential loss due to the fair value of the equipment declining below its residual estimate at lease inception.

## PART J OTHER REQUIREMENTS

### 48 Approval for IRB adoption

- S** 48.1 A financial institution intending to adopt the IRB approach in determining the regulatory capital requirements for credit risk shall obtain the Bank's prior written approval. This includes the following circumstances:
- (a) first-time adoption of the IRB approach within the financial institution; or
  - (b) for a financial institution approved to adopt IRB and with existing exposures under the IRB approach:
    - (i) migration of exposures currently under the Standardised Approach to the IRB approach; and
    - (ii) changes to an approved IRB rating system or scope of applicability of an approved IRB rating system.
- S** 48.2 A financial institution seeking the Bank's approval under paragraph 48.1, shall submit an application in writing to the Bank for consideration to the following:
- (a) Pengarah, Jabatan Penyeliaan Konglomerat Kewangan; or
  - (b) Pengarah, Jabatan Penyeliaan Perbankan,
- as the case may be.
- S** 48.3 Where a financial institution seeks the Bank's prior written approval to adopt the IRB approach, the financial institution shall implement the IRB approach on a banking group basis. Specifically, if one financial institution within the banking group applies to the Bank to adopt the IRB approach, all other financial institutions shall also likewise apply to adopt the IRB approach unless that financial institution's credit risk exposures are not material.

### Submission of application

- S** 48.4 An application by a financial institution in relation to paragraph 48.1 shall be made in writing to the Bank and submitted together with the following documents and information as set out in Appendix 1 which shall include:
- (a) general information on the financial institution's overall implementation plan for IRB adoption<sup>161</sup>;
  - (b) specific information with regard to the IRB systems including rating system design, operations, estimation and validation and internal governance structure of the rating system;
  - (c) outcomes of a self-assessment of the financial institution's compliance with the minimum requirements described under Part I in this Policy Document. Gaps identified from the self-assessment exercise shall be documented and reported to the board; and
  - (d) any other document, information or evidence that may facilitate the Bank's assessment of the application or as specified by the Bank<sup>162</sup>.

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<sup>161</sup> Including the rationale for applying for IRB status, governance structure for implementing IRB, scope of IRB coverage and timeline for the rollout.

<sup>162</sup> e.g. internal policies, procedures, technical documents, internal and/or external audit reports.

- S** 48.5 In relation to paragraph 48.4, a financial institution shall produce an implementation plan, specifying the intended IRB roll out plan across significant asset classes and business units within the banking group over time. The intended roll out plan shall:
- (a) be realistic (and agreed in writing with the Bank);
  - (b) be driven by practicality and feasibility of moving to more advanced approaches;
  - (c) not be dictated by the desire to minimise any capital requirements; and
  - (d) result in all asset class or portfolios that represent material parts of the financial institution's business in terms of size or risk being covered by the IRB approach.
- S** 48.6 A locally-incorporated foreign financial institution seeking the Bank's prior written approval under paragraph 48.1 with an intent to adapt or use systems, processes or models developed and adopted by its parent financial institution (herein referred to as global/regional IRB models<sup>163</sup>) for implementation in Malaysia shall also submit the information outlined in Appendix 1 together with the written application for the Bank's assessment.
- S** 48.7 A financial institution shall ensure that all documents and information submitted are up to date upon submission.
- S** 48.8 In the case of a model submission where prior iterations may no longer be representative or applicable upon model submission, a financial institution shall provide updated assessments<sup>164</sup> to the Bank.
- S** 48.9 Notwithstanding paragraphs 48.4 and 48.6, where the Bank requires additional documents or information at any point in time during or after the submission of an application, a financial institution shall submit the required document or information without delay to facilitate timely assessment of the application.

### **Timelines for IRB submission**

- S** 48.10 A financial institution intending to adopt the IRB approach for the first-time shall notify the Bank in writing its intention no later than three years prior to the intended IRB implementation date. The full application shall be submitted to the Bank no later than two years prior to the intended IRB implementation date.
- S** 48.11 A financial institution intending to adopt the IRB approach for the first time will be subjected to a parallel calculation period of no less than one year prior to the actual IRB implementation, during which time, the financial institution shall submit regulatory templates to the Bank based on the IRB approach on a quarterly basis (in addition to submitting regulatory templates based on the Standardised Approach).

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<sup>163</sup> Generally characterised as systems, processes or models which are (i) owned by either the regional or global risk management committee (in terms of model commission, development and approval); (ii) adapted (e.g. in terms of PD calibration) to the Malaysian market using Malaysian customer/market data either as part of a larger data set, or on its own; and (iii) largely standardised globally, but may incorporate Malaysian-specific practices.

<sup>164</sup> Including technical assessments, evidence of use test, internal and/or external audit reports.

- S** 48.12 In addition, prior to applying for the IRB adoption, a financial institution shall comply with all minimum requirements for IRB adoption set out in Part I, except for the requirement on the use of internal ratings information as specified in paragraph 35.7, whereby the financial institution shall instead demonstrate credible use of ratings information for at least one year.
- S** 48.13 For the avoidance of doubt, a financial institution shall continue to comply with the requirement for credible use of ratings information for at least three years prior to the actual IRB implementation<sup>165</sup>.

### **Assessment of application**

- S** 48.14 In assessing an application, the Bank seeks to establish that a financial institution is capable of meeting the minimum requirements and the Bank's expectations in implementing IRB approach as set out in Part I. For this purpose, the financial institution shall be able to demonstrate the following, among others:
- (a) the ability of a financial institution to implement the IRB approach in a sustainable fashion, including whether there is strong support from the board and whether there are adequate resources to ensure smooth progress in implementing the IRB approach;
  - (b) whether the systems, processes and IRB models developed are fit for purpose;
  - (c) the capability (including risk management capability) of the financial institution to support effective IRB implementation<sup>166</sup>; and
  - (d) the commitment and discipline to execute the planned initiatives in accordance with the implementation plan and timeline<sup>167</sup>.
- S** 48.15 In the case of a locally-incorporated foreign financial institution intending to adapt or use its global/regional IRB models for implementation in Malaysia, the Bank also seeks to ascertain the suitability of these IRB models for use in Malaysia. While IRB model performance testing may have been performed at the global/regional level, the locally-incorporated foreign financial institution shall provide supplementary analysis to the Bank if global/regional models are not reasonably and sufficiently representative of the default and loss experience in Malaysia.
- G** 48.16 The Bank may, in assessing an application by a locally-incorporated foreign financial institution, consult and coordinate with its home supervisor<sup>168</sup>.

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<sup>165</sup> A financial institution may utilise the time allocated for the review period by the Bank and parallel run period to meet the three years requirement.

<sup>166</sup> For example, a financial institution that has been using internal ratings in critical decision-making would have less difficulty in meeting the use test requirements of the IRB approach.

<sup>167</sup> Including a financial institution's ability to complete the implementation of IRB over the remainder of its portfolio (i.e. those under temporary exemption).

<sup>168</sup> Including taking into consideration the home regulator's feedback in the final model for local adoption.

**Communication of decision**

- G** 48.17 Where the Bank is satisfied that a financial institution has met the minimum requirements to adopt IRB, the Bank may approve in writing the financial institution's application, with or without conditions<sup>169</sup>.
- G** 48.18 The Bank endeavours to communicate decision in relation to paragraph 48.17 within one year upon receipt of the full application from a financial institution.
- G** 48.19 Notwithstanding paragraph 48.18, in cases where one or several material issues arise<sup>170</sup> which warrant greater scrutiny in assessing the application, the Bank reserves the right to defer the decision until such time that the Bank is satisfied to do so.

**Roll out of implementation plan**

- S** 48.20 A financial institution which has been granted with an approval by the Bank to adopt the IRB approach shall roll out such adoption in accordance with the approved implementation plan.
- S** 48.21 In relation to paragraph 48.20, a financial institution shall provide periodic updates to the Bank on the progress of the IRB adoption until it is fully implemented, in a mode and at a frequency to be agreed by both the Bank and the financial institution.
- G** 48.22 A financial institution may adopt a phased roll out of the IRB approach across business units in the following manner:
- (a) adoption of IRB approach across individual asset class within the same business unit;
  - (b) adoption of IRB approach across business units within the financial institution; and
  - (c) move from the F-IRB approach to A-IRB approach for risk components where the use of A-IRB approach is permitted.
- S** 48.23 A financial institution shall seek the Bank's prior written approval for any changes to the roll-out plan.

**49 Other approvals**

- S** 49.1 For any application other than those relating to IRB adoption set out in paragraph 48.1, a financial institution shall address such application to the following:
- (a) Pengarah, Jabatan Penyeliaan Konglomerat Kewangan; or
  - (b) Pengarah, Jabatan Penyeliaan Perbankan,
- as the case may be.

<sup>169</sup> This may include the Bank specifying a transitional arrangement on the output floor requirement set out in paragraph 50 or a different transitional arrangement that the Bank deems fit.

<sup>170</sup> e.g. non-performing models, inadequate assessments or slow response from the financial institution.

For the avoidance of doubt, a financial institution seeking the Bank’s approval under this paragraph is not subject to meeting the detailed requirements set out in paragraphs 48.4 to 48.23.

## **50 Transitional arrangements**

- S** 50.1 Ahead of the requirements in this Policy Document coming into formal effect on 1 January 2028, a financial institution shall conduct parallel reporting between 1 July 2027 until 31 December 2027. During this parallel reporting period, the financial institution shall submit to the Bank reporting templates accompanying this Policy Document in addition to the existing IRB credit risk reporting requirements for CAF RWA PD and CAFIB RWA PD in force during that period.
- S** 50.2 The following output floor levels shall apply until 31 December 2032, in place of the amount set out in paragraph 6.1(b):

<b>Year</b>	<b>Output floor level</b>
2028	50%
2029	55%
2030	60%
2031	65%
2032	70%

From 1 January 2033 onwards, the output floor level shall be 72.5%, in accordance with paragraph 6.1(b).

## APPENDICES

### APPENDIX 1 Supervisory slotting approach for specialised financing

The following tables in this Appendix set out the criteria for determining which supervisory category would be applicable for a given SF exposure under the SSA. SF exposures that are classified as defaulted exposures as set out in paragraphs 36.12 to 36.14 shall be mapped to the “Default” supervisory category.

#### Project Finance

	<b>Strong</b>	<b>Good</b>	<b>Satisfactory</b>	<b>Weak</b>
<b>Financial strength</b>				
Market conditions	Few competing suppliers or substantial and durable advantage in location, cost, or technology. Demand is strong and growing	Few competing suppliers or better than average location, cost, or technology but this situation may not last. Demand is strong and stable	Project has no advantage in location, cost, or technology. Demand is adequate and stable	Project has worse than average location, cost, or technology. Demand is weak and declining
Financial ratios (e.g. debt service coverage ratio (DSCR), financing life coverage ratio, project life)	Strong financial ratios considering the level of project risk; very robust economic assumptions	Strong to acceptable financial ratios considering the level of project risk; robust project economic assumptions	Standard financial ratios considering the level of project risk	Aggressive financial ratios considering the level of project risk

coverage ratio, and debt-to-equity ratio)				
Stress analysis	The project can meet its financial obligations under sustained, severely stressed economic or sectoral conditions	The project can meet its financial obligations under normal stressed economic or sectoral conditions. The project is only likely to default under severe economic conditions	The project is vulnerable to stresses that are not uncommon through an economic cycle, and may default in a normal downturn	The project is likely to default unless conditions improve soon
<i>Financial structure</i>				
Duration of the credit compared to the duration of the project	Useful life of the project significantly exceeds tenor of the financing	Useful life of the project exceeds tenor of the financing		Useful life of the project may not exceed tenor of the financing
Amortisation schedule	Amortising financing		Amortising financing repayments with limited bullet payment	Bullet repayment or amortising financing repayments with high bullet repayment
<b>Political and legal environment</b>				
Political risk, including transfer risk, considering	Very low exposure; strong mitigation instruments, if needed	Low exposure; satisfactory mitigation instruments, if needed	Moderate exposure; fair mitigation instruments	High exposure; no or weak mitigation instruments

project type and mitigants				
Force majeure risk (war, civil unrest, etc),	Low exposure	Acceptable exposure	Standard protection	Significant risks, not fully mitigated
Government support and project's importance for the country over the long term	Project of strategic importance for the country (preferably export-oriented). Strong support from Government	Project considered important for the country. Good level of support from Government	Project may not be strategic but brings unquestionable benefits for the country. Support from Government may not be explicit	Project not key to the country. No or weak support from Government
Stability of legal and regulatory environment (risk of change in law)	Favourable and stable regulatory environment over the long term	Favourable and stable regulatory environment over the medium term	Regulatory changes can be predicted with a fair level of certainty	Current or future regulatory issues may affect the project
Acquisition of all necessary supports and approvals for such relief from local content laws	Strong	Satisfactory	Fair	Weak
Enforceability of contracts,	Contracts, collateral and security are enforceable		Contracts, collateral and security are considered	There are unresolved key issues in respect of actual

collateral and security			enforceable even if certain non-key issues may exist	enforcement of contracts, collateral and security
<b>Transaction characteristics</b>				
<i>Design and technology risk</i>	Fully proven technology and design		Proven technology and design – startup issues are mitigated by a strong completion package	Unproven technology and design; technology issues exist and/or complex design
<i>Construction risk</i>				
Permitting and siting	All permits have been obtained	Some permits are still outstanding but their receipt is considered very likely	Some permits are still outstanding but the permitting process is well defined and they are considered routine	Key permits still need to be obtained and are not considered routine. Significant conditions may be attached
Type of construction contract	Fixed-price date-certain turnkey construction engineering and procurement contract (EPC)	Fixed-price date-certain turnkey construction EPC	Fixed-price date-certain turnkey construction contract with one or several contractors	No or partial fixed-price turnkey contract and/or interfacing issues with multiple contractors
Completion guarantees	Substantial liquidated damages supported by financial substance and/or strong completion guarantee from sponsors with	Significant liquidated damages supported by financial substance and/or completion guarantee from sponsors with good financial standing	Adequate liquidated damages supported by financial substance and/or completion guarantee from sponsors with good financial standing	Inadequate liquidated damages or not supported by financial substance or weak completion guarantees

	excellent financial standing			
Track record and financial strength of contractor in constructing similar projects	Strong	Good	Satisfactory	Weak
<i>Operating risk</i>				
Scope and nature of operations and maintenance (O&M) contracts	Strong long-term O&M contract, preferably with contractual performance incentives, and/or O&M reserve accounts	Long-term O&M contract, and/or O&M reserve accounts	Limited O&M contract or O&M reserve account	No O&M contract: risk of high operational cost overruns beyond mitigants
Operator's expertise, track record, and financial strength	Very strong, or committed technical assistance of the sponsors	Strong	Acceptable	Limited/weak, or local operator dependent on local authorities
<i>Off-take risk</i>				
(a) If there is a take-or-pay or fixed-price off-take contract	Excellent creditworthiness of off-taker; strong termination clauses; tenor of contract comfortably	Good creditworthiness of off-taker; strong termination clauses; tenor of contract exceeds the maturity of the debt	Acceptable financial standing of off-taker; normal termination clauses; tenor of contract	Weak off-taker; weak termination clauses; tenor of contract does not exceed the maturity of the debt

	exceeds the maturity of the debt		generally matches the maturity of the debt	
(b) If there is no take-or-pay or fixed-price off-take contract	Project produces essential services or a commodity sold widely on a world market; output can readily be absorbed at projected prices even at lower than historic market growth rates	Project produces essential services or a commodity sold widely on a regional market that will absorb it at projected prices at historical growth rates	Commodity is sold on a limited market that may absorb it only at lower than projected prices	Project output is demanded by only one or a few buyers or is not generally sold on an organised market
<i>Supply risk</i>				
Price, volume and transportation risk of feedstocks; supplier's track record and financial strength	Long-term supply contract with supplier of excellent financial standing	Long-term supply contract with supplier of good financial standing	Long-term supply contract with supplier of good financial standing - a degree of price risk may remain	Short-term supply contract or long-term supply contract with financially weak supplier - a degree of price risk definitely remains
Reserve risks (e. g. natural resource development)	Independently audited, proven and developed reserves well in excess of requirements over lifetime of the project	Independently audited, proven and developed reserves in excess of requirements over lifetime of the project	Proven reserves can supply the project adequately through the maturity of the debt	Project relies to some extent on potential and undeveloped reserves

<b>Strength of sponsor</b>				
Sponsor's track record, financial strength, and country/sector experience	Strong sponsor with excellent track record and high financial standing	Good sponsor with satisfactory track record and good financial standing	Adequate sponsor with adequate track record and good financial standing	Weak sponsor with no or questionable track record and/or financial weaknesses
Sponsor support, as evidenced by equity, ownership clause and incentive to inject additional cash if necessary	Strong. Project is highly strategic for the sponsor (core business – long-term strategy)	Good. Project is strategic for the sponsor (core business – long-term strategy)	Acceptable. Project is considered important for the sponsor (core business)	Limited. Project is not key to sponsor's long-term strategy or core business
<b>Security package</b>				
Assignment of contracts and accounts	Fully comprehensive	Comprehensive	Acceptable	Weak
Pledge of assets, taking into account quality, value and liquidity of assets	First perfected security interest in all project assets, contracts, permits and accounts necessary to run the project	Perfected security interest in all project assets, contracts, permits and accounts necessary to run the project	Acceptable security interest in all project assets, contracts, permits and accounts necessary to run the project	Little security or collateral for financiers; weak negative pledge clause

	Strong	Satisfactory	Fair	Weak
Financier's control over cash flow (e.g. cash sweeps, independent escrow accounts)				
Strength of the covenant package (mandatory prepayments, payment deferrals, payment cascade, dividend restrictions)	<p>Covenant package is strong for this type of project</p> <p>Project may issue no additional debt</p>	<p>Covenant package is satisfactory for this type of project</p> <p>Project may issue extremely limited additional debt</p>	<p>Covenant package is fair for this type of project</p> <p>Project may issue limited additional debt</p>	<p>Covenant package is insufficient for this type of project</p> <p>Project may issue unlimited additional debt</p>
Reserve funds (debt service, O&M, renewal and replacement, unforeseen events, etc)	<p>Longer than average coverage period, all reserve funds fully funded in cash or letters of credit from highly-rated bank</p>	<p>Average coverage period, all reserve funds fully funded</p>		<p>Shorter than average coverage period, reserve funds funded from operating cash flows</p>

**IPRE and HVCRE**

	<b>Strong</b>	<b>Good</b>	<b>Satisfactory</b>	<b>Weak</b>
<b>Financial strength</b>				
Market conditions	The supply and demand for the project's type and location are currently in equilibrium. The number of competitive properties coming to market is equal or lower than forecasted demand	The supply and demand for the project's type and location are currently in equilibrium. The number of competitive properties coming to market is roughly equal to forecasted demand	Market conditions are roughly in equilibrium. Competitive properties are coming on the market and others are in the planning stages. The project's design and capabilities may not be state of the art compared to new projects	Market conditions are weak. It is uncertain when conditions will improve and return to equilibrium. The project is losing tenants at lease expiration. New lease terms are less favourable compared to those expiring
Financial ratios and advance rate	The property's DSCR is considered strong (DSCR is not relevant for the construction phase) and its financing-to-value ratio (FTV) is considered low given its property type. Where a secondary market exists, the transaction is underwritten to market standards	The DSCR (not relevant for development real estate) and FTV are satisfactory. Where a secondary market exists, the transaction is underwritten to market standards	The property's DSCR has deteriorated and its value has fallen, increasing its FTV	The property's DSCR has deteriorated significantly and its FTV is well above underwriting standards for new financings

Stress analysis	The property's resources, contingencies and liability structure allow it to meet its financial obligations during a period of severe financial stress (e.g. interest rates, economic growth)	The property can meet its financial obligations under a sustained period of financial stress (e.g. interest rates, economic growth). The property is likely to default only under severe economic conditions	During an economic downturn, the property would suffer a decline in revenue that would limit its ability to fund capital expenditures and significantly increase the risk of default	The property's financial condition is strained and is likely to default unless conditions improve in the near term
Cash-flow predictability				
(a) For complete and stabilised property	The property's leases are long-term with creditworthy tenants and their maturity dates are scattered. The property has a track record of tenant retention upon lease expiration. Its vacancy rate is low. Expenses (maintenance, insurance, security, and property taxes) are predictable	Most of the property's leases are long-term, with tenants that range in creditworthiness. The property experiences a normal level of tenant turnover upon lease expiration. Its vacancy rate is low. Expenses are predictable	Most of the property's leases are medium rather than long-term with tenants that range in creditworthiness. The property experiences a moderate level of tenant turnover upon lease expiration. Its vacancy rate is moderate. Expenses are relatively predictable but vary in relation to revenue	The property's leases are of various terms with tenants that range in creditworthiness. The property experiences a very high level of tenant turnover upon lease expiration. Its vacancy rate is high. Significant expenses are incurred preparing space for new tenants
(b) For complete but	Leasing activity meets or exceeds projections. The project should achieve stabilisation in the near future		Most leasing activity is within projections; however,	Market rents do not meet expectations. Despite achieving target occupancy rate, cash flow coverage is

not stabilised property			stabilisation will not occur for some time	tight due to disappointing revenue
(c) For construction phase	The property is entirely pre-leased through the tenor of the financing or pre-sold to an investment grade tenant or buyer, or the financial institution has a binding commitment for take-out financing from an investment grade financier	The property is entirely pre-leased or pre-sold to a creditworthy tenant or buyer, or the financial institution has a binding commitment for permanent financing from a creditworthy financier	Leasing activity is within projections but the building may not be pre-leased and there may not exist a take-out financing. The financial institution may be the permanent financier	The property is deteriorating due to cost overruns, market deterioration, tenant cancellations or other factors. There may be a dispute with the party providing the permanent financing
<b>Asset characteristics</b>				
Location	Property is located in a highly desirable location that is convenient to services that tenants desire	Property is located in a desirable location that is convenient to services that tenants desire	The property location lacks a competitive advantage	The property's location, configuration, design and maintenance have contributed to the property's difficulties
Design and condition	Property is favoured due to its design, configuration, and maintenance, and is highly competitive with new properties	Property is appropriate in terms of its design, configuration and maintenance. The property's design and capabilities are	Property is adequate in terms of its configuration, design and maintenance	Weaknesses exist in the property's configuration, design or maintenance

		competitive with new properties		
Property is under construction	Construction budget is conservative and technical hazards are limited. Contractors are highly qualified		Construction budget is adequate and contractors are ordinarily qualified	Project is over budget or unrealistic given its technical hazards. Contractors may be under qualified
<b>Strength of Sponsor/Developer</b>				
Financial capacity and willingness to support the property	The sponsor/developer made a substantial cash contribution to the construction or purchase of the property. The sponsor/developer has substantial resources and limited direct and contingent liabilities. The sponsor/developer's properties are diversified geographically and by property type	The sponsor/developer made a material cash contribution to the construction or purchase of the property. The sponsor/developer's financial condition allows it to support the property in the event of a cash flow shortfall. The sponsor/developer's properties are located in several geographic regions	The sponsor/developer's contribution may be immaterial or non-cash. The sponsor/developer is average to below average in financial resources	The sponsor/developer lacks capacity or willingness to support the property
Reputation and track record with	Experienced management and high sponsors' quality. Strong reputation and lengthy	Appropriate management and sponsors' quality. The sponsor or	Moderate management and sponsors' quality. Management or sponsor	Ineffective management and substandard sponsors' quality. Management and sponsor difficulties have contributed to

similar properties	and successful record with similar properties	management has a successful record with similar properties	track record does not raise serious concerns	difficulties in managing properties in the past
Relationships with relevant real estate actors	Strong relationships with leading actors such as leasing agents	Proven relationships with leading actors such as leasing agents	Adequate relationships with leasing agents and other parties providing important real estate services	Poor relationships with leasing agents and/or other parties providing important real estate services
<b>Security package</b>				
Nature of lien	Perfected first lien	Perfected first lien. Financiers in some markets extensively use financing structures that include junior liens. Junior liens may be indicative of this level of risk if the total FTV inclusive of all senior positions does not exceed a typical first loan FTV.		Ability of financier to foreclose is constrained
Assignment of rents (for projects leased to long-term tenants)	The financier has obtained an assignment. They maintain current tenant information that would facilitate providing notice to the tenants to remit rents directly to the financial institution, such as current rent roll and copies of the project's leases			The financial institution has not obtained an assignment of the leases or has not maintained the information necessary to readily provide notice to the building's tenants
Quality of the insurance coverage	Appropriate			Substandard

**Object Finance**

	<b>Strong</b>	<b>Good</b>	<b>Satisfactory</b>	<b>Weak</b>
<b>Financial strength</b>				
Market conditions	Demand is strong and growing, strong entry barriers, low sensitivity to changes in technology and economic outlook	Demand is strong and stable. Some entry barriers, some sensitivity to changes in technology and economic outlook	Demand is adequate and stable, limited entry barriers, significant sensitivity to changes in technology and economic outlook	Demand is weak and declining, vulnerable to changes in technology and economic outlook, highly uncertain environment
Financial ratios (DSCR and FTV)	Strong financial ratios considering the type of asset. Very robust economic assumptions	Strong/acceptable financial ratios considering the type of asset. Robust project economic assumptions	Standard financial ratios for the asset type	Aggressive financial ratios considering the type of asset
Stress analysis	Stable long-term revenues, capable of withstanding severely stressed conditions through an economic cycle	Satisfactory short-term revenues. Financing can withstand some financial adversity. Default is only likely under severe economic conditions	Uncertain short-term revenues. Cash flows are vulnerable to stresses that are not uncommon through an economic cycle. The financing may default in a normal downturn	Revenues subject to strong uncertainties; even in normal economic conditions the asset may default, unless conditions improve
Market liquidity	Market is structured on a worldwide basis; assets are highly liquid	Market is worldwide or regional; assets are relatively liquid	Market is regional with limited prospects in the short term, implying lower liquidity	Local market and/or poor visibility. Low or no liquidity, particularly on niche markets
<b>Political and legal environment</b>				

Political risk, including transfer risk	Very low; strong mitigation instruments, if needed	Low; satisfactory mitigation instruments, if needed	Moderate; fair mitigation instruments	High; no or weak mitigation instruments
Legal and regulatory risks	Jurisdiction is favourable to repossession and enforcement of contracts		Jurisdiction is generally favourable to repossession and enforcement of contracts, even if repossession might be long and/or difficult	Poor or unstable legal and regulatory environment. Jurisdiction may make repossession and enforcement of contracts lengthy or impossible
<b>Transaction characteristics</b>				
Financing term compared to the economic life of the asset	Full payout profile/minimum balloon. No grace period	Balloon more significant, but still at satisfactory levels	Important balloon, potentially with grace periods	Repayment in fine or high balloon
<b>Operating risk</b>				
Permits/licensing	All permits have been obtained; asset meets current and foreseeable safety regulations	All permits obtained or in the process of being obtained; asset meets current and foreseeable safety regulations	Most permits obtained or in process of being obtained, outstanding ones considered routine, asset meets current safety regulations	Problems in obtaining all required permits, part of the planned configuration and/or planned operations might need to be revised
Scope and nature of	Strong long-term O&M contract, preferably with contractual performance	Long-term O&M contract, and/or O&M	Limited O&M contract or O&M reserve account (if needed)	No O&M contract: risk of high operational cost overruns beyond mitigants

O&M contracts	incentives, and/or O&M reserve accounts (if needed)	reserve accounts (if needed)		
Operator's financial strength, track record in managing the asset type and capability to re-market asset when it comes off-lease	Excellent track record and strong re-marketing capability	Satisfactory track record and re-marketing capability	Weak or short track record and uncertain re-marketing capability	No or unknown track record and inability to re-market the asset
<b>Asset characteristics</b>				
Configuration, size, design and maintenance (e.g. age, size for a plane) compared to other assets on the same market	Strong advantage in design and maintenance. Configuration is standard such that the object meets a liquid market	Above average design and maintenance. Standard configuration, maybe with very limited exceptions — such that the object meets a liquid market	Average design and maintenance. Configuration is somewhat specific, and thus might cause a narrower market for the object	Below average design and maintenance. Asset is near the end of its economic life. Configuration is very specific; the market for the object is very narrow

Resale value	Current resale value is well above debt value	Resale value is moderately above debt value	Resale value is slightly above debt value	Resale value is below debt value
Sensitivity of the asset value and liquidity to economic cycles	Asset value and liquidity are relatively insensitive to economic cycles	Asset value and liquidity are sensitive to economic cycles	Asset value and liquidity are quite sensitive to economic cycles	Asset value and liquidity are highly sensitive to economic cycles
<b>Strength of sponsor</b>				
Operator's financial strength, track record in managing the asset type and capability to re-market asset when it comes off-lease	Excellent track record and strong re-marketing capability	Satisfactory track record and re-marketing capability	Weak or short track record and uncertain re-marketing capability	No or unknown track record and inability to re-market the asset
Sponsors' track record and financial strength	Sponsors with excellent track record and high financial standing	Sponsors with good track record and good financial standing	Sponsors with adequate track record and good financial standing	Sponsors with no or questionable track record and/or financial weaknesses
<b>Security package</b>				

Asset control	Legal documentation provides the financier effective control (e.g. a first perfected security interest, or a leasing structure including such security) on the asset, or on the company owning it	Legal documentation provides the financier effective control (e.g. a perfected security interest, or a leasing structure including such security) on the asset, or on the company owning it		The contract provides little security to the financier and leaves room to some risk of losing control on the asset
Rights and means at the financier's disposal to monitor the location and condition of the asset	The financier is able to monitor the location and condition of the asset, at any time and place (regular reports, possibility to lead inspections)	The financier is able to monitor the location and condition of the asset, almost at any time and place		The financier is able to monitor the location and condition of the asset are limited
Insurance against damages	Strong insurance coverage including collateral damages with top quality insurance companies	Satisfactory insurance coverage (not including collateral damages) with good quality insurance companies	Fair insurance coverage (not including collateral damages) with acceptable quality insurance companies	Weak insurance coverage (not including collateral damages) or with weak quality insurance companies

### Commodities Finance

	<b>Strong</b>	<b>Good</b>	<b>Satisfactory</b>	<b>Weak</b>
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<b>Financial strength</b>				
Degree of over-collateralisation of trade	Strong	Good	Satisfactory	Weak
<b>Political and legal environment</b>				
Country risk	No country risk	Limited exposure to country risk (in particular, offshore location of reserves in an emerging country)	Exposure to country risk (in particular, offshore location of reserves in an emerging country)	Strong exposure to country risk (in particular, inland reserves in an emerging country)
Mitigation of country risks	Very strong mitigation: <ul style="list-style-type: none"> <li>• Strong offshore mechanisms</li> <li>• Strategic commodity</li> <li>• 1st class buyer</li> </ul>	Strong mitigation: <ul style="list-style-type: none"> <li>• Offshore mechanisms</li> <li>• Strategic commodity</li> <li>• Strong buyer</li> </ul>	Acceptable mitigation: <ul style="list-style-type: none"> <li>• Offshore mechanisms</li> <li>• Less strategic commodity</li> <li>• Acceptable buyer</li> </ul>	Only partial mitigation: <ul style="list-style-type: none"> <li>• No offshore mechanisms</li> <li>• Non-strategic commodity</li> <li>• Weak buyer</li> </ul>
<b>Asset characteristics</b>				
Liquidity	Commodity is quoted and can be hedged through futures or over-	Commodity is quoted and can be hedged	Commodity is not quoted but is liquid. There is uncertainty about the possibility of hedging	Commodity is not quoted. Liquidity is limited given the size and depth of the

	the-counter (OTC) instruments	through OTC instruments		market. No appropriate hedging instruments
Susceptibility to damage	Commodity is not susceptible to damage			Commodity is susceptible to damage
<b>Strength of sponsor</b>				
Financial strength of trader	Very strong, relative to trading philosophy and risks	Strong	Adequate	Weak
Track record, including ability to manage the logistic process	Extensive experience with the type of transaction in question. Strong record of operating success and cost efficiency	Sufficient experience with the type of transaction in question. Above average record of operating success and cost efficiency	Limited experience with the type of transaction in question. Average record of operating success and cost efficiency	Limited or uncertain track record in general. Volatile costs and profits
Trading controls and hedging policies	Strong standards for counterparty selection, hedging, and monitoring	Adequate standards for counterparty selection, hedging, and monitoring	Past deals have experienced no or minor problems	Trader has experienced significant losses on past deals
Quality of financial disclosure	Excellent	Good	Satisfactory	Financial disclosure contains some uncertainties or is insufficient
<b>Security package</b>				

Asset control	First perfected security interest provides the financier legal control of the assets at any time if needed		At some point in the process, there is a rupture in the control of the assets by the financier. The rupture is mitigated by knowledge of the trade process or a third-party undertaking, as the case may be	Contract leaves room for some risk of losing control over the assets. Recovery could be jeopardised
Insurance against damages	Strong insurance coverage including collateral damages with top quality insurance companies	Satisfactory insurance coverage (not including collateral damages) with good quality insurance companies	Fair insurance coverage (not including collateral damages) with acceptable quality insurance companies	Weak insurance coverage (not including collateral damages) or with weak quality insurance companies

**APPENDIX 2 Potential evidence of likely compliance with the use test**

<b>Essential areas</b>	<b>Evidence of likely compliance</b>
1. Credit approval	<ul style="list-style-type: none"> <li>• Ratings assignment is part of credit analysis and decision.</li> <li>• Authority level for approval depends on rating.</li> </ul>
2. Capital management	<ul style="list-style-type: none"> <li>• Internal ratings, default and loss estimates are used in internal capital allocation, and in Pillar 2 capital assessments.</li> </ul>
3. Credit policies	<ul style="list-style-type: none"> <li>• Rating system, estimates, processes and organisational guidelines are all consistent.</li> </ul>
4. Reporting	<ul style="list-style-type: none"> <li>• Internal ratings, default and loss estimates are used in all reports relating to credit and profitability information at all levels within the organisation, including senior management.</li> </ul>
5. Pricing and limit setting	<ul style="list-style-type: none"> <li>• Estimates for regulatory purposes and those derived for risk-based pricing, are produced for senior management's information. However, for actual pricing purposes, the financial institution may use estimates which have been aligned with the actual life of the facility.</li> <li>• Individual and portfolio limits are set with reference to internal ratings, default and loss estimates.</li> </ul>

**APPENDIX 3 Data-enhancing and benchmarking tools**

1. While industry and supervisory practices are still emerging, the Bank views that the preliminary range of data-enhancing and validation tools and techniques summarised in this appendix might be useful to facilitate efforts undertaken by financial institutions. Nevertheless, these tools are more applicable to estimation of PDs rather than LGDs or EADs. Additional techniques that are more relevant to LGD and EAD are only expected to emerge over time. Financial institutions are encouraged to consider the list below and to utilise the tools and techniques that are most appropriate to their particular circumstances.

*Data-enhancing tools for quantification and validation*

2. While a relative lack of loss data may make it more difficult to use quantitative methods to assess risk parameters, there are tools that could be used to enhance data richness or to determine the degree of uncertainty that could be addressed through conservatism. Examples of the possible tools are as follows:
  - (i) Pooling of data with other financial institutions or market participants, the use of other external data sources, and the use of market measures of risk can be effective methods to complement internal loss data. While a financial institution would need to satisfy itself and the Bank that these sources of data are relevant to its own situation, the Bank views that in principle, data pooling, external data and market measures can be an effective means to augment internal data in appropriate circumstances. This can be especially relevant for small portfolios or for portfolios where a financial institution is a recent market entrant;
  - (ii) Internal portfolio segments with similar risk characteristics might be combined. For example, a financial institution might have a broad portfolio with adequate default history that, if narrowly segmented, could result in the creation of a number of low-default portfolios. While such segmentation might be appropriate from the standpoint of internal use (e.g. pricing), for purposes of assigning risk parameters for regulatory capital purposes it might be more appropriate to combine sub-portfolios;
  - (iii) In some circumstances, different rating categories might be combined and PDs analysed for the combined category. Financial institutions using rating systems that map to rating agency categories might find it useful, for example, to combine AAA, AA and A-rated credits. This could enhance default data without necessarily sacrificing the predictiveness or risk-sensitivity of the rating system;
  - (iv) the upper bound of the PD estimate can be used as an input to the RWA formula for those portfolios where the PD estimate itself is deemed to be too unreliable to warrant direct inclusion in capital adequacy calculations;
  - (v) financial institutions may derive PD estimates from data with a horizon that is different from one year. Where defaults are spread out over several years, a financial institution may calculate a multi-year

(vi) cumulative PD and then annualise the resulting figure. Where intra-year rating migrations contain additional information, these migrations could be analysed as separate rating movements in order to infer PDs, which may be especially useful for the higher-quality rating grades; or if low default rates in a particular portfolio are the result of credit support, the lowest non-default rating could be used as a proxy for default (e.g. banks, investment firms, thrifts, pension funds, insurance firms) in order to develop ratings that differentiate risks. When such an approach is taken, calibration of such ratings to a PD consistent with IRB definition of default would still be necessary.

3. While financial institutions would not be expected to utilise all of these tools, the suitability and most appropriate combination of individual tools and techniques will depend on the nature of the financial institution and the characteristics of the specific portfolio.

#### *Benchmarking tools for validation*

4. In addition, where a scarcity of internal historical data makes it difficult to meaningfully back-test risk rating predictions against realised defaults, it may be possible to make greater use of various benchmarking tools for validation. Among the tools that could potentially be used are the following:
  - (i) Internal ratings and migration matrices could be compared with the ratings and migrations of third parties such as rating agencies or data pools, or with the ratings and migrations resulting from other internal models;
  - (ii) Internal ratings could be benchmarked against internal or external expert judgements, for example where a portfolio has not experienced recent losses but where historical experience suggests the risk of loss is greater than zero;
  - (iii) Internal ratings could be compared with market-based proxies for credit quality, such as equity prices, bond spreads, or premiums for credit derivatives;
  - (iv) An analysis of the rating characteristics of similarly rated exposures could be undertaken; or
  - (v) The average rating output for the portfolio as a whole could be compared with actual experience for the portfolio rather than focusing on back-testing estimates for more narrowly defined segments of the portfolio. Similarly, rating grades can be combined in order to make back-testing more meaningful.
5. This list is not intended to be exhaustive, but rather serves as a useful guide of some benchmarking tools that might be useful in the case of scarce internal loss data. It is important that financial institutions utilise as many tools and techniques, as necessary to build confidence and demonstrate the predictive ability of the credit risk rating systems.

**APPENDIX 4 Information requirements to apply for IRB adoption**

A financial institution intending to apply for the adoption of IRB approach shall submit the following information to the Bank:

**For first-time adoption of IRB approach within the financial institution:**

<b>Overall implementation details</b>				
i.	Objective, goal and rationale for applying for IRB	<i>Articulate the objectives, goals and rationale as approved by the board.</i>		
ii.	Governance structure of the implementation project	<i>Insert name, designation and responsibilities. Append chart if available. Explain the role of external parties, if applicable.</i>		
iii.	Scope and timeline of the rollout of IRB			
	• across asset class	<i>Insert class name</i>	<i>Insert commencement date</i>	<i>Insert completion date</i>
	• across entity	<i>Insert entity name</i>	<i>Insert commencement date</i>	<i>Insert completion date</i>
	• exposures falling under temporary and permanent exemptions, if any and the plan to migrate the temporary exempted portfolio to IRB	<i>Insert class name</i>	<i>Insert commencement date</i>	<i>Insert completion date</i>
iv.	Detailed timeline (describe for each model to be adopted for each asset class and entity, for example, behavioural model for QRRE class in ABC entity)	<i>Insert work step (e.g. data collection, IT implementation)</i>	<i>Insert commencement date</i>	<i>Insert completion date</i>
v.	Detailed approved budget and committed resources for implementation	<i>Insert overall amount committed, estimate of personnel involved (breakdown where external parties are involved).</i>		
vi.	Cost-benefit analysis	<i>Provide a detailed estimate of cost in completing the entire IRB implementation project and explain the benefits gained from IRB adoption as compared to the Standardised Approach.</i>		

**For all IRB applications (append one for each rating system):**

<b>Information with regard to the IRB system</b>	
<i>A financial institution shall submit information (in the form of policies, reports and technical documentation) that describe its compliance with the relevant paragraphs on the IRB minimum requirements in this Policy Document. The remarks that follow in this section are meant only as a guide.</i>	
<b>Information</b>	<b>Remarks</b>
i. Overview or general description of internal rating systems	<i>Describe the rating system in term of the rating/modelling approach, model structure and factors adopted.</i>
ii. Scope of applicability of the rating system	<i>Describe the segment and exposure size of the portfolio, asset class or product type.</i>
iii. Details on other rating systems for similar exposures (e.g. rating models for other exposures within the same asset class or business unit)	<i>Name and describe the scope of applicability of other rating systems (if any) that are in use for other exposures within the same asset class or business unit.</i>
iv. Rating system design	<i>Elaborate on the existence of borrower and facility dimensions for each major portfolio.</i>  <i>Explain the structural design of the rating system. Append any rating criteria, definition and assignment process adopted.</i>
v. Rating system operations	<i>Describe how the rating assignment process ensures appropriate and consistent rating coverage.</i>  <i>Elaborate on the controls put in place to ensure integrity of the process, including the process of reviewing and overriding ratings and loss estimates.</i>  <i>Explain the process put in place to verify and assess data input for rating assignment.</i>  <i>Explain (append if possible) the structure or framework for data maintenance and documentation.</i>
vi. Rating system estimation (covering development and calibration)	<i>Explain the conceptual and technical features of the process undertaken to estimate the relevant parameters (PD, LGD, EAD etc.), inclusive of reasons (appropriateness, strength and</i>

	<p><i>weaknesses) and further enhancements to be taken.</i></p> <p><i>Explain and justify the differences, if any, in the definition of default adopted.</i></p> <p><i>Provide empirical analysis to justify the appropriateness of using the conventional IRB model and its parameters on the Islamic banking assets.</i></p> <p><i>Describe the stress testing processes in place (including the scenarios adopted and the sources of information) in relation to stress testing requirements within this framework.</i></p>
vii. Rating system validation	<p><i>Include a summary of validation observations and opinions.</i></p> <p><i>Include the measurement of performance especially on accuracy, calibration, stability and consistency.</i></p> <p><i>For a financial institution with an Islamic asset portfolio which leverages on a same model as their conventional assets, include an assessment of the performance of the model specifically on the Islamic asset portfolio.</i></p>
viii. IRB adoption impact analysis	<i>Insert impact to total RWA and total capital for changes to each relevant risk component (PD, LGD, EAD) individually and post-aggregation.</i>
ix. Overview of the internal governance structure of the rating system	<i>Append chart if available.</i>
<ul style="list-style-type: none"> <li>• role of board (and its committees)</li> </ul>	<i>Insert name and responsibilities specific to the governance of rating system (if any).</i>
<ul style="list-style-type: none"> <li>• role of senior management (and its committees)</li> </ul>	<i>Insert name and responsibilities specific to the governance of rating system as well as other critical responsibilities.</i>
<ul style="list-style-type: none"> <li>• role of credit risk management unit (or its equivalent)</li> </ul>	<i>Insert name and responsibilities specific to the design, selection, implementation and performance of rating system.</i>
<ul style="list-style-type: none"> <li>• role of internal audit (or other relevant assurance function)</li> </ul>	<i>Insert name and responsibilities specific to the review of rating system.</i>
<ul style="list-style-type: none"> <li>• role of model owner</li> </ul>	<i>Insert name and responsibilities specific to the model owner.</i>

	<ul style="list-style-type: none"> <li>role of validation function</li> </ul>	<i>Insert name and responsibilities specific to the validation review</i>
x.	Use of ratings	<p><i>Explain how the ratings will support internal business decisions.</i></p> <p><i>Explain any adjustments made if ratings are not used directly.</i></p> <p><i>Provide details on latest independent review for all aspects on use of rating.</i></p>
xi.	Logical data model and the surrounding IT infrastructure	<i>Append the logical data fields used and their dependencies.</i>
xii.	Data extraction and cleansing process	<i>Explain and attach the tests undertaken to verify the integrity of data.</i>
xiii.	IRB training conducted to relevant officers, senior management personnel and board members	<p><i>List all relevant training (especially on the operations and use of ratings) conducted in the immediate past.</i></p> <p><i>Include areas covered, instructor's name, departments affected, and date conducted.</i></p> <p><i>Include training plans for the future, if possible.</i></p>
xiv.	Expected rating system roll-out timeline	<i>Describe expected commencement and completion date of rating system roll-out, as well as any other intermediate milestone (e.g. approval from other regulators).</i>
<b>Information with regard to changes to an approved IRB rating system and/or scope of applicability of an approved IRB rating system (where applicable only)</b>		
<b>Information</b>		<b>Remarks</b>
xv.	Objective, goal and rationale for the IRB application	<i>Describe the reason for model redevelopment, or changes to scope of applicability.</i>
xvi.	Overview of changes to IRB rating system or scope of applicability	<i>Describe the key difference in rating system, as well as the scope of applicability.</i>
xvii.	Background of existing IRB rating system (where applicable)	<i>Describe the general characteristics, scope of applicability, date of last modification, date of last validation and date of regulatory approval for use of the existing rating system.</i>
<b>Compliance self-assessment against the minimum requirements of this Framework (e.g. Gap analysis)</b>		
<b>Information</b>		<b>Remarks</b>
xviii.	Overview of compliance self-assessment	<i>Explain the process and personnel involved in conducting the assessment, clarifying the skills</i>

	process (e.g. gap analysis)	<i>and independence of the reviewer, where applicable.</i>
xix.	Outcome of assessment	<i>Provide line-by-line assessment, including evidence of compliance to each line.</i>  <i>List all gaps identified.</i>  <i>Evaluate the impact of the gaps or non-compliance to the overall implementation of IRB.</i>
xx.	Detailed plan for achieving compliance	<i>For each gap, explain the remedial actions taken, the time needed to bridge the gap and the person responsible.</i>  <i>Alternatively, submit the detailed action plan.</i>

A locally-incorporated foreign financial institution shall submit the following information to the Bank:

- (a) number of models developed or to be developed outside Malaysia;
- (b) the asset classes covered by the models;
- (c) estimated coverage in terms of RWA percentage;
- (d) the extent to which documents (development, independent validation) are available locally;
- (e) whether the home regulator has reviewed or has plans to review the model;
- (f) where available, detailed assessments by the home regulator, for the purpose of the Bank's review for initial adoption as well as on an ongoing basis; and
- (g) date of last review by the home regulator and the results of the review.