Office of the Superintendent of Financial Institutions Canada
Bureau du surintendant des institutions financières Canada

Guideline

Subject: Capital Adequacy Requirements (CAR)

Chapter 5 – Credit Risk – Internal Ratings-Based Approach

Effective Date: November -2027 / January 2028

For institutions with a fiscal year ending October 31 or December 31, respectively.

The Capital Adequacy Requirements (CAR) for banks (including federal credit unions), bank holding companies, federally regulated trust companies, and federally regulated loan companies are set out in nine chapters, each of which has been issued as a separate document. This document should be read in conjunction with the other CAR chapters. The complete list of CAR chapters is as follows:

Chapter 1	Overview of Risk-Based Capital Requirements
Chapter 2	Definition of Capital
Chapter 3	Operational Risk
Chapter 4	Credit Risk – Standardized Approach
Chapter 5	Credit Risk – Internal Ratings-Based Approach
Chapter 6	Securitization
Chapter 7	Settlement and Counterparty Risk
Chapter 8	Credit Valuation Adjustment (CVA) Risk
Chapter 9	Market Risk

Please refer to OSFI's *Corporate Governance Guideline* for OSFI's expectations of institution Boards of Directors in regard to the management of capital and liquidity.

Table of Contents

5.1. Overview 4
5.2. Mechanics of the IRB approach 4
5.2.1 Categorization of exposures 5
5.2.2 Foundation and advanced approaches 13
5.2.3 Adoption of the IRB approach across asset classes 17
5.3. IRB approach risk weight functions 18
5.3.1 RWA for corporate, sovereign, PSE, and bank exposures not in default 19
5.3.2 RWA for retail exposures that are not in default 22
5.4. IRB risk components 24
5.4.1 Risk components for corporate, sovereign, PSE, and bank exposures 24
5.4.2 Risk Components for retail exposures 36
5.5. Supervisory slotting approach for specialized lending 39
5.5.1 Risk weights for specialized lending (PF, OF, CF and IPRE) 39
5.5.2 Risk weights for specialized lending (HVCRE) 40
5.5.3 Expected loss (EL) for SL exposures subject to the supervisory slotting criteria 41
5.6. Rules for Purchased Receivables 41
5.6.1 Risk-weighted assets for default risk 42
5.6.2 Risk-weighted assets for dilution risk 44
5.6.3 Treatment of purchase price discounts for receivables 45
5.6.4 Recognition of credit risk mitigants 45
5.7. Treatment of expected losses and recognition of allowances 46
5.7.1 Calculation of expected losses 46
5.7.2 Calculation of provisions 46
5.7.3 Treatment of EL and provisions 47
5.8. Minimum requirements for IRB approach 47
5.8.1 Composition of minimum requirements 48
5.8.2 Compliance with minimum requirements 48
5.8.3 Rating system design 49
5.8.4 Risk rating system operations 55
5.8.5 Corporate governance and oversight 58

Use of internal ratings *60*
5.8.6 Risk quantification 60
5.8.7 Validation of internal estimates 79
5.8.8 Supervisory LGD and EAD estimates 79
5.8.9 Requirements for recognition of leasing 84
5.8.10 Disclosure requirements 84
Appendix 5-1 - Illustrative IRB Risk Weights 85
Appendix 5-2 - Supervisory Slotting Criteria for Specialized Lending 86
Appendix 5-3 – Teranet metropolitan area house price indices to be used in the calculation of the DLGD floor 104

Chapter 5 - Credit Risk – Internal Ratings-Based Approach

1. This chapter is drawn from the Basel Committee on Banking Supervision (BCBS) Basel Framework published on the Bank for International Settlements (BIS) website[1]. For reference, the Basel paragraph numbers that are associated with the text appearing in this chapter are indicated in square brackets at the end of each paragraph.[2]

5.1. Overview

2. This chapter of the guideline describes the IRB approach to credit risk. Subject to certain minimum conditions and disclosure requirements, institutions that have received OSFI approval to use the IRB approach may rely on their own internal estimates of risk components in determining the capital requirement for a given exposure. The risk components include measures of the probability of default (PD), loss given default (LGD), the exposure at default (EAD), and effective maturity (M). In some cases, institutions may be required to use a supervisory value as opposed to an internal estimate for one or more of the risk components.
[Basel Framework, CRE 30.1]

3. The IRB approach is based on measures of unexpected losses (UL) and expected losses (EL). The risk-weight functions, as outlined in section 5.3, produce capital requirements for the UL portion. Expected losses are treated separately, as outlined in section 5.7 and section 2.1.3.7 of Chapter 2. [Basel Framework, CRE 30.2]

4. In this chapter, the asset classes eligible for the IRB approach are defined in section 5.2. Adoption of the IRB approach across all asset classes is also discussed in this section. The risk-weight functions that have been developed for separate asset classes are defined in section 5.3. For example, there is a risk-weight function for corporate exposures and another one for qualifying revolving retail exposures. The risk components, each of which is defined in section 5.4, serve as inputs to the risk-weight functions. The legal certainty standards for recognizing CRM as set out in section 4.3 apply for both the foundation and advanced IRB approaches. There are also unique treatments for specialized lending and purchased receivables that are defined in sections 5.5 and 5.6, followed by a description of the treatment of the EL component in section 5.7. The minimum requirements that institutions must satisfy to use the IRB approach are presented at the end of this chapter in section 5.8.

5.2. Mechanics of the IRB approach

5. In this section, first the asset classes (e.g. corporate exposures and retail exposures) eligible for the IRB approach are defined. Second, section 5.2.2 provides a description of the risk components to be used by institutions by asset class. Third, sections 5.2.3 outline an institution's adoption of the IRB approach at the asset class level and the related roll out requirements. In cases where an IRB treatment is not specified, institutions should refer to the treatment specified under the standardized approach, as outlined in Chapter 4 of this guideline, and the resulting risk-

[1] The Basel Framework
[2] Following the format: [Basel Framework XXX yy.zz].

weighted assets are assumed to represent UL only. Moreover, institutions must apply the risk weights referenced in Chapter 4 to investments that are assessed against materiality thresholds.
[Basel Framework, CRE 30.3]

6. For securities lent or sold under repurchase agreements or under securities lending and borrowing transactions, institutions are required to hold capital for both the original exposure and the exposure to the counterparty of the repo-style transaction as described in section 5.4.

5.2.1 Categorization of exposures

7. Under the IRB approach, institutions must categorize banking book exposures into broad classes of assets with different underlying risk characteristics, subject to the definitions set out below. The broad classes of assets are (a) corporate, (b) sovereign, (c) public sector entity, (d) bank, (e) retail, and (f) equity. Within the corporate asset class, five sub-classes of specialized lending are separately identified. Within the retail asset class, three sub-classes are separately identified. Within the corporate and retail asset classes, a distinct treatment for purchased receivables may also apply provided certain conditions are met. For the equity asset class the IRB approach is not permitted, as outlined further in paragraph 48. For a discussion of the IRB treatment of securitization exposures, see Chapter 6 of this guideline.
[Basel Framework, CRE 30.4]

8. The classification of exposures in this way is broadly consistent with established institution practice. However, some institutions may use different definitions in their internal risk management and measurement systems. While it is not OSFI's intention to require institutions to change the way in which they manage their business and risks, institutions are required to apply the appropriate treatment to each exposure for the purposes of deriving their minimum capital requirement. Institutions must demonstrate to OSFI that their methodology for assigning exposures to different classes is appropriate and consistent over time.
[Basel Framework, CRE 30.5]

(i) Definition of corporate exposures

9. In general, a corporate exposure is defined as a debt obligation or obligation under a derivative contract of a corporation, limited liability company, partnership, proprietorship or special purpose entities (including those created specifically to finance and /or operate physical assets). Institutions are permitted to distinguish separately exposures to small- and medium-sized entities (SME), as defined in paragraph 68. Corporate exposures also include U.S. Government Sponsored Enterprises (GSEs).
[Basel Framework, CRE 30.6]

10. In addition to general corporates, five sub-classes of specialized lending (SL) are identified. Such lending possesses all the following characteristics, in legal form or economic substance:

a. The exposure is typically to an entity (often a special purpose entity (SPE)) which was created specifically to finance and/or operate physical assets;

b. The borrowing entity has little or no other material assets or activities, and therefore little or no independent capacity to repay the obligation, apart from the income that it receives from the asset(s) being financed;

c. The terms of the obligation give the lender a substantial degree of control over the asset(s) and the income that it generates; and

d. As a result of the preceding factors, the primary source of repayment of the obligation is the income generated by the asset(s), rather than the independent capacity of a broader commercial enterprise.

[Basel Framework, CRE 30.7]

11. The five sub-classes of specialized lending are project finance (PF), object finance (OF), commodities finance (CF), income-producing real estate (IPRE), and high-volatility commercial real estate (HVCRE). Each of these sub-classes is defined below.
[Basel Framework, CRE 30.8]

Project finance

12. PF is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. This type of financing is usually for large, complex and expensive installations that might include, for example, power plants, chemical processing plants, mines, transportation infrastructure, environment, and telecommunications infrastructure. Project finance may take the form of financing of the construction of a new capital installation, or refinancing of an existing installation, with or without improvements. [Basel Framework, CRE 30.9]

13. In such transactions, the lender is usually paid solely or almost exclusively out of the money generated by the contracts for the facility's output, such as the electricity sold by a power plant. The borrower is usually an SPE that is not permitted to perform any function other than developing, owning, and operating the installation. The consequence is that repayment depends primarily on the project's cash flow and on the collateral value of the project's assets. In contrast, if repayment of the exposure depends primarily on a well-established, diversified, credit-worthy, contractually obligated end user for repayment, it is considered a secured exposure to that end-user.
[Basel Framework, CRE 30.10]

Object finance

14. OF refers to a method of funding the acquisition of physical assets (e.g. ships, aircraft, satellites, railcars, and fleets) where the repayment of the exposure is dependent on the cash flows generated by the specific assets that have been financed and pledged or assigned to the lender. A primary source of these cash flows might be rental or lease contracts with one or several third parties. In contrast, if the exposure is to a borrower whose financial condition and debt-servicing capacity enables it to repay the debt without undue reliance on the specifically pledged assets, the exposure should be treated as a collateralized corporate exposure.
[Basel Framework, CRE 30.11]

Commodities finance

15. CF refers to structured short-term lending to finance reserves, inventories, or receivables of exchange-traded commodities (e.g. crude oil, metals, or crops), where the exposure will be repaid from the proceeds of the sale of the commodity and the borrower has no independent capacity to repay the exposure. This is the case when the borrower has no other activities and no other material assets on its balance sheet. The structured nature of the financing is designed to compensate for the weak credit quality of the borrower. The exposure's rating reflects its self-liquidating nature and the lender's skill in structuring the transaction rather than the credit quality of the borrower. [Basel Framework, CRE 30.12]

16. Such lending can be distinguished from exposures financing the reserves, inventories, or receivables of other more diversified corporate borrowers. Institutions are able to rate the credit quality of the latter type of borrowers based on their broader ongoing operations. In such cases, the value of the commodity serves as a risk mitigant rather than as the primary source of repayment. [Basel Framework, CRE 30.13]

Income-producing real estate lending

17. IPRE lending refers to a method of providing funding to real estate (such as, office buildings to let, retail space, multifamily residential buildings, industrial or warehouse space, and hotels) where the prospects for repayment and recovery on the exposure depend primarily on the cash flows generated by the asset. The primary source of these cash flows would generally be lease or rental payments or the sale of the asset. The borrower may be, but is not required to be, an SPE, an operating company focused on real estate construction or holdings, or an operating company with sources of revenue other than real estate. The distinguishing characteristic of IPRE versus other corporate exposures that are collateralized by real estate 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 depending primarily on the cash flows generated by a property.
[Basel Framework, CRE 30.14]

High-volatility commercial real estate

18. HVCRE lending is the financing of commercial real estate that exhibits higher loss rate volatility (i.e. higher asset correlation) compared to other types of SL. HVCRE includes:

a. Commercial real estate exposures in foreign jurisdictions secured by properties of types that are categorized by the relevant foreign national supervisor as sharing higher volatilities in portfolio default rates (referred to as HVCRE loans in foreign jurisdictions);

b. Loans financing land acquisition, development and construction (ADC), as defined in Chapter 4, section 4.1.13, for HVCRE loans in foreign jurisdictions; and

c. Loans financing land ADC of any Canadian properties where the source of repayment at origination of the exposure is either the future uncertain sale of the property or cash flows whose source of repayment is substantially uncertain (e.g. the property has not yet been leased to the occupancy rate prevailing in that geographic market for that type of commercial real estate), unless the borrower has substantial equity at risk. "Substantial

equity at risk" means that at least 25% of the real estate's appraised as-completed value has been contributed by the borrower, as defined in Chapter 4, section 4.1.10 and 4.1.13.

[Basel Framework, CRE 30.15]

19. Commercial ADC loans exempted from the treatment as HVCRE loans on the basis of certainty of repayment of borrower equity are, however, ineligible for the additional reductions for SL exposures described in paragraph 161. Loans financing the construction of pre-sold one- to four-family residential properties are also excluded from the ADC category.
[Basel Framework, CRE 30.15]

(ii) Definition of sovereign exposures

20. This asset class covers all exposures to counterparties treated as sovereigns under the standardized approach. This includes all entities referred to in Chapter 4, section 4.1.1, as well as public sector entities (PSEs) that are treated as sovereigns in section 4.1.2, and multilateral development banks (MDBs) that meet the criteria for a 0% risk weight under section 4.1.3.
[Basel Framework, CRE 30.17]

(iii) Definition of public sector entity exposures

21. This asset class covers all exposures to counterparties treated as public sector entities (PSEs) under the standardized approach as defined in section 4.1.2.

(iv) Definition of bank exposures

22. This asset class covers exposures to banks outlined in section 4.1.4, securities firms and other financial institutions set out in section 4.1.6 that are treated as exposures to banks, and MDBs that do not meet the criteria for a 0% risk weight under the standardized approach. Bank exposures also include covered bonds as defined in section 4.1.5.
[Basel Framework, CRE 30.18]

23. This asset class also includes exposures to the entities listed in paragraph 22 that are in the form of subordinated debt or regulatory capital instruments (which form their own asset class within the standardized approach), provided that such instruments:

a. do not fall within the scope of equity exposures as defined in paragraph 29;
b. are not deducted from regulatory capital or risk-weighted at 250% according to Chapter 2[3]; and
c. are not risk weighted at 1250% according to Chapter 4.

[Basel Framework, CRE 30.18]

[3] For investments in the capital and/or Other TLAC Instruments of banking, financial, or insurance entities, institutions should also refer to section 2.3 of Chapter 2 of this guideline and apply the applicable regulatory adjustment.

(v) Definition of regulatory retail exposures

24. A retail exposure is categorized as a regulatory retail exposure if it meets all of the six following criteria related to the nature of the borrowers and the size of the pool of exposures, otherwise the exposure is categorized as a non-regulatory retail exposure, and is subject to the Corporate SME risk-weight function:

Nature of borrower or low value of individual exposures

a. Exposures to individuals – such as revolving credits and lines of credit (e.g. credit cards, overdrafts, and retail facilities secured by financial instruments) as well as personal term loans and leases (e.g. instalment loans, auto loans and leases, student and educational loans, personal finance, and other exposures with similar characteristics) – are eligible for retail treatment regardless of exposure size.

b. Residential mortgage loans[4] (including first and subsequent liens, term loans and revolving home equity lines of credit) are eligible for retail treatment regardless of exposure size so long as:
   i. the credit is secured by a one-to-four unit residence as set out in Chapter 4, section 4.1.10;
   ii. the residence is or will be occupied by the borrower, or is rented, and
   iii. is extended to:
      - an individual, or
      - a condominium association, cooperative, or similar body with the purpose of granting its members the use of a primary residence in the property securing the loan.

c. Loans extended to small businesses and managed as retail exposures are eligible for retail treatment provided the total exposure of the banking group to a small business borrower (on a consolidated basis where applicable) is less than $2.5 million.[5] Small business loans extended through or guaranteed by an individual are subject to the same exposure threshold.

d. The maximum aggregated retail exposure to one counterparty cannot exceed an absolute threshold of $2.5 million. Aggregated exposures means the gross amount of all forms of retail exposures, excluding residential real estate exposures. The gross amount (before any credit risk mitigation) would include the credit equivalent amount (after applying the applicable credit conversion factor) of any off-balance sheet exposure. Small business loans extended through or guaranteed by an individual are to be aggregated with direct loans to the individual and are subject to the same exposure threshold.

Size of the pool of exposures

e. The exposure must be one of a large pool of exposures, which are managed by the institution on a pooled basis.

---

[4] Loans that meet the conditions set out in section 4.1.10 of Chapter 4 are also eligible to be included in the IRB retail residential mortgage subclass.

[5] As stated in Chapter 1 of this guideline, all dollar values in this guideline are in Canadian dollars, unless otherwise noted.

f. Small business exposures below $2.5 million may be treated as retail exposures if the institution treats such exposures in its internal risk management systems consistently over time and in the same manner as regulatory retail exposures. This requires that such an exposure be originated in a similar manner to regulatory retail exposures. Furthermore, it must not be managed individually in a way comparable to corporate exposures, but rather as part of a portfolio segment or pool of exposures with similar risk characteristics for purposes of risk assessment and quantification. However, this does not preclude regulatory 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 deny the eligibility as a regulatory retail exposure.

[Basel Framework, CRE 30.19 to 30.22]

25. Within the regulatory retail asset class category, institutions are required to identify separately three sub-classes of exposures:

a. residential mortgage loans as defined above,
b. qualifying revolving retail exposures, as defined in paragraph 26, and
c. all other regulatory retail exposures.

[Basel Framework, CRE 30.23]

(vi) Definition of qualifying revolving retail exposures

26. All of the following criteria must be satisfied for a sub-portfolio to be treated as a qualifying revolving retail exposure (QRRE). These criteria must be applied at a sub-portfolio level consistent with the institution's segmentation of its retail activities generally. If credit cards are managed separately from lines of credit (LOC), then credit cards and LOCs may be considered as separate sub-portfolios. Segmentation at the national or country level (or below) should be the general rule.

a. The exposures are revolving, unsecured, and uncommitted (both contractually and in practice). In this context, revolving exposures are defined as those where customers' outstanding balances are permitted to fluctuate based on their decisions to borrow and repay, up to a limit established by the institution.

b. The exposures are to individuals.

c. The maximum exposure to a single individual in the sub-portfolio is $150,000 or less.

d. Because the asset correlation assumptions for the QRRE risk-weight function are markedly below those for all other regulatory retail risk-weight function at low PD values, institutions must demonstrate that the use of the QRRE risk-weight function is constrained to portfolios that have exhibited low volatility of loss rates, relative to their average level of loss rates, especially within the low PD bands.

e. Data on loss rates for the sub-portfolio must be retained in order to allow analysis of the volatility of loss rates.

f. OSFI must concur that treatment as a qualifying revolving retail exposure is consistent with the underlying risk characteristics of the sub-portfolio.

[Basel Framework, CRE 30.24]

27. The QRRE sub-class is split into exposures to transactors and revolvers. A QRRE transactor is an exposure to an obligor that meets the definition of a transactor set out in section 4.1.9 of Chapter 4. That is, the exposure is to an obligor in relation to a facility such as a credit card or charge card with an interest free grace period, where the total accrued interest over the previous 12 months is less than $50, or the exposure is in relation to an overdraft facility or a line of credit if the facility has not been drawn down at any point in time over the previous 12 months. All QRRE exposures that are not transactors are revolvers.[6]
[Basel Framework, CRE 30.25]

28. In cases where an institution is unable to ensure compliance with the retail thresholds (for both QRR in paragraph 26 and total aggregate exposures in paragraph 24), they must be able to, on at least an annual basis, verify and document that the amount of exposures that breach these thresholds are less than 2% of retail exposures, and upon request, provide this documentation to OSFI. If the amount of exposures that breach the exposure threshold is above the 2% threshold, the institution must notify OSFI immediately and develop a plan to either reduce the materiality of these exposures or move these exposures to the Corporate asset class.

(vii) Definition of equity exposures

29. This asset class covers exposures to equities as defined in section 4.1.8.
[Basel Framework, CRE 30.26]

(viii) Definition of eligible purchased receivables

30. Eligible purchased receivables are divided into retail and corporate receivables as defined below. [Basel Framework, CRE 30.27]

Retail receivables

31. Purchased retail receivables, provided the purchasing institution complies with the IRB rules for retail exposures, are eligible for the top-down approach as permitted for retail exposures. The institution must also apply the minimum operational requirements as set forth in sections 5.6 and 5.8. [Basel Framework, CRE 30.28]

Corporate receivables

32. In general, for purchased corporate receivables, institutions are expected to assess the default risk of individual obligors as specified in sections 5.3.1 and 5.3.2 consistent with the treatment of other corporate exposures. However, the top-down approach may be used, provided that the purchasing institution's programme for corporate receivables complies with both the criteria for eligible receivables and the minimum operational requirements of this approach. The

[6] New accounts will be deemed revolvers until the account has been open for at least 12 months and the definition of a transactor is satisfied.

use of the top-down purchased receivables treatment is limited to situations where it would be an undue burden on an institution to be subjected to the minimum requirements for the IRB approach to corporate exposures that would otherwise apply. Primarily, it is intended for receivables that are purchased for inclusion in asset-backed securitization structures, but institutions may also use this approach, with the approval of OSFI, for appropriate on-balance sheet exposures that share the same features. [Basel Framework, CRE 30.29]

33. OSFI may deny the use of the top-down approach for purchased corporate receivables depending on the institution's compliance with minimum requirements. In particular, to be eligible for the proposed 'top-down' treatment, purchased corporate receivables must satisfy the following conditions:

a. The receivables are purchased from unrelated, third party sellers, and as such the institution has not originated the receivables either directly or indirectly.

b. The receivables must be generated on an arm's-length basis between the seller and the obligor. (As such, intercompany accounts receivable and receivables subject to contra-accounts between firms that buy and sell to each other are ineligible.)[7]

c. The purchasing institution has a claim on all proceeds from the pool of receivables or a *pro-rata* interest in the proceeds.[8]

d. If any single receivable or group of receivables guaranteed by the same seller or made to the same obligor represents more than 4% of the pool of receivables, capital charges must be calculated using the minimum requirements for the bottom-up approach for corporate exposures.

[Basel Framework, CRE 30.30]

34. The existence of full or partial recourse to the seller does not automatically disqualify an institution from adopting this top-down approach, as long as the cash flows from the purchased corporate receivables are the primary protection against default risk as determined by the rules in paragraphs 174 to 177 for purchased receivables and the institution meets the eligibility criteria and operational requirements. [Basel Framework, CRE 30.31]

(ix) Definition of a Commitment

35. Commitments are defined as arrangements offered by the institution and accepted by the client that obligate an institution, at a client's request, to:

a. Extend credit in the form of loans or participations in loans, lease financing receivables, mortgages (including the undrawn portion of HELOCs), overdrafts;

b. Purchase loans, securities, or other assets; or

c. Issue credit substitutes such as letters of credit and guarantees.

---

7 Contra-accounts involve a customer buying from and selling to the same firm. The risk is that debts may be settled through payments in kind rather than cash. Invoices between the companies may be offset against each other instead of being paid. This practice can defeat a security interest when challenged in court.

8 Claims on tranches of the proceeds (first loss position, second loss position, etc.) would fall under the securitization treatment.

This includes arrangements that can be:

a. unconditionally cancelled by the institution at any time without prior notice to the obligor
b. cancelled by the institution if the obligor fails to meet conditions set out in the facility documentation, including conditions that must be met by the obligor or third party (conditions precedent) prior to any initial or subsequent drawdown under the arrangement.

Normally, commitments involve a written contract or agreement and some form of consideration, such as a commitment fee. Note that unfunded mortgage commitments are treated as commitments for risk-based capital purposes when the borrower has accepted the commitment extended by the institution and all conditions related to the commitment have been fully satisfied.

5.2.2 Foundation and advanced approaches

36. For each of the asset classes covered under the IRB framework, there are three key elements:

a. Risk components ─ estimates of risk parameters provided by institutions some of which are supervisory estimates.
b. Risk-weight functions ─ the means by which risk components are transformed into risk-weighted assets and therefore capital requirements.
c. Minimum requirements ─ the minimum standards that must be met in order for an institution to use the IRB approach for a given asset class.

[Basel Framework, CRE 30.32]

37. For certain asset classes, two broad approaches are available: a foundation and an advanced approach. Under the foundation approach (FIRB approach), as a general rule, institutions provide their own estimates of PD and their own calculation of M and rely on supervisory estimates for other risk components. Under the advanced approach (AIRB approach), institutions provide their own estimates of PD, LGD and EAD, and their own calculation of M, subject to meeting minimum standards. For both the foundation and advanced approaches, institutions must always use the risk-weight functions provided in this guideline for the purpose of deriving capital requirements. The full suite of approaches is described below.
[Basel Framework, CRE 30.33]

38. For exposures to equities, as defined in paragraph 29, the IRB approaches are not permitted (see paragraph 48). In addition, the AIRB approach cannot be used for the following:

a. Exposures to general corporates (i.e. exposures to corporates that are not classified as specialized lending) belonging to a group with total consolidated annual revenues greater than $750 million.

b. Exposures in the bank asset class as defined in paragraph 23, and other securities firms and financial institutions (including insurance companies and other financial institutions in the corporate asset class), including all exposures to financial institutions to which a 1.25 correlation parameter multiplier applies as referenced in paragraph 67.[9]

[Basel Framework, CRE 30.34]

39. In making the assessment for the revenue threshold in paragraph 38(a), the amounts must be as reported in the audited financial statements of the corporates or, for corporates that are part of consolidated groups, their consolidated groups (according to the accounting standard applicable to the ultimate parent of the consolidated group). The figures must be based either (i) on the average amounts calculated over the prior three years, or (ii) on the latest amounts available to the institution, updated at least every three years. Institutions are expected to choose an approach and use it consistently, where possible. However, institutions are requested to store the annual revenue data of corporate borrowers on an ongoing basis, even if only the latest amount is used for purposes of comparing against the threshold amount. In the event where there is insufficient information on the consolidated group as a whole, the institution may rely on the financial statements of the highest level which is available to the institution at the reporting date (this could be the borrower itself if no higher level of consolidated reporting is available to the institution). If information about different parts of the consolidated group are available on an unconsolidated basis, the institution must combine this information in order to form a view on the larger group.
[Basel Framework, CRE 30.35]

40. Apart from the asset classes listed in paragraph 38, the FIRB approach may only be applied subject to OSFI approval. The size or materiality of a portfolio cannot, in isolation, justify applying the FIRB approach. However, subject to OSFI approval, an institution could adopt the FIRB approach in order to gain experience with the IRB approach prior to transitioning to the AIRB approach.

(i) Corporate, sovereign, PSE and bank exposures

41. Under the foundation approach, institutions must provide their own estimates of PD associated with each of their borrower grades, and must calculate M using the definition provided in paragraphs 131 to 143 but must use supervisory estimates for the other relevant risk components. The other risk components are LGD and EAD.
[Basel Framework, CRE 30.36]

42. Under the advanced approach, institutions must calculate the effective maturity (M)[10] and provide their own estimates of PD, LGD and EAD.
[Basel Framework, CRE 30.37]

[9] Exposures to sovereigns and public sector entities are not excluded from the advanced IRB approach (see paragraphs 20 and 21).

[10] At the discretion of the host regulator, certain domestic exposures in a foreign jurisdiction may be exempt from the calculation of M (see paragraph 132).

43. There is an exception to this general rule (specified in paragraphs 41 and 42) for the five sub-classes of assets identified as SL.
[Basel Framework, CRE 30.38]

The SL categories: PF, OF, CF, IPRE, and HVCRE

44. Institutions that do not meet the requirements for the estimation of PD under the corporate foundation approach for their SL exposures are required to map their internal risk grades to five supervisory categories, each of which is associated with a specific risk weight. This approach is termed the 'supervisory slotting criteria approach'. [Basel Framework, CRE 30.39]

45. Institutions that meet the requirements for the estimation of PD are able to use the foundation approach to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE. With the exception of exposures specified in paragraph 18(c), there are no HVCRE exposures in Canada. However at the discretion of host regulators, institutions meeting the requirements for HVCRE exposures in foreign jurisdictions may be able to use a foundation approach that is similar in all respects to the corporate approach, with the exception of a separate risk-weight function as described in paragraph 75. [Basel Framework, CRE 30.40]

46. Institutions that meet the requirements for the estimation of PD, LGD and EAD are permitted to use the advanced approach to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE. With the exception of exposures specified in paragraph **Error! Reference source not found.**, there are no HVCRE exposures in Canada. However at the discretion of host regulators, institutions meeting these requirements for HVCRE exposures in a foreign jurisdiction may be permitted to use an advanced approach that is similar in all respects to the corporate approach, with the exception of a separate risk-weight function as described in paragraph 75. [Basel Framework, CRE 30.41]

(ii) Retail exposures

47. For retail exposures, institutions must provide their own estimates of PD, LGD and EAD. There is no foundation approach for this asset class. [Basel Framework, CRE 30.42]

(iii) Equity exposures

48. The treatment of equity exposures is set out in Chapter 2 and section 4.1.8 of this guideline, with the exception of equity investment in funds. Equity investments in funds are subject to the requirements set out in section 4.1.23 of this guideline, with the following exceptions:

Under the look-through approach (LTA):

a. Institutions using an IRB approach must calculate the IRB risk components (i.e. PD of the underlying exposures and, where applicable, LGD and EAD) associated with the fund's underlying exposures (except where the underlying exposures are equity exposures, in respect of which the standardized approach must be used as required by paragraph 38).

b. Institutions using an IRB approach may use the standardized approach for credit risk when applying risk weights to the underlying components of funds if they are permitted to do so under the provisions relating to the adoption of the IRB approach set out in earlier in this chapter in the case of directly held investments. In addition, when an IRB calculation is not feasible (e.g. the institution cannot assign the necessary risk components to the underlying exposures in a manner consistent with its own underwriting criteria), the methods set out in paragraph 49 must be used.
c. Institutions may rely on third-party calculations for determining the risk weights associated with their equity investments in funds (i.e. the underlying risk weights of the exposures of the fund) if they do not have adequate data or information to perform the calculations themselves. In this case, the third party must use the methods set out in paragraph 49, with the applicable risk weight set 1.2 times higher than the one that would be applicable if the exposure were held directly by the institution.

[Basel Framework, CRE 60.19]

49. In cases when the IRB calculation is not feasible (paragraph 48(b) above), a third party is performing the calculation of risk weights (paragraph 48 above) or when the institution is using the mandate-based approach (MBA), the following methods must be used to determine the risk weights associated with the fund's underlying exposures:

a. for securitization exposures, the Securitization External Ratings-Based Approach (SEC-ERBA) set out in section 6.6.2 of this guideline or the Securitization Standardized Approach (SEC-SA) set out in section 6.6.4 of this guideline if the institution is not able to use the SEC-ERBA; or a 1250% risk weight where the specified requirements for using the SEC-ERBA or SEC-SA are not met; and
b. the Standardized Approach as described in Chapter 4 of this guideline for all other exposures.

[Basel Framework, CRE 60.20]

(iv) Eligible purchased receivables

50. The treatment of eligible purchased receivables potentially straddles two asset classes. For eligible corporate receivables, both a foundation and advanced approach are available subject to certain operational requirements being met. As noted in paragraph 32, for corporate purchased receivables institutions are in general expected to assess the default risk of individual obligors. The institution may use the AIRB treatment for purchased corporate receivables (paragraphs 176 and 177) only for exposures to individual corporate obligors that are eligible for the AIRB approach according to paragraphs 38 and 39. Otherwise, the FIRB treatment for purchased corporate receivables should be used. For eligible retail receivables, as with the retail asset class, only the AIRB approach is available. [Basel Framework, CRE 30.44]

(v) Asset-backed securities

51. Exposures to asset-backed securities that are tranched are treated as securitization exposures, defined under Chapter 6, Securitization. For other asset-backed securities, section 4.1.15 outlines the required criteria for capitalizing the exposure based on the underlying assets

rather than the originator/SPV. If the criteria outlined in section in 4.1.15 are met and the institution has received IRB approval for the underlying assets, then the underlying assets may be treated as purchased receivables.

5.2.3 Adoption of the IRB approach across asset classes

52. Once an institution adopts an IRB approach for part of its holdings within an asset class, it is expected to extend it across all holdings within that asset class. In this context, the relevant asset classes are as follows:

a. Sovereigns
b. Public Sector Entities
c. Banks
d. Corporates (excluding specialized lending and purchased receivables)
e. Specialized lending
f. Corporate purchased receivables
g. QRRE
h. Retail residential mortgages
i. All other regulatory retail (excluding purchased receivables)
j. Retail purchased receivables

[Basel Framework, CRE 30.45]

53. OSFI recognizes that for many institutions it may not be practicable for various reasons to implement the IRB approach across all material asset classes and business units at the same time. Furthermore, once on IRB, data limitations may mean that institutions can meet the standards for the use of own estimates of LGD and EAD for some but not all of their exposures within an asset class at the same time (for example, exposures that are in the same asset class, but are in different business units). [Basel Framework, CRE 30.46]

54. As such, OSFI may allow institutions to adopt a phased rollout of the IRB approach across an asset class. The phased rollout includes (i) adoption of IRB across the asset class within the same business unit; (ii) adoption of IRB across business units in the same banking group; and (iii) the move from the foundation approach to the advanced approach for certain risk components where use of the advanced approach is permitted. However, when an institution adopts an IRB approach for an asset class within a particular business unit (or in the case of retail exposures for an individual sub-class), it must apply the IRB approach to all exposures within that asset class (or sub-class) in that unit. [Basel Framework, CRE 30.47]

55. If an institution intends to adopt an IRB approach for an asset class, it must produce an implementation plan, specifying to what extent and when it intends to roll out IRB approaches within the asset class and business units. The plan should be realistic, and must be agreed with OSFI. It should be driven by the practicality and feasibility of moving to the more advanced

approaches, and not motivated by a desire to adopt an approach that minimizes its capital charge. During the roll-out period, OSFI will ensure that no capital relief is granted for intra-group transactions which are designed to reduce a banking group's aggregate capital charge by transferring credit risk among entities on the standardized approach, foundation and advanced IRB approaches. This includes, but is not limited to, asset sales or cross guarantees.
[Basel Framework, CRE 30.48]

56. Some exposures that are immaterial in terms of size and perceived risk profile may be exempt from the requirements paragraphs 54 and 55, subject to supervisory approval. Capital requirements for such operations will be determined according to the standardized approach, with OSFI determining whether an institution should hold more capital under Pillar 2 for such positions.
[Basel Framework, CRE 30.49]

57. Institutions adopting an IRB approach for an asset class are expected to continue to employ an IRB approach for that asset class. A voluntary return to the standardized or foundation approach is permitted only in extraordinary circumstances, such as divestiture of a large fraction of the institution's credit-related business, and must be approved by OSFI.
[Basel Framework, CRE 30.50]

58. Given the data limitations associated with SL exposures, an institution may remain on the supervisory slotting criteria approach for one or more of the PF, OF, CF, IPRE or HVCRE sub-classes, and move to the foundation or advanced approach for the other sub-classes. However, an institution should not move to the advanced approach for the HVCRE sub-class without also doing so for material IPRE exposures at the same time. [Basel Framework, CRE 30.51]

59. Irrespective of the materiality, exposures to central counterparties arising from over-the-counter derivatives, exchange traded derivatives transactions and securities financing transactions must be treated according to the dedicated treatment laid down in section 7.1.8.
[Basel Framework, CRE 30.52]

60. Institutions adopting the IRB approaches are required to calculate their capital requirements using these approaches, as well as the standardized approach as set out in section 1.5. Institutions moving directly from the standardized to the IRB approaches will be subject to parallel calculations or impact studies in the years leading up to their adoption of the advanced approaches.

5.3. IRB approach risk weight functions

61. Section 5.3 presents the calculation of risk-weighted assets under the IRB approach for i) corporate, sovereign, PSE and bank exposures and ii) retail exposures. Risk-weighted assets are designed to address unexpected losses from exposures. The method for calculating expected losses, and for determining the difference between that measure and provisions is described in section 5.7. [Basel Framework, CRE 31.1]

Explanation of the risk-weight functions

62. Regarding the risk-weight functions for deriving risk weighted assets set out in section 5.3:

a. Probability of default (PD) and loss-given-default (LGD) are measured as decimals.

b. Exposure at default (EAD) is measured as currency (e.g. CAD), except where explicitly noted otherwise.

c. ln denotes the natural logarithm and *e* the base of the natural logarithm.

d. N(x) denotes the cumulative distribution function for a standard normal random variable (i.e. the probability that a normal random variable with mean zero and variance of one is less than or equal to x). The normal cumulative distribution function is, for example, available in Excel as the function NORMSDIST.

e. G(z) denotes the inverse cumulative distribution function for a standard normal random variable (i.e. the value of x such that N(x) = z). The inverse of the normal cumulative distribution function is, for example, available in Excel as the function NORMSINV.

[Basel Framework, CRE 31.2]

Risk-weighted assets for all exposures that are in default

63. The capital requirement (K) for a defaulted exposure under the AIRB approach is equal to the greater of zero and the difference between its LGD (described in paragraph 283) and the institution's best estimate of expected loss (described in paragraph 286). For exposures under the FIRB approach, the capital requirement for a defaulted exposure is equal to 0. The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD. [Basel Framework, CRE 31.3]

5.3.1 RWA for corporate, sovereign, PSE, and bank exposures not in default

(i) Risk weight functions for corporate, sovereign, PSE, and bank exposures

64. The derivation of risk-weighted assets is dependent on estimates of the PD, LGD, EAD and, in some cases, effective maturity (M), for a given exposure. [Basel Framework, CRE 31.4]

65. For exposures not in default, the formula for calculating risk-weighted assets is:

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

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

Capital requirement[11] (K) = $$\left[LGD \cdot N\left[\frac{G(PD)}{\sqrt{(1-R)}} + \sqrt{\frac{R}{1-R}} \cdot G(0.999)\right] - PD \cdot LGD\right] \times \frac{(1 + (M - 2.5) \cdot b)}{1 - 1.5 \cdot b}$$

Risk-weighted assets (RWA) = $K \cdot 12.5 \cdot EAD$

Illustrative risk weights are shown in Appendix 5-1.

[11] If this calculation results in a negative capital charge for any individual sovereign exposure, institutions should apply a zero capital charge for that exposure.

[Basel Framework, CRE 31.5]

66. The M used in the calculation of K in paragraph 65 is the effective maturity, calculated according to paragraphs 131 to 142, and the following term is used to refer to a specific part of the capital requirements formula:

$$\text{Full maturity adjustment} = \frac{(1 + (M - 2.5) \cdot b)}{(1 - 1.5 \cdot b)}$$

[Basel Framework, CRE 31.6]

67. A multiplier of 1.25 is applied to the correlation parameter of all exposures to financial institutions meeting the following criteria:

a. Regulated financial institutions whose total assets are greater than or equal to $150 billion. The most recent audited financial statement of the parent company and consolidated subsidiaries must be used in order to determine asset size. For the purpose of this paragraph, a regulated financial institution is defined as a parent and its subsidiaries where any substantial legal entity in the consolidated group[12] is supervised by a regulator that imposes prudential requirements consistent with international norms. These include, but are not limited to, prudentially regulated Insurance Companies, Broker/Dealers, Banks, Thrifts and Futures Commission Merchants;

b. Unregulated financial institutions, regardless of size. Unregulated financial institutions are, for the purposes of this paragraph, legal entities whose main business includes: the management of financial assets, lending, factoring, leasing, provision of credit enhancements, securitization, investments, financial custody, central counterparty services, proprietary trading and other financial services activities identified by regulatory authorities (including OSFI), including financial institutions or leveraged funds that are not subject to prudential solvency regulation.

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

[Basel Framework, CRE 31.7]

(ii) Firm-size adjustment for small- and medium-sized entities (SME)

68. Under the IRB approach for corporate credits, institutions will be permitted to separately distinguish exposures to SME borrowers (defined as corporate exposures where the reported sales for the consolidated group of which the firm is a part is less than $75 million) from those to large firms. A firm-size adjustment (i.e. 0.06 x (1- (S - 7.5)/67.5)) is made to the corporate risk weight formula for exposures to SME borrowers. S is expressed as total annual sales in millions of dollars with values of S falling in the range of equal to or less than $75 million or greater than or equal to $7.5 million. Reported sales of less than $7.5 million will be treated as if they were equivalent to $7.5 million for the purposes of the firm-size adjustment for SME borrowers.

[12] The term "consolidated group" is defined in paragraph 39 above.

$$\text{Correlation (R)} = 0.12 \cdot \frac{\left(1 - e^{(-50 \cdot PD)}\right)}{\left(1 - e^{(-50)}\right)} + 0.24 \cdot \left[1 - \frac{1 - e^{(-50 \cdot PD)}}{1 - e^{(-50)}}\right] - 0.06 \cdot \left(1 - \frac{S - 7.5}{67.5}\right)$$

[Basel Framework, CRE 31.8]

69. Annual sales, rather than total assets, are to be used to measure borrower size, unless in limited circumstances an institution can demonstrate that it would be more appropriate to use the total assets of the borrower. OSFI is willing to consider limited recognition for classes of entities that always have much smaller sales than total assets, because assets are a more appropriate indicator in this case. The use of total assets should be a limited exception. The maximum reduction in the risk weight for SMEs is achieved when borrower size is $7.5 million. For borrower sizes below $7.5 million, borrower size is set equal to $7.5 million. The adjustment shrinks to zero as borrower size approaches $75 million. Additionally, the Corporate SME RWA formula must be used with $7.5 million for the annual sales amount for exposures to individuals for non-regulatory retail exposures. [Basel Framework, CRE 31.9]

(iii) Risk weights for specialized lending

Risk weights for PF, OF, CF, and IPRE

70. Institutions that meet the requirements for the estimation of PD will be able to use the FIRB approach for the corporate asset class to derive risk weights for SL sub-classes.
[Basel Framework, CRE 31.10]

71. Institutions that meet the requirements for the estimation of PD and LGD and EAD (where relevant) will be able to use the AIRB approach for the corporate asset class to derive risk weights for SL sub-classes.
[Basel Framework, CRE 31.10]

72. Institutions that do not meet the requirements for the estimation of PD under the IRB approach for corporate exposures must follow the supervisory slotting approach outlined in section 5.5.1.
[Basel Framework, CRE 31.10]

Risk weights for HVCRE

73. For Canadian exposures, the HVCRE category only applies to loans financing ADC properties where the source of repayment at origination is substantially uncertain without the borrower having substantial equity at risk.

74. However, the HVCRE risk weights may apply more broadly to loans made by Canadian institutions' foreign operations that are secured by property types designated by the host supervisor as HVCRE, where the host supervisor has given the foreign operation approval to use the IRB approach. In this instance, a Canadian institution shall use the HVCRE risk weights required by the foreign supervisor in calculating its consolidated capital requirements for loans secured by these properties.

75. Institutions will use the same formula for the derivation of HVCRE risk weights that is used for other SL exposures, except that they will apply the following asset correlation formula:

$$\text{Correlation (R)} = 0.12 \cdot \frac{(1 - e^{(-50\,x\,PD)})}{(1 - e^{(-50)})} + 0.30 \cdot \left[1 - \frac{(1 - e^{-50 \cdot PD})}{(1 - e^{-50})}\right]$$

[Basel Framework, CRE 31.11]

76. Institutions that do not meet the requirements for estimation of LGD and EAD for HVCRE exposures must use the supervisory parameters for LGD and EAD for corporate exposures or use the supervisory slotting approach for HVCRE exposures outlined in section 5.5.2.
[Basel Framework, CRE 31.12]

5.3.2 RWA for retail exposures that are not in default

77. There are four separate risk-weight functions for retail exposures, as defined in paragraphs 78 to 82. Risk weights for retail exposures are based on separate assessments of PD and LGD as inputs to the risk-weight functions. None of the three non-regulatory retail risk-weight functions contain the explicit maturity adjustment component that is present in the risk weight function for exposures to banks, sovereigns, PSEs and corporates. Illustrative risk weights are shown in Appendix 5-1. [Basel Framework, CRE 31.13]

(i) Residential mortgage exposures

78. For exposures defined in paragraph 24 that are not in default and are secured or partly secured[13] by residential mortgages, risk weights will be assigned based on the following formula:

Correlation (R) = 0.15 where repayment is not materially dependent on cash flows generated by the property;[14] or

= 0.22 where one or more of the following applies:

a. repayment is materially dependent on cash flows generated by the property[15];
b. OSFI's expectations related to Guideline B-20[16] are not met;

= 0.25 where the exposure i) is a variable rate fixed payment residential mortgage or any other residential mortgage product where the amortization could be extended due to rising interest rates; and ii) has an LTV above 65%, unless the exception noted below applies.

[13] This means that risk weights for residential mortgages also apply to the unsecured portion of such residential mortgages.
[14] As defined in Section 4.1.11 of Chapter 4 of this guideline.
[15] As defined in Section 4.1.11 of Chapter 4 of this guideline
[16] Guideline B-20: Residential Mortgage Underwriting Practices and Procedures

OSFI may exempt an institution from using the 0.25 correlation factor for a variable rate fixed payment mortgage described above if the institution can demonstrate, to OSFI's satisfaction, that its estimates of IRB parameters account for this risk in a manner that is at least as conservative as increasing the correlation factor from 0.15 to 0.25.

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

RWA = $K \cdot 12.5 \cdot EAD$

[Basel Framework, CRE 31.14]

(ii) Qualifying revolving retail exposures

79. For qualifying revolving retail exposures as defined in paragraph 26 that are not in default, risk weights are defined based on the following formula:

Correlation (R) = 0.04

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

Risk-weighted assets = K x 12.5 x EAD

[Basel Framework, CRE 31.15]

(iii) All other regulatory retail exposures

80. For all other regulatory retail exposures that are not in default, risk weights are assigned based on the following function, which allows correlation to vary with PD:

Correlation (R) = $0.03 \cdot \frac{(1-e^{-35PD})}{(1-e^{-35})} + 0.16 \cdot \left[1 - \frac{1-e^{-35 \cdot PD}}{1-e^{-35}}\right]$

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

Risk-weighted assets = K x 12.5 x EAD

[Basel Framework, CRE 31.16]

(iv) Non-regulatory retail

81. Retail exposures (both individuals and small businesses) which fail to meet any of the six criteria related to the nature of the borrowers and the size of the pool of exposures in paragraph 24 are categorized as non-regulatory retail. They are subject to the Corporate SME risk-weight function.

5.4. IRB risk components

82. Section 5.4 presents the calculation of the risk components (PD, LGD, EAD, M) that are used in the formulas set out in section 5.3. In calculating these components, the legal certainty standards for recognizing credit risk mitigation (CRM) under the standardized approach as set out in section 4.3 apply for both the FIRB and AIRB approaches. [Basel Framework, CRE 32.1]

5.4.1 Risk components for corporate, sovereign, PSE, and bank exposures

83. Section 5.4.1 sets out the calculation of the risk components for corporate, sovereign, PSE, and bank exposures. In the case of an exposure that is guaranteed by a sovereign, the floors that apply to the risk components do not apply to that part of the exposure covered by the sovereign guarantee (i.e. any part of the exposure that is not covered by the guarantee is subject to the relevant floors). [Basel Framework, CRE 32.2]

(i) Probability of default (PD)

84. For corporate, sovereign, PSE and bank exposures, the PD is the one-year PD associated with the internal borrower grade to which that exposure is assigned. The PD of borrowers assigned to a default grade(s), consistent with the reference definition of default, is 100%. The minimum requirements for the derivation of the PD estimates associated with each internal borrower grade are outlined in paragraphs 276 to 278. [Basel Framework, CRE 32.3]

85. The PD floor for exposures to U.S. GSEs in conservatorship or receivership is 0.03%. For all other exposures except those in the sovereign asset class (including PSEs treated as sovereigns as defined in paragraph 20), the PD for each exposure that is used as input into the risk weight formula and the calculation of expected loss must not be less than 0.05%.
[Basel Framework, CRE 32.4]

(ii) Loss given default (LGD)

86. An institution must provide an estimate of the LGD for each corporate, sovereign, PSE, and bank exposure. There are two approaches for deriving this estimate: a foundation approach and an advanced approach. As noted in paragraph 38, the advanced approach is not permitted for exposures to certain entities. [Basel Framework, CRE 32.5]

LGD under the foundation approach: treatment of unsecured claims and non-recognized collateral

87. Under the foundation approach, senior claims on sovereigns, PSEs, banks, securities firms and other financial institutions (including insurance companies and any financial institutions in the corporate asset class) that are not secured by recognized collateral will be assigned a 45% LGD. Senior claims on other corporates that are not secured by recognized collateral will be assigned a 40% LGD. [Basel Framework, CRE 32.6]

88. All subordinated claims on corporates, sovereigns, PSEs and banks will be assigned a 75% LGD. A subordinated loan is a facility that is expressly subordinated to another facility. The legal definition of subordination applies for the purpose of this paragraph.
[Basel Framework, CRE 32.7]

LGD under the foundation approach: collateral recognition

89. In addition to the eligible financial collateral recognized in the standardized approach, under the foundation IRB approach some other forms of collateral, known as eligible IRB collateral, are also recognized. These include receivables, specified commercial and residential real estate (CRE/RRE), and other collateral, where they meet the minimum requirements set out in paragraphs 336 to 352. For eligible financial collateral, the requirements are identical to the operational standards as set out in section 4.3. [Basel Framework, CRE 32.8]

90. The methodology for the recognition of eligible financial collateral closely follows that outlined in the comprehensive approach to collateral in section 4.3.3 (iii).

91. The simple approach to collateral presented in section 4.3.3 (ii) is not available to institutions applying the IRB approach. [Basel Framework, CRE 32.9]

92. The effective LGD applicable to a collateralized transaction (LGD`) must be calculated as the exposure weighted average of the LGD applicable to the unsecured part of an exposure (LGD_U) and the LGD applicable to the collateralized part of an exposure (LGD_S). Specifically, the formula that follows must be used, where:

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 has to be increased by applying the appropriate haircuts (H_E) according to the comprehensive approach for financial collateral;

E_S is the current value of the collateral received after the application of the haircut applicable for the type of collateral (H_C) and for any currency mismatches between the exposure and the collateral, as specified in the paragraphs 93 to 95. E_S is capped at the value of $E \cdot (1 + H_E)$;

$E_U = E \cdot (1 + H_E) - E_S$. The terms Eu and E_S are only used to calculate LGD`. Institutions must continue to calculate EAD without taking into account the presence of any collateral, unless otherwise specified;

LGD_U is that applicable for an unsecured exposure, as set out in paragraphs 87 and 88;

LGD_S is the LGD applicable to exposures secured by the type of collateral used in the transaction, as specified in paragraph 93;

$$LGD' = LGD_U \text{ x } \frac{E_U}{E \cdot (1 + H_E)} + LGD_S \text{ x } \frac{E_S}{E \cdot (1 + H_E)}$$

[Basel Framework, CRE 32.10]

93. The following table specifies the LGD_S and haircuts applicable when calculating E_S in the formula set out in paragraph 92:

Supervisory LGDs and Haircuts under the Foundation IRB

Type of collateral	LGD_S	Haircut
Eligible financial collateral	0%	As determined by the haircuts that apply in the comprehensive formula of the standardized approach for credit risk (see section 4.3.3 iii). The haircuts have to be adjusted for different holding periods and non-daily remargining or revaluation according to section 4.3.3 iii.
Eligible receivables	20%	40%
Eligible residential real estate / commercial real estate[17]	20%	40%
Other eligible physical collateral	25%	40%
Ineligible collateral	N/A	100%

[Basel Framework, CRE 32.11]

94. When eligible collateral is denominated in a different currency to that of the exposure, the haircut for currency risk used to calculate E_S is the same haircut that applies in the comprehensive approach (section 4.3.3 (iii) of Chapter 4). [Basel Framework, CRE 32.12]

95. Institutions that lend securities or post collateral must calculate capital requirements for both of the following: (i) the credit risk or market risk of the securities, if this remains with the institution; and (ii) the counterparty credit risk arising from the risk that the borrower of the securities may default. Paragraphs 124 to 130 set out the calculation of the EAD arising from transactions that give rise to counterparty credit risk such as securities financing transactions. For such transactions where the collateral has been reflected through EAD, the LGD of the counterparty must be determined using the LGD specified for unsecured exposures, as set out in paragraph 87 and 88. [Basel Framework, CRE 32.13]

[17] This includes exposures to covered bonds as defined in section 4.1.5 of chapter 4.

LGD under the F-IRB approach: methodology for the treatment of pools of collateral

96. In the case where an institution has obtained multiple types of collateral it may apply the formula set out in paragraph 92 sequentially for each individual type of collateral. In doing so, after each step of recognizing one individual type of collateral, the remaining value of the unsecured exposure (E_U) will be reduced by the adjusted value of the collateral (E_S) recognized in that step. In line with paragraph 92, the total of E_S across all collateral types is capped at the value of $E \cdot (1+H_E)$. This results in the formula that follows, where for each collateral type i:

a. LGD_{Si} is the LGD applicable to that form of collateral (as specified in paragraph 93).

b. E_{Si} is the current value of the collateral received after the application of the haircut applicable for the type of collateral (H_c) (as specified in paragraph 93).

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

[Basel Framework, CRE 32.14]

LGD under the advanced approach

97. Subject to certain additional minimum requirements specified below (and the conditions set out in paragraph 32), institutions may use their own internal estimates of LGD for corporate, PSE and sovereign exposures. LGD must be measured as the loss given default as a percentage of the EAD. Institutions eligible for the IRB approach that are unable to meet these additional minimum requirements must utilize the foundation LGD treatment described above.
[Basel Framework, CRE 32.15]

98. The LGD for each corporate and PSE exposure that is used as input into the risk weight formula and the calculation of expected loss must not be less than the parameter floors indicated in the table below (the floors do not apply to the LGD for exposures in the sovereign asset class):

LGD Parameter Floors

Wholesale classes	LGD	
	Unsecured	Secured
Corporate and PSE	0% for U.S. GSEs in conservatorship or receivership and 25% otherwise	Varying by collateral type: • 0% financial • 10% receivables • 10% commercial or residential real estate • 15% other physical • 25% intangibles

[Basel Framework, CRE 32.16]

99. The LGD floors for secured exposures in the table above apply when the exposure is fully secured (i.e. the value of collateral after the application of haircuts exceeds the value of the exposure). The LGD floor for a partially secured exposure is calculated as a 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 should be used to determine the LGD floor, where:

a. $LGD_{U\ floor}$ and $LGD_{S\ floor}$ are the floor values for fully unsecured and fully secured exposures respectively, as specified in the table in paragraph 98.

b. The other terms are defined as set out in paragraphs 92 and 93.

$$Floor = LGD_{Ufloor} \cdot \frac{E_U}{E \cdot (1 + H_E)} + LGD_{Sfloor} \cdot \frac{E_S}{E \cdot (1 + H_E)}$$

[Basel Framework, CRE 32.17]

100. In cases where an institution has met the conditions to use their own internal estimates of LGD for a pool of unsecured exposures, and takes collateral against one of these exposures, it may not be able to model the effects of the collateral (i.e. it may not have enough data to model the effect of the collateral on recoveries). In such cases, the institution is permitted to apply the formula set out in paragraph 92 or 96, with the exception that the LGD_U term would be the institution's own internal estimate of the unsecured LGD. To adopt this treatment the collateral must be eligible under the F-IRB and the institution's estimate of LGD_U must not take account of any effects of collateral recoveries. [Basel Framework, CRE 32.18]

101. The minimum requirements for the derivation of LGD estimates are outlined in section 5.8.6, (vii). [Basel Framework, CRE 32.19]

Treatment of certain repo-style transactions under the IRB approaches

102. Institutions that want to recognize the effects of master netting agreements on repo-style transactions for capital purposes must apply the methodology outlined in paragraph 125 for determining E` for use as the EAD in the calculation of counterparty credit risk. For institutions using the advanced approach, own LGD estimates would be permitted for the unsecured equivalent amount (E`) used to calculate counterparty credit risk. In both cases, in addition to counterparty credit risk, institutions must also calculate the capital requirements relating to any credit or market risk to which they remain exposed arising from the underlying securities in the master netting agreement. [Basel Framework, CRE 32.20]

Treatment of guarantees and credit derivatives under the IRB approaches

103. There are two approaches for recognition of credit risk mitigation (CRM) in the form of guarantees and credit derivatives in the IRB approach: a foundation approach for institutions using supervisory values of LGD, and an advanced approach for those institutions using their own internal estimates of LGD. [Basel Framework, CRE 32.21]

104. Under either approach, CRM in the form of guarantees and credit derivatives must not reflect the effect of double default (see paragraph 306). As such, to the extent that the CRM is recognized by the institution, the adjusted risk weight will not be less than that of a comparable direct exposure to the protection provider. A comparable, direct exposure to the guarantor is one using the PD of the guarantor and the LGD for an unsecured exposure to the guarantor. In the case where a guarantor pledges additional collateral beyond that of the original borrower, this additional collateral may be reflected in the LGD of a comparable, direct exposure to the guarantor. Consistent with the standardized approach, institutions may choose not to recognize credit protection if doing so would result in a higher capital requirement. [Basel Framework, CRE 32.22]

Treatment of guarantees and credit derivatives: recognition under the foundation approach

105. For institutions using the foundation approach for LGD, the approach to guarantees and credit derivatives closely follows the treatment under the standardized approach as specified in section 4.3.5. The range of eligible guarantors is the same as under the standardized approach except that companies that are internally rated may also be recognized under the foundation approach. To receive recognition, the requirements outlined in section 4.3.5 must be met. [Basel Framework, CRE 32.23]

106. Eligible guarantees from eligible guarantors will be recognized as follows:

a. For the covered portion of the exposure, a risk weight is 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 institution may replace the LGD of the underlying transaction with the LGD applicable to the guarantee taking into account seniority and any collateralization of a guaranteed commitment. For example, when an 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 87) instead of an LGD applicable for subordinated exposures.
c. In case the institution applies the standardized approach to direct exposures to the guarantor it may only recognize the guarantee by applying the standardized approach to the covered portion of the exposure. [Basel Framework, CRE 32.24]

Although the PD component may be adjusted to lie somewhere between those of the guarantor and the obligor if the guarantor's PD is not appropriate, note that LGD may only be substituted and may not be adjusted. Paragraph 104 establishes a floor on the recognition of a guarantee. Therefore, the PD and LGD used for the covered portion of an exposure under the foundation approach must not result in a risk weight that is lower than that of a comparable direct exposure to the guarantor. While substituting both the PD and LGD of the guarantor for those of the borrower will result in a risk weight equal to that of a direct exposure to the guarantor, replacing or adjusting only one of these components could result in a risk weight that is lower. Notwithstanding, institutions are not permitted to combine a risk component of the guarantor with a component of the underlying obligation in the risk weight formula if doing so results in a risk weight lower than that of a

comparable direct exposure to the guarantor. For guaranteed undrawn exposures, the CCF of the original borrower should be used. [Basel Framework, CRE 32.25]

107. The uncovered portion of the exposure is assigned the risk weight associated with the underlying obligor. [Basel Framework, CRE 32.25]

108. Where partial coverage exists, or where there is a currency mismatch between the underlying obligation and the credit protection, it is necessary to split the exposure into a covered and an uncovered amount. The treatment in the foundation approach follows that outlined in section 4.3.5 (vii) of Chapter 4, and depends upon whether the cover is proportional or tranched. [Basel Framework, CRE 32.26]

109. Loans to individuals secured by the cash surrender value of a life insurance policy may be treated as guaranteed by the insurance company issuing the policy provided the conditions in section 4.1.16 are satisfied.

Treatment of guarantees and credit derivatives: recognition under the AIRB approach

110. Institutions using the advanced approach for estimating LGDs may reflect the risk-mitigating effect of guarantees and credit derivatives through either adjusting PD or LGD estimates. Whether adjustments are done through PD or LGD, they must be done in a consistent manner for a given guarantee or credit derivative type. For unconditional guarantees meeting the requirements for the recognition of guarantees under the foundation approach outlined in paragraphs 105 to 108, (including the operational requirements outlined in section 4.3.5 of Chapter 4) institutions may substitute both the PD and LGD of the obligor for those of the guarantor in cases where they have determined it is warranted. In doing so, institutions must not include the effect of double default in such adjustments. Thus, the adjusted risk weight must not be less than that of a comparable direct exposure to the protection provider. In the case where the institution applies the standardized approach to direct exposures to the guarantor it may only recognize the guarantee by applying the standardized approach to the covered portion of the exposure. In the case where the institution applies the foundation IRB approach to direct exposures to the guarantor it may only recognize the guarantee by determining the risk weight for the comparable direct exposure to the guarantor according to the foundation IRB approach. [Basel Framework, CRE 32.27]

111. Under all circumstances the risk weight of a guaranteed exposure cannot be lower than that of a comparable direct claim on the guarantor. This assumes that any claim on the guarantor will be net of any recovery from the collateral pledged by the borrower.

112. In determining the risk weight for a comparable direct exposure, institutions should take into account both the seniority and the exposure at default of the direct exposure.

113. When an adjustment is made to PD, the risk weight function used for the guaranteed exposure should be that of the protection provider. However, when an adjustment is made to LGD the risk weight function used must be the one applicable to the original exposure.

114. An institution relying on own-estimates of LGD has the option to adopt the treatment outlined above for banks under the foundation IRB approach (paragraphs 105 to 108), or to make an adjustment to its LGD estimate of the exposure to reflect the presence of the guarantee or credit derivative. Under this option, there are no limits to the range of eligible guarantors although the set of minimum requirements provided in paragraphs 308 to 310 concerning the type of guarantee must be satisfied. For credit derivatives, the requirements of paragraphs 315 and 316 must be satisfied.[18] For exposures for which an institution has permission to use its own estimates of LGD, the institution may recognize the risk mitigating effects of first-to-default credit derivatives, but may not recognize the risk mitigating effects of second-to-default or more generally nth-to-default credit derivatives. [Basel Framework, CRE 32.28]

(iii) Exposure at Default (EAD)

115. The following sections apply to both on and off-balance sheet positions:

a. All exposures are measured gross of specific allowances[19]
b. The EAD on drawn amounts should not be less than the sum of:

   i. the amount by which an institution's regulatory capital would be reduced if the exposure were written-off fully, and
   ii. any specific allowances.

c. When the difference between the instrument's EAD and the sum of (i) and (ii) is positive, this amount is termed a discount. The calculation of risk-weighted assets is independent of any discounts.
d. Under the limited circumstances described in section 5.7.2, discounts may be included in the measurement of total eligible allowances for purposes of the EL-provision calculation set out in section 5.7.

[Basel Framework, CRE 32.29]

Exposure measurement for on-balance sheet items

116. On-balance sheet netting of loans and deposits will be recognized subject to the same conditions as under the standardized approach (see section 4.3.4). Where currency or maturity mismatched on-balance sheet netting exists, the treatment follows the standardized approach, as set out in sections 4.3.1 (iv) and 4.3.1 (v). [Basel Framework, CRE 32.30]

Exposure measurement for off-balance sheet items (with the exception of derivatives)

117. For off-balance sheet items there are two approaches for the estimation of EAD: a foundation approach and an advanced approach. When only the drawn balances of revolving facilities have been securitized, institutions must ensure that they continue to hold required capital

[18] When credit derivatives do not cover the restructuring of the underlying obligation, the partial recognition set out in paragraph 284 of Chapter 4 applies.

[19] Under IFRS 9, Stage 3 allowances and partial write-offs are considered to be specific allowances, while Stage 1 and Stage 2 allowances are considered to be general allowances.

against the undrawn balances associated with the securitized exposures. [Basel Framework, CRE 32.31]

118. In the foundation IRB approach, EAD is calculated as the committed but undrawn amount multiplied by a credit conversion factor (CCF). In the advanced approach, EAD for undrawn commitments may be calculated as the committed but undrawn amount multiplied by a CCF or derived from direct estimates of total facility EAD. In both the foundation and advanced IRB approaches, commitments are defined in paragraph 35. [Basel Framework, CRE 32.32]

EAD under the foundation approach

119. The types of instruments and the CCFs applied to them are the same as those in the standardized approach, as outlined in section 4.1.19. [Basel Framework, CRE 32.33]

120. The amount to which the CCF is applied is the lower of the value of the unused committed credit line, and the value that reflects any possible constraining availability of the facility, such as the existence of a ceiling on the potential lending amount which is related to a borrower's reported cash flow. If the facility is constrained in this way, the institution must have sufficient line monitoring and management procedures to support this contention. [Basel Framework, CRE 32.34]

121. Where a commitment is obtained on another off-balance sheet exposure, institutions under the foundation approach are to apply the lower of the applicable CCFs. [Basel Framework, CRE 32.35]

EAD under the advanced approach

122. Institutions which meet the minimum requirements for use of their own estimates of EAD (see paragraphs 290 to 299) will be allowed (for exposures for which AIRB is permitted, as per paragraph 37) to use their own internal estimates of EAD for undrawn revolving commitments[20] to extend credit, purchase assets or issue credit substitutes provided the exposure is not subject to a CCF of 100% in the foundation approach (see paragraph 119). Standardized approach CCFs must be used for all other off-balance sheet items (for example, undrawn non-revolving commitments), and must be used where the minimum requirements for own estimates of EAD are not met. [Basel Framework, CRE 32.36]

123. Estimates of CCF for all non-sovereign exposures may not be lower than 50% of the applicable CCF in the standardized approach. [Basel Framework, CRE 32.36]

Exposures that give rise to counterparty credit risk

124. For exposures that give rise to counterparty credit risk according to section 7.1.2 (i.e. OTC derivatives, exchange-traded derivatives, long settlement transactions and securities financing

[20] A revolving loan facility is one that lets a borrower obtain a loan where the borrower has the flexibility to decide how often to withdraw from the loan and at what time intervals. A revolving facility allows the borrower to drawdown, repay and re-draw loans advanced to it. Facilities that allow prepayments and subsequent redraws of those prepayments are considered as revolving.

transactions) the EAD is to be calculated as per the rules set forth in Chapter 7. [Basel Framework, CRE 32.37]

125. For securities financing transactions (SFTs), institutions may recognize a reduction in the counterparty credit risk requirement arising from the effect of a master netting agreement providing that it satisfies the criteria set out in section 4.3.3(iii)(e). The institution must calculate E`, which is the exposure to be used for the counterparty credit risk requirement taking account of the risk mitigation of collateral received, using the formula set out in section 4.3.3(iii)(e). In calculating risk-weighted assets and expected loss (EL) amounts for the counterparty credit risk arising from the set of transactions covered by the master netting agreement, E` must be used as the EAD of the counterparty. [Basel Framework, CRE 32.38]

126. As an alternative to the use of standard haircuts for the calculation of the counterparty credit risk charge for SFTs set out in paragraph 125, institutions may be permitted to use a value-at-risk (VaR) models approach to reflect price volatility of the exposures and the financial collateral. This approach can take into account the correlation effects between security positions. This approach applies to single SFTs and SFTs covered by netting agreements on a counterparty-by-counterparty basis, both under the condition that the collateral is revalued on a daily basis. This holds for the underlying securities being different and unrelated to securitizations. The master netting agreement must satisfy the criteria set out in section 4.3.3(iii)(e). The VaR models approach is available to institutions that have received supervisory recognition for an internal market risk model according to Chapter 9. Institutions which have not received market risk model recognition can separately apply for supervisory recognition to use their internal value-at-risk (VaR) models for the calculation of potential price volatility for SFTs, provided the model meets the requirements of Chapter 9. Although the market risk standards have changed from a 99% VaR to a 97.5% expected shortfall, the VaR models approach to SFTs retains the use of a 99% VaR to calculate the counterparty credit risk for SFTs. The VaR model needs to capture risk sufficient to pass the backtesting and profit and loss attribution tests from Chapter 9. The default risk charge described in Chapter 9 is not required in the VaR model for SFTs. [Basel Framework, CRE 32.39]

127. The quantitative and qualitative criteria for recognition of internal market risk models for SFTs are in principle the same as in of Chapter 9. The minimum liquidity horizon or the holding period for SFTs is 5 business days for margined repo-style transactions, rather than the 10 business days in Chapter 9. For other transactions eligible for the VaR models approach, the 10 business day holding period will be retained. The minimum holding period should be adjusted upwards for market instruments where such a holding period would be inappropriate given the liquidity of the instrument concerned. [Basel Framework, CRE 32.40]

128. The calculation of the exposure E` for institutions using their internal model to calculate their counterparty credit risk charge will be as follows, where institutions will use the previous day's VaR number:

$$E` = max\{0, [(\sum E - \sum C) + VaR\ output\ from\ internal\ model]\}$$

[Basel Framework, CRE 32.41]

129. Subject to supervisory approval, instead of using the VaR approach, institutions may also calculate an effective expected positive exposure for repo-style and other similar SFTs, in

accordance with the Internal Models Method set out in the counterparty credit risk standards in Chapter 7. [Basel Framework, CRE 32.42]

130. As in the standardized approach, for transactions where the conditions in section 4.3.3(ii)(c) are met, and the counterparty is a core market participant, the haircuts specified under the comprehensive approach do not apply, and instead a zero H applies. A netting set that contains any transaction that does not meet the requirements in section 4.3.3(ii)(c) of the standardized approach is not eligible for this treatment. [Basel Framework, CRE 32.43]

(iv) Effective maturity (M)

131. Institutions using the FIRB approach for an exposure are required to calculate an explicit M adjustment consistent with the AIRB approach as defined below. [Basel Framework, CRE 32.44]

132. The exemption described in this paragraph does not apply when lending to borrowers in Canada, but institutions may follow the local treatment for international exposures. Some foreign supervisors may exempt facilities to certain smaller domestic corporate borrowers from the explicit maturity adjustment if the reported sales (i.e. turnover) as well as total assets for the consolidated group of which the firm is a part of are less than $750 million. The consolidated group must be a domestic company based in the foreign country where the exemption is applied to qualify for this exemption. If adopted by a foreign supervisor, all exposures to qualifying smaller domestic firms in that jurisdiction will be assumed to have an average maturity of 2.5 years. [Basel Framework, CRE 32.45]

133. Except as noted in paragraph 138, the effective maturity (M) is subject to a floor of one year and a cap of five years. [Basel Framework, CRE 32.46]

134. For an instrument subject to a determined cash flow schedule, effective maturity M is defined as follows, where CFt denotes the cash flows (principal, interest payments and fees) contractually payable by the borrower in period t.

$$\text{Effective Maturity (M)} = \sum_t t \cdot CF_t / \sum_t CF_t$$

[Basel Framework, CRE 32.47]

135. If an institution is not in a position to calculate the effective maturity of the contracted payments as noted above, it is allowed to use a more conservative measure of M such as that it equals the maximum remaining time (in years) that the borrower is permitted to take to fully discharge its contractual obligation (principal, interest, and fees) under the terms of loan agreement. Normally, this will correspond to the nominal maturity of the instrument. [Basel Framework, CRE 32.48]

136. For derivatives subject to a master netting agreement, the effective maturity is defined as the weighted average maturity of the transactions within the netting agreement. Further, the notional amount of each transaction should be used for weighting the maturity. [Basel Framework, CRE 32.49]

137. For revolving exposures, effective maturity must be determined using the maximum contractual termination date of the facility. Institutions must not use the repayment date of the current drawing. [Basel Framework, CRE 32.50]

138. The one-year floor does not apply to certain short-term exposures, comprising fully or nearly-fully collateralized[21] capital market-driven transactions (i.e. OTC derivatives transactions and margin lending) and repo-style transactions (i.e. repos/reverse repos and securities lending/borrowing) with an original maturity of less then one year, where the documentation contains daily remargining clauses. For all eligible transactions the documentation must require daily revaluation, and must include provisions that must allow for the prompt liquidation or setoff of the collateral in the event of default or failure to re-margin. The maturity of such transactions must be calculated as the greater of one-day, and the effective maturity (M, consistent with the definition above), except for transactions subject to a master netting agreement, where the floor is determined by the minimum holding period for the transaction type, as required by paragraph 141. [Basel Framework, CRE 32.51]

139. The one-year floor, set out in paragraph 133, also does not apply to the following exposures:

a. Short-term self-liquidating trade transactions. Import and export letters of credit and similar transactions should be accounted for at their actual remaining maturity.

b. Issued as well as confirmed letters of credit that are:

   i. short term (i.e. have a maturity below one year) and

   ii. self-liquidating.

[Basel Framework, CRE 32.52]

140. In addition to the transactions considered in paragraph 138, other short-term exposures with an original maturity of less than one year that are not part of an institution's ongoing financing of an obligor may be eligible for exemption from the one-year floor. The types of short-term exposures that are eligible for this treatment include transactions such as:

a. Repo-style transactions, interbank loans and deposits and other economically equivalent products with a maturity of under one-year that might not fall within the scope of paragraph 138.

b. Some short-term self-liquidating trade transactions that do not fall within the scope of paragraph 139. Import and export letters of credit and similar transactions could be accounted for at their actual remaining maturity;

c. Some exposures arising from settling securities purchases and sales. This also includes overdrafts arising from failed securities settlements provided that such overdrafts do not continue more than a short, fixed number of business days;

[21] The intention is to include both parties of a transaction meeting these conditions where neither of the parties is systematically under-collateralized.

d. Some exposures arising from cash settlements by wire transfer, including overdrafts arising from failed transfers provided that such overdrafts do not continue more than a short, fixed number of business days; and

e. Some exposures to banks arising from foreign exchange settlements; and

f. Some short-term loans and deposits.

[Basel Framework, CRE 32.53]

141. For transactions falling within the scope of paragraph 138 subject to a master netting agreement, the effective maturity is defined as the weighted average maturity of the transactions. A floor equal to the minimum holding period for the transaction type set out in section 4.3.3(iii)(d) will apply to the average. Where more than one transaction type is contained in the master netting agreement a floor equal to the highest holding period will apply to the average. Further, the notional amount of each transaction should be used for weighting maturity. [Basel Framework, CRE 32.54]

142. Where there is no explicit adjustment, the effective maturity (M) assigned to all exposures is set at 2.5 years unless otherwise specified in paragraph 131. In addition, all non-regulatory retail exposures will be assigned a maturity of 2.5 years. [Basel Framework, CRE 32.55]

Treatment of maturity mismatches

143. The treatment of maturity mismatches under IRB is identical to that in the standardized approach (see section 4.3.1(iv)). [Basel Framework, CRE 32.56]

5.4.2 Risk Components for retail exposures

144. This section sets out the calculation of the risk components for retail exposures. In the case of an exposure that is guaranteed by a sovereign, the floors that apply to the risk components do not apply to that part of the exposure covered by the sovereign guarantee (i.e. any part of the exposure that is not covered by the guarantee is subject to the relevant floors). [Basel Framework, CRE 32.57]

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

145. For each identified pool of retail exposures, institutions are expected to provide an estimate of the PD and LGD associated with the pool, subject to the minimum requirements as set out in section 5.8. Additionally, the PD for retail exposures is the greater of:

a. the one-year PD associated with the internal borrower grade to which the pool of retail exposures is assigned; and
b. 0.10% for revolver QRRE exposures (see paragraph 27 for the definition of revolvers) and 0.05% for all other exposures.

The LGD for each exposure that is used as input into the risk weight formula and the calculation of expected loss must not be less than the parameter floors indicated in the table below:

LGD Parameter Floors

Retail classes	LGD	
	Unsecured	Secured
QRRE (incl. transactors and revolvers)	50%	*N/A*
Residential mortgages	*N/A*	10%
All other regulatory retail	30%	Varying by collateral type: 0% financial 10% receivables 10% commercial or residential real estate 15% other physical

[Basel Framework, CRE 32.58]

146. Regarding the LGD parameter floors set out in the table above, the LGD floors for partially secured exposures in the "all other regulatory retail" category should be calculated according to the formula set out in paragraph 99. The LGD floor for residential mortgages is fixed at 10% irrespective of the level of collateral provided by the property. [Basel Framework, CRE 32.59]

147. The 10% floor on LGD for residential mortgages does not apply to any portion of a residential mortgage that is guaranteed or otherwise insured by the Government of Canada.

To reflect the effect of the Government of Canada backstop guarantee on a privately insured mortgage exposure, institutions may separate the full amount of the privately insured mortgage exposure into a deductible portion and a backstop portion:

a. the deductible portion is calculated as 10% of the original loan amount (i.e. the deductible portion grows as a percentage of the full amount of the total exposure as the mortgage amortizes), and is to be risk weighted according to paragraph 148(a);

b. the backstop portion is the amount covered by the government guarantee (i.e. the total outstanding amount less the deductible portion), and is to be treated as a sovereign exposure.

148. For residential mortgages insured by a private mortgage insurer having a Government of Canada backstop guarantee, the loan should be risk weighted in one of the following three ways:

a. A loan to the private mortgage insurer with a Government of Canada backstop. In this case, the deductible exposure defined in paragraph 147 is treated as a guaranteed exposure. It can be risk weighted using either i) the PD of the private mortgage insurer (using the risk weight function described in paragraphs 65 to 67) or ii) the PD of the original mortgage borrower (and the risk weight function for residential mortgages in paragraph 78). In both cases, a LGD of 100% must be used. The backstop exposure is treated as an exposure to the Government of Canada.

b. An uninsured residential mortgage using the original borrower's PD and LGD.

c. A loan to the private mortgage insurer (without a Government of Canada backstop) using either i) the PD of the original borrower and an LGD adjusted to incorporate the effect of the guarantee or ii) the PD of the private mortgage insurer and the LGD of the original borrower. In both cases, the resulting RWA cannot be less than that of a comparable direct

exposure to the private mortgage insurer (which is the risk weight determined using the private mortgage insurer's PD and the LGD used for an unsecured facility to the private mortgage insurer).

149. Consistent with the standardized approach, institutions may choose not to recognize the mortgage insurance and/or Government of Canada backstop guarantee if doing so would result in a higher capital requirement.

(ii) Recognition of guarantees and credit derivatives

150. Institutions may reflect the risk-reducing effects of guarantees and credit derivatives, either in support of an individual obligation or a pool of exposures, through an adjustment of either the PD or LGD estimate, subject to the minimum requirements in paragraphs 301 to 316. Whether adjustments are done through PD or LGD, they must be done in a consistent manner for a given guarantee or credit derivative type. In case the institution applies the standardized approach to direct exposures to the guarantor it may only recognize the guarantee by applying the standardized approach risk weight to the covered portion of the exposure. [Basel Framework, CRE 32.60]

151. Consistent with the requirements outlined above for corporate, sovereign, PSE, and bank exposures, institutions must not include the effect of double default in such adjustments. The adjusted risk weight must not be less than that of a comparable direct exposure to the protection provider. Consistent with the standardized approach, institutions may choose not to recognize credit protection if doing so would result in a higher capital requirement. [Basel Framework, CRE 32.61]

(iii) Exposure at default (EAD)

152. Both on and off-balance sheet retail exposures are measured gross of specific allowances.[22] The EAD on drawn amounts should not be less than the sum of (i) the amount by which an institution's regulatory capital would be reduced if the exposure were written-off fully, and (ii) any specific allowances. When the difference between the instrument's EAD and the sum of (i) and (ii) is positive, this amount is termed a discount. The calculation of risk-weighted assets is independent of any discounts. Under the limited circumstances described in paragraph 187, discounts may be included in the measurement of total eligible allowances for purposes of the EL-provision calculation set out in section 5.7. [Basel Framework, CRE 32.62]

153. On-balance sheet netting of loans and deposits of an institution to or from a retail customer will be permitted subject to the same conditions outlined in section 4.3.4. Institutions must use their own estimates of CCFs for undrawn revolving commitments not subject to a CCF of 100% in the standardized approach (see section 4.1.19) and the minimum requirements in paragraphs 290 to 298 and 300 are satisfied. Foundation approach CCFs must be used for all other off-balance sheet items (for example, for all undrawn non-revolving commitments), and must be used where the minimum requirements for own estimates of EAD are not met. [Basel Framework, CRE 32.63]

[22] Under IFRS 9, Stage 3 allowances and partial write-offs are considered to be specific allowances, while Stage 1 and Stage 2 allowances are considered to be general allowances.

154. Regarding own estimates of EAD, the EAD for each exposure that is used as input into the risk weight formula and the calculation of expected loss is subject to a floor that is the sum of:

a. the on balance sheet amount; and
b. 50% of the off balance sheet exposure using the applicable CCF in the standardized approach.

[Basel Framework, CRE 32.64]

155. For retail exposures with uncertain future drawdown such as credit cards, institutions must take into account their history and/or expectation of additional drawings prior to default in their overall calibration of loss estimates. In particular, where an institution does not reflect conversion factors for undrawn lines in its EAD estimates, it must reflect in its LGD estimates the likelihood of additional drawings prior to default. Conversely, if the institution does not incorporate the possibility of additional drawings in its LGD estimates, it must do so in its EAD estimates. [Basel Framework, CRE 32.65]

156. When only the drawn balances of revolving retail facilities have been securitized, institutions must ensure that they continue to hold required capital against the undrawn balances associated with the securitized exposures using the IRB approach to credit risk for commitments. This means that for such facilities, institutions must reflect the impact of CCFs in their EAD estimates rather than in the LGD estimates. [Basel Framework, CRE 32.66]

157. To the extent that foreign exchange and interest rate commitments exist within an institution's retail portfolio for IRB purposes, institutions are not permitted to provide their internal assessments of credit equivalent amounts. Instead, the rules for the standardized approach continue to apply. [Basel Framework, CRE 32.67]

5.5. Supervisory slotting approach for specialized lending

158. This section sets out the calculation of risk-weighted assets and expected losses for specialized lending (SL) exposures subject to the supervisory slotting approach. The method for determining the difference between expected losses and provisions is set out in section 5.7. [Basel Framework, CRE 33.1]

5.5.1 Risk weights for specialized lending (PF, OF, CF and IPRE)

159. For project finance (PF), object finance (OF), commodities finance (CF) and income producing real estate (IPRE) exposures, institutions that do not meet the requirements for the estimation of PD under the corporate IRB approach will be required to map their internal grades to five supervisory categories, each of which is associated with a specific risk weight. The slotting criteria on which this mapping must be based are provided in Appendix 5-2. The risk weights for unexpected losses (UL) associated with each supervisory category are:

Supervisory categories and unexpected loss (UL) risk weights for other SL exposures

Strong	Good	Satisfactory	Weak	Default
70%	90%	115%	250%	0%

[Basel Framework, CRE 33.2]

160. Although institutions are expected to map their internal ratings to the supervisory categories for specialized lending using the slotting criteria provided in Appendix 5-2, each supervisory category broadly corresponds to a range of external credit assessments as outlined below.

Broad Mapping between Supervisory Categories and External Ratings

Strong	Good	Satisfactory	Weak	Default
BBB- or better	BB+ or BB	BB- or B+	B to C-	Not applicable

[Basel Framework, CRE 33.3]

161. OSFI may allow institutions to assign preferential risk weights of 50% to "strong" exposures, and 70% to "good" exposures, provided they have a remaining maturity of less than 2.5 years or OSFI determines that institutions' underwriting and other risk characteristics are substantially stronger than specified in the slotting criteria for the relevant supervisory risk category. [Basel Framework, CRE 33.4]

5.5.2 Risk weights for specialized lending (HVCRE)

162. The HVCRE risk weights in paragraphs 163 and 75 apply to Canadian institution foreign operations' loans on properties in jurisdictions where the national supervisor has designated specific property types as HVCRE and to Canadian properties where the source of repayment at origination of the exposure is substantially uncertain, and the borrower does not have substantial equity at risk.

163. For HVCRE exposures, institutions that do not meet the requirements for estimation of PD, must map their internal grades to five supervisory categories, each of which is associated with a specific risk weight. The slotting criteria on which this mapping must be based are the same as those for IPRE, as provided in Appendix 5-2. The risk weights associated with each category are:

Supervisory categories and UL risk weights for high-volatility commercial real estate

Strong	Good	Satisfactory	Weak	Default
95%	120%	140%	250%	0%

[Basel Framework, CRE 33.5]

164. As indicated in paragraph 160, each supervisory category broadly corresponds to a range of external credit assessments. [Basel Framework, CRE 33.6]

165. Following the direction of the host supervisor, institutions may assign preferential risk weights of 70% to "strong" exposures, and 95% to "good" exposures, provided they have a remaining maturity of less than 2.5 years or the supervisor determines that institutions' underwriting and other risk characteristics are substantially stronger than specified in the slotting criteria for the relevant supervisory risk category. [Basel Framework, CRE 33.7]

5.5.3 Expected loss (EL) for SL exposures subject to the supervisory slotting criteria

166. For SL exposures subject to the supervisory slotting criteria, the EL amount is determined by multiplying 8% by the risk-weighted assets produced from the appropriate risk weights, as specified below, multiplied by EAD. [Basel Framework, CRE 33.8]

167. The risk weights for SL, other than HVCRE, are as follows:

Strong	Good	Satisfactory	Weak	Default
5%	10%	35%	100%	625%

[Basel Framework, CRE 33.9]

168. Where, at national discretion, a host supervisor allows institutions to assign preferential risk weights to other SL exposures falling into the "strong" and "good" supervisory categories as outlined in paragraph 161, the corresponding EL risk weight is 0% for "strong" exposures, and 5% for "good" exposures. [Basel Framework, CRE 33.10]

169. The risk weights for HVCRE are as follows:

Strong	Good	Satisfactory	Weak	Default
5%	5%	35%	100%	625%

[Basel Framework, CRE 33.11]

170. Even where, at national discretion, supervisors allow institutions to assign preferential risk weights to HVCRE exposures falling into the "strong" and "good" supervisory categories as outlined in paragraph 165, the corresponding EL risk weight will remain at 5% for both "strong" and "good" exposures. [Basel Framework, CRE 33.12]

5.6. Rules for Purchased Receivables

171. Section 5.6 presents the method of calculating the UL capital requirements for purchased receivables. For such assets, there are IRB capital charges for both default risk and dilution risk. Section 5.6.1 discusses the calculation of risk-weighted assets for default risk. The calculation of risk-weighted assets for dilution risk is provided in section 5.6.2. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in section 5.7. [Basel Framework, CRE 34.1]

5.6.1 Risk-weighted assets for default risk

172. For receivables belonging unambiguously to one asset class, the IRB risk weight for default risk is based on the risk-weight function applicable to that particular exposure type, as long as the institution can meet the qualification standards for this particular risk-weight function. For example, if institutions cannot comply with the standards for qualifying revolving retail exposures (defined in paragraph 26), they should use the risk-weight function for all other regulatory retail exposures. For hybrid pools containing mixtures of exposure types, if the purchasing institution cannot separate the exposures by type, the risk-weight function producing the highest capital requirements for the exposure types in the receivable pool applies. [Basel Framework, CRE 34.2]

(i) Purchased retail receivable

173. For purchased retail receivables, an institution must meet the risk quantification standards for retail exposures but can utilize external and internal reference data to estimate the PDs and LGDs. The estimates for PD and LGD (or EL) must be calculated for the receivables on a stand-alone basis; that is, without regard to any assumption of recourse or guarantees from the seller or other parties. [Basel Framework, CRE 34.3]

(ii) Purchased corporate receivables

174. For purchased corporate receivables the purchasing institution is expected to apply the existing IRB risk quantification standards for the bottom-up approach. However, for eligible purchased corporate receivables, and subject to OSFI permission, an institution may employ the following top-down procedure for calculating IRB risk weights for default risk:

a. The purchasing institution will estimate the pool's one-year EL for default risk, expressed in percentage of the exposure amount (i.e. the total EAD amount to the institution by all obligors in the receivables pool). The estimated EL must be calculated for the receivables on a stand-alone basis; that is, without regard to any assumption of recourse or guarantees from the seller or other parties. The treatment of recourse or guarantees covering default risk (and/or dilution risk) is discussed separately below.

b. Given the EL estimate for the pool's default losses, the risk weight for default risk is determined by the risk-weight function for corporate exposures.[23] As described below, the precise calculation of risk weights for default risk depends on the institution's ability to decompose EL into its PD and LGD components in a reliable manner. Institutions can utilize external and internal data to estimate PDs and LGDs. However, the advanced approach will not be available for institutions that use the foundation approach for corporate exposures (this excludes large corporate exposures, which are ineligible under the advanced IRB approach).

[Basel Framework, CRE 34.4]

[23] The firm-size adjustment for SME, as defined in paragraph 68, will be the weighted average by individual exposure of the pool of purchased corporate receivables. If the institution does not have the information to calculate the average size of the pool, the firm-size adjustment will not apply.

Foundation IRB treatment

175. The risk weight under the foundation IRB treatment is determined as follows:

a. If the purchasing institution is unable to decompose EL into its PD and LGD components in a reliable manner, the risk weight is determined from the corporate risk-weight function using the following specifications:

i. If the institution can demonstrate that the exposures are exclusively senior claims to corporate borrowers:

- An LGD of 40% can be used.
- PD will be calculated by dividing the EL using this LGD.
- EAD will be calculated as the outstanding amount minus the capital charge for dilution prior to credit risk mitigation ($K_{Dilution}$).
- EAD for a revolving purchase facility is the sum of the current amount of receivables purchased plus 40% of any undrawn purchase commitments minus $K_{Dilution}$.

ii. If the institution cannot demonstrate that the exposures are exclusively senior claims to corporate borrowers:

- PD is the institution's estimate of EL
- LGD will be 100%.
- EAD will be calculated as the outstanding amount minus $K_{Dilution}$.
- EAD for a revolving purchase facility is the sum of the current amount of receivables purchased plus 40% of any undrawn purchase commitments minus $K_{Dilution}$.

b. If the purchasing institution is able to estimate PD in a reliable manner, the risk weight is determined from the corporate risk-weight functions according to the specifications for LGD, M and the treatment of guarantees under the foundation approach as given in paragraphs 87 to 96, 102 to 108, and 131. [Basel Framework, CRE 34.5]

Advanced IRB treatment

176. Under the AIRB approach, if the purchasing institution can estimate either the pool's default-weighted average loss rates given default (as defined in paragraph 283) or average PD in a reliable manner, the institution may estimate the other parameter based on an estimate of the expected long-run loss rate. The institution may (i) use an appropriate PD estimate to infer the long-run default-weighted average loss rate given default, or (ii) use a long-run default-weighted average loss rate given default to infer the appropriate PD. In either case, the LGD used for the IRB capital calculation for purchased receivables cannot be less than the long-run default-weighted average loss rate given default and must be consistent with the concepts defined in paragraph 283. The risk weight for the purchased receivables will be determined using the institution's estimated PD and LGD as inputs to the corporate risk-weight function. Similar to the foundation IRB

treatment, EAD will be the amount outstanding minus $K_{Dilution}$. EAD for a revolving purchase facility will be the sum of the current amount of receivables purchased plus 40% of any undrawn purchase commitments minus $K_{Dilution}$ (thus, institutions using the AIRB approach will not be permitted to use their internal EAD estimates for undrawn purchase commitments). [Basel Framework, CRE 34.6]

177. For drawn amounts, M will equal the pool's exposure-weighted average effective maturity (as defined in paragraphs 133 to 142). This same value of M will also be used for undrawn amounts under a committed purchase facility provided the facility contains effective covenants, early amortization triggers, or other features that protect the purchasing institution against a significant deterioration in the quality of the future receivables it is required to purchase over the facility's term. Absent such effective protections, the M for undrawn amounts will be calculated as the sum of (a) the longest-dated potential receivable under the purchase agreement and (b) the remaining maturity of the purchase facility. [Basel Framework, CRE 34.7]

5.6.2 Risk-weighted assets for dilution risk

178. Dilution refers to the possibility that the receivable amount is reduced through cash or non-cash credits to the receivable's obligor.[24] For both corporate and retail receivables, unless the institution can demonstrate to OSFI that the dilution risk for them is immaterial, the treatment of dilution risk must be the following:

a. At the level of either the pool as a whole (top-down approach) or the individual receivables making up the pool (bottom-up approach), the purchasing institution will estimate the one-year EL for dilution risk, also expressed in percentage of the receivables amount. Institutions can utilize external and internal data to estimate EL. As with the treatments of default risk, this estimate must be computed on a stand-alone basis; that is, under the assumption of no recourse or other support from the seller or third-party guarantors.
b. For the purpose of calculating risk weights for dilution risk, the corporate risk-weight function must be used with the following settings:

    i. The PD must be set equal to the estimated EL.
    ii. The LGD must be set at 100%.
    iii. An appropriate maturity treatment applies when determining the capital requirement for dilution risk. If an institution can demonstrate that the dilution risk is appropriately monitored and managed to be resolved within one year, the supervisor may allow the institution to apply a one-year maturity.

    [Basel Framework, CRE 34.8]

179. This treatment will be applied regardless of whether the underlying receivables are corporate or retail exposures, and regardless of whether the risk weights for default risk are

[24] Examples include offsets or allowances arising from returns of goods sold, disputes regarding product quality, possible debts of the borrower to a receivables obligor, and any payment or promotional discounts offered by the borrower (e.g. a credit for cash payments within 30 days).

computed using the standard IRB treatments or, for corporate receivables, the top-down treatment described above. [Basel Framework, CRE 34.9]

5.6.3 Treatment of purchase price discounts for receivables

180. In many cases, the purchase price of receivables will reflect a discount (not to be confused with the discount concept defined in paragraphs 115 and 152) that provides first loss protection for default losses, dilution losses or both. To the extent a portion of such a purchase price discount will be refunded to the seller based on the performance of the receivables, the purchaser may recognize this refundable amount as first loss protection under the securitization framework outlined in Chapter 6, while the seller providing such a refundable purchase price discount must treat the refundable amount as a first loss position under Chapter 6. Non-refundable purchase price discounts for receivables do not affect either the EL-provision calculation in section 5.7 or the calculation of risk-weighted assets. [Basel Framework, CRE 34.10]

181. When collateral or partial guarantees obtained on receivables provide first loss protection (collectively referred to as mitigants in this paragraph), and these mitigants cover default losses, dilution losses, or both, they may also be treated as first loss protection under the IRB securitization framework (see paragraph 71 of Chapter 6). When the same mitigant covers both default and dilution risk, institutions using the Securitization Internal Ratings-Based Approach (SEC-IRBA) that are able to calculate an exposure-weighted LGD must do so as defined in paragraph 109 of Chapter 6. [Basel Framework, CRE 34.11]

5.6.4 Recognition of credit risk mitigants

182. Credit risk mitigants will be recognized generally using the same type of framework as set forth in paragraphs 104 to 114. In particular, a guarantee provided by the seller or a third party will be treated using the existing IRB rules for guarantees, regardless of whether the guarantee covers default risk, dilution risk, or both.

a. If the guarantee covers both the pool's default risk *and* dilution risk, the institution will substitute the risk weight for an exposure to the guarantor in place of the pool's total risk weight for default and dilution risk.

b. If the guarantee covers only default risk or dilution risk, but not both, the institution will substitute the risk weight for an exposure to the guarantor in place of the pool's risk weight for the corresponding risk component (default or dilution). The capital requirement for the other component will then be added.

c. If a guarantee covers only a portion of the default and/or dilution risk, the uncovered portion of the default and/or dilution risk will be treated as per the existing CRM rules for proportional or tranched coverage (i.e. the risk weights of the uncovered risk components will be added to the risk weights of the covered risk components).

[Basel Framework, CRE 34.12]

5.7. Treatment of expected losses and recognition of allowances

183. Section 5.7. discusses the calculation of expected losses (EL) under the IRB approach, and the method by which the difference between allowances (e.g. specific allowances or general allowances[25]) and EL may be included in or must be deducted from regulatory capital, as outlined in section 2.1.3.7. [Basel Framework, CRE 35.1]

5.7.1 Calculation of expected losses

184. An institution must sum the EL amount (defined as EL multiplied by EAD) associated with its exposures to which the IRB approach is applied (excluding the EL associated with securitization exposures) to obtain a total EL amount. The treatment of EL for securitization exposures is described in paragraph 48 of Chapter 6. [Basel Framework, CRE 35.2]

(i) Expected loss for exposures other than SL subject to the supervisory slotting criteria

185. Institutions must calculate an EL as PD x LGD for corporate, sovereign, PSE, bank, and retail exposures not in default. For corporate, sovereign, PSE, bank, and retail exposures that are in default, institutions must use their best estimate of expected loss as defined in paragraph 286 for exposures subject to the advanced approach and for exposures subject to the foundation approach institutions must use the supervisory LGD. For SL exposures subject to the supervisory slotting criteria EL is calculated as described in paragraphs 166 to 169. Securitization exposures do not contribute to the EL amount, as set out in paragraph 48 of Chapter 6. [Basel Framework, CRE 35.3]

(ii) Expected loss for SL exposures subject to the supervisory slotting criteria

186. The calculation of EL for SL exposures subject to the supervisory slotting criteria is outlined section 5.5.3.

5.7.2 Calculation of provisions

(i) Exposures subject to IRB approach

187. Total eligible allowances are defined as the sum of all allowances (e.g. specific allowances or general allowances) that are attributed to exposures treated under the IRB approach. In addition, total eligible allowances may include any discounts on defaulted assets that are treated under the IRB approach. Specific allowances set aside against securitization exposures must not be included in total eligible allowances. [Basel Framework, CRE 35.4]

[25] Under IFRS 9, Stage 3 allowances and partial write-offs are considered to be specific allowances, while Stage 1 and Stage 2 allowances are considered to be general allowances.

(ii) Portion of exposures subject to the standardized approach

188. Institutions using the standardized approach for a portion of their credit risk exposures, (see section 5.2.3), must determine the portion of general allowances attributed to the standardized or IRB treatment of allowances (see section 2.1.3.7) according to the method outlined in paragraphs 189 and 190. [Basel Framework, CRE 35.5]

189. When one approach to determining credit risk-weighted assets (i.e. standardized or IRB approach) is used exclusively within an entity, general allowances booked within the entity using the standardized approach should be attributed to the standardized treatment. Similarly, general allowances booked within entities exclusively using the IRB approach should be attributed to the total eligible allowances as defined in paragraph 187. [Basel Framework, CRE 35.6]

190. In other cases, institutions should rely on their internal methods for allocating general allowances for recognition in capital under either the standardized or IRB approach, which must align with the institution's public and internal reporting. [Basel Framework, CRE 35.7]

5.7.3 Treatment of EL and provisions

191. As specified in section 2.1.3.7, institutions using the IRB approach must compare the total amount of total eligible allowances (as defined in paragraph 187) with the total EL amount as calculated within the IRB approach (as defined in paragraph 184). In addition, section 2.1.3.7 outlines the treatment for that portion of an institution that is subject to the standardized approach to credit risk when the institution uses both the standardized and IRB approaches.
[Basel Framework, CRE 35.8]

192. If specific allowances exceed the EL amount on defaulted assets, the difference cannot be used to offset the EL amount on non-defaulted assets nor recognized in capital. OSFI will not require any additional processes to operationalize paragraph 192 over and above what is already being done for the assessment of specific and general allowances, credit reviews, and the self-assessment process. [Basel Framework, CRE 35.9]

5.8. Minimum requirements for IRB approach

193. This section presents the minimum requirements for entry and ongoing use of the IRB approach. The minimum requirements are set out in the following 11 sections

a. Composition of minimum requirements
b. Compliance with minimum requirements
c. Rating system design
d. Risk rating system operations
e. Corporate governance and oversight
f. Use of internal ratings
g. Risk quantification
h. Validation of internal estimates
i. Supervisory LGD and EAD estimates

j. Requirements for recognition of leasing, and
k. Disclosure requirements

[Basel Framework, CRE 36.1]

194. The minimum requirements in the sections that follow cut across asset classes. Therefore, more than one asset class may be discussed within the context of a given minimum requirement. [Basel Framework, CRE 36.2]

5.8.1 Composition of minimum requirements

195. To be eligible for the IRB approach an institution must demonstrate to OSFI that it meets certain minimum requirements at the outset and on an ongoing basis. Many of these requirements are in the form of objectives that a qualifying institution's risk rating systems must fulfil. The focus is on institutions' abilities to rank order and quantify risk in a consistent, reliable and valid fashion. [Basel Framework, CRE 36.3]

196. The overarching principle behind these requirements is that rating and risk estimation systems and processes provide for a meaningful assessment of borrower and transaction characteristics; a meaningful differentiation of risk; and reasonably accurate and consistent quantitative estimates of risk. Furthermore, the systems and processes must be consistent with internal use of these estimates.
[Basel Framework, CRE 36.4]

197. The minimum requirements set out in this chapter apply to all asset classes unless noted otherwise. The standards related to the process of assigning exposures to borrower or facility *grades* (and the related oversight, validation, etc.) apply equally to the process of assigning retail exposures to pools of homogenous exposures, unless noted otherwise.
[Basel Framework, CRE 36.5]

198. The minimum requirements set out in this chapter apply to both foundation and advanced approaches unless noted otherwise. Generally, all IRB institutions must produce their own estimates of PD[26] and must adhere to the overall requirements for rating system design, operations, controls, and corporate governance, as well as the requisite requirements for estimation and validation of PD measures. Institutions wishing to use their own estimates of LGD and EAD must also meet the incremental minimum requirements for these risk factors included in paragraphs 283 to 316. [Basel Framework, CRE 36.6]

5.8.2 Compliance with minimum requirements

199. To be eligible for an IRB approach, an institution must demonstrate to OSFI that it meets the IRB requirements in this chapter, at the outset and on an ongoing basis. Institutions' overall credit risk management practices must also be consistent with the evolving sound practices guidance issued by OSFI. [Basel Framework, CRE 36.7]

[26] Institutions are not required to produce their own estimates of PD for exposures subject to the supervisory slotting approach.

200. There may be circumstances when an institution is not in complete compliance with all the minimum requirements. Where this is the case, the institution must produce a plan for a timely return to compliance, and seek approval from OSFI, or the institution must demonstrate that the effect of such non-compliance is immaterial in terms of the risk posed to the institution. Failure to produce an acceptable plan or satisfactorily implement the plan or to demonstrate immateriality will lead OSFI to reconsider the institution's eligibility for the IRB approach. Furthermore, for the duration of any non-compliance, OSFI will consider the need for the institution to hold additional capital under Pillar 2 or will take other appropriate supervisory action.
[Basel Framework, CRE 36.8]

5.8.3 Rating system design

201. The term "rating system" comprises 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. [Basel Framework, CRE 36.9]

202. Within each asset class, an institution may utilize multiple rating methodologies/systems. For example, an institution may have customized rating systems for specific industries or market segments (e.g. middle market and large corporate). If an institution chooses to use multiple systems, the rationale for assigning a borrower to a rating system must be documented and applied in a manner that best reflects the level of risk of the borrower. Institutions must not allocate borrowers across rating systems inappropriately to minimize regulatory capital requirements (i.e. cherry-picking by choice of rating system). Institutions must demonstrate that each system used for IRB purposes is in compliance with the minimum requirements at the outset and on an ongoing basis. [Basel Framework, CRE 36.10]

(i) Rating dimensions

Standards for corporate, sovereign, PSE, and bank exposures

203. A qualifying IRB rating system must have two separate and distinct dimensions: (i) the risk of borrower default, and (ii) transaction-specific factors. [Basel Framework, CRE 36.11]

204. The first dimension must be oriented to the risk of borrower default. Separate exposures to the same borrower must be assigned to the same borrower grade, irrespective of any differences in the nature of each specific transaction. There are two exceptions to this. Firstly, in the case of country transfer risk, where an institution may assign different borrower grades depending on whether the facility is denominated in local or foreign currency. Secondly, when the treatment of associated guarantees to a facility may be reflected in an adjusted borrower grade. In either case, separate exposures may result in multiple grades for the same borrower. An institution must articulate in its credit policy the relationship between borrower grades in terms of the level of risk each grade implies. Perceived and measured risk must increase as credit quality declines from one grade to the next. The policy must articulate 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. [Basel Framework, CRE 36.12]

205. The second dimension must reflect transaction-specific factors, such as collateral, seniority, product type, etc. For exposures subject to the foundation IRB approach, this requirement can be fulfilled by the existence of a facility dimension, which reflects both borrower and transaction-specific factors. For example, a rating dimension that reflects EL by incorporating both borrower strength (PD) and loss severity (LGD) considerations would qualify. Likewise a rating system that exclusively reflects LGD would qualify. Where a rating dimension reflects EL and does not separately quantify LGD, the supervisory estimates of LGD must be used. [Basel Framework, CRE 36.13]

206. For institutions using the advanced approach, facility ratings must reflect exclusively LGD. These ratings can reflect any and all factors that can influence LGD including, but not limited to, the type of collateral, product, industry, and purpose. Borrower characteristics may be included as LGD rating criteria only to the extent they are predictive of LGD. Institutions may alter the factors that influence facility grades across segments of the portfolio as long as they can satisfy OSFI that it improves the relevance and precision of their estimates. [Basel Framework, CRE 36.14]

207. Institutions using the supervisory slotting criteria for the SL sub-class are exempt from this two-dimensional requirement for these exposures. Given the interdependence between borrower/transaction characteristics in exposures subject to the supervisory slotting approaches, institutions may satisfy the requirements under this heading through a single rating dimension that reflects EL by incorporating both borrower strength (PD) and loss severity (LGD) considerations. This exemption does not apply to institutions using either the general corporate foundation or advanced approach for the SL sub-class. [Basel Framework, CRE 36.15]

Standards for retail exposures

208. Rating systems for retail exposures must be oriented to both borrower and transaction risk, and must capture all relevant borrower and transaction characteristics. Institutions must assign each exposure that falls within the definition of retail for IRB purposes into a particular pool. Institutions must demonstrate that this process provides for a meaningful differentiation of risk, provides for a grouping of sufficiently homogenous exposures, and allows for accurate and consistent estimation of loss characteristics at a pool level. [Basel Framework, CRE 36.16]

209. For each pool, institutions must estimate PD, LGD, and EAD. Multiple pools may share identical PD, LGD and EAD estimates. At a minimum, institutions should consider the following risk drivers when assigning exposures to a pool:

a. Borrower risk characteristics (e.g. borrower type, demographics such as age/occupation);

b. Transaction risk characteristics, including product and/or collateral types (e.g. loan to value measures, seasoning,[27] guarantees; and seniority (e.g. first vs. second lien)). Institutions must explicitly address cross-collateral provisions where present.

[27] For each pool where the institutions estimate PD and LGD, they should 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 institution's actual facilities. In some jurisdictions default rates peak

c. Delinquency of exposure: Institutions are expected to separately identify exposures that are delinquent and those that are not.

[Basel Framework, CRE 36.17]

(ii) Rating structure

Standards for corporate, sovereign, PSE, and bank exposures

210. An institution must have a meaningful distribution of exposures across grades with no excessive concentrations, on both its borrower-rating and its facility-rating scales.
[Basel Framework, CRE 36.18]

211. To meet this objective, an institution must have a minimum of seven borrower grades for non-defaulted borrowers and one for those that have defaulted. Institutions with lending activities focused on a particular market segment may satisfy this requirement with the minimum number of grades. [Basel Framework, CRE 36.19]

212. A borrower grade is defined as an assessment of borrower risk on the basis of a specified and distinct set of rating criteria, from which estimates of PD are derived. The grade definition must 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. Furthermore, "+" or "-" modifiers to alpha or numeric grades will only qualify as distinct grades if the institution has developed complete rating descriptions and criteria for their assignment, and separately quantifies PDs for these modified grades. [Basel Framework, CRE 36.20]

213. Institutions with loan portfolios concentrated in a particular market segment and range of default risk must have enough grades within that range to avoid undue concentrations of borrowers in particular grades. Significant concentrations within a single grade or grades must be supported by convincing empirical evidence that the grade or grades cover reasonably narrow PD bands and that the default risk posed by all borrowers in a grade fall within that band.
[Basel Framework, CRE 36.21]

214. There is no specific minimum number of facility grades for institutions using the advanced approach for estimating LGD. An institution must have a sufficient number of facility grades to avoid grouping facilities with widely varying LGDs into a single grade. The criteria used to define facility grades must be grounded in empirical evidence. [Basel Framework, CRE 36.22]

215. Institutions using the supervisory slotting criteria for the SL asset classes must have at least four grades for non-defaulted borrowers, and one for defaulted borrowers. The requirements for SL exposures that qualify for the corporate foundation and advanced approaches are the same as those for general corporate exposures. [Basel Framework, CRE 36.23]

several years after origination or recovery rates show a low point several years after default, as such institutions should 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.

Standards for retail exposures

216. For each pool identified, the institution must be able to provide quantitative measures of loss characteristics (PD, LGD, and EAD) for that pool. The level of differentiation for IRB purposes must ensure that the number of exposures in a given pool is sufficient so as to allow for meaningful quantification and validation of the loss characteristics at the pool level. There must be a meaningful distribution of borrowers and exposures across pools. A single pool must not include an undue concentration of the institution's total retail exposure.
[Basel Framework, CRE 36.24]

(iii) Rating criteria

217. An institution must have specific rating definitions, processes and criteria for assigning exposures to grades within a rating system. The rating definitions and criteria must be both plausible and intuitive and must result in a meaningful differentiation of risk.

a. The grade descriptions and criteria must be sufficiently detailed to allow those charged with assigning ratings to consistently assign the same grade to borrowers or facilities posing similar risk. This consistency should exist across lines of business, departments and geographic locations. If rating criteria and procedures differ for different types of borrowers or facilities, the institution must monitor for possible inconsistency, and must alter rating criteria to improve consistency when appropriate.

b. Written rating definitions must be clear and detailed enough to allow third parties, such as internal audit or an equally independent function and OSFI, to understand the assignment of ratings, to replicate rating assignments and evaluate the appropriateness of the grade/pool assignments.

c. The criteria must also be consistent with the institution's internal lending standards and its policies for handling troubled borrowers and facilities.

[Basel Framework, CRE 36.25]

218. To ensure that institutions are consistently taking into account available information, they must use all relevant and material information in assigning ratings to borrowers and facilities. Information must be current. The less information an institution has, the more conservative must be its assignments of exposures to borrower and facility grades or pools. An external rating can be the primary factor determining an internal rating assignment; however, the institution must ensure that it considers other relevant information. [Basel Framework, CRE 36.26]

Exposure subject to the supervisory slotting approach

219. Institutions using the supervisory slotting criteria for SL exposures must assign exposures to their internal rating grades based on their own criteria, systems and processes, subject to compliance with the requisite minimum requirements. Institutions must then map these internal rating grades into the five supervisory rating categories. Tables 1 to 4 in Annex 5-2 provide, for each sub-class of SL exposures, the general assessment factors and characteristics exhibited by the exposures that fall under each of the supervisory categories. Each lending activity has a unique table describing the assessment factors and characteristics. [Basel Framework, CRE 36.27]

220. OSFI recognizes that the criteria that institutions use to assign exposures to internal grades will not perfectly align with criteria that define the supervisory categories; however, institutions must demonstrate that their mapping process has resulted in an alignment of grades which is consistent with the preponderance of the characteristics in the respective supervisory category. Institutions should take special care to ensure that any overrides of their internal criteria do not render the mapping process ineffective. [Basel Framework, CRE 36.28]

(iv) Rating assignment horizon

221. Although the time horizon used in PD estimation is one year (as described in paragraph 261), institutions are expected to use a longer time horizon in assigning ratings.
[Basel Framework, CRE 36.29]

222. A borrower rating must represent the institution's assessment of the borrower's ability and willingness to contractually perform despite adverse economic conditions or the occurrence of unexpected events. The range of economic conditions that are considered when making assessments must be consistent with current conditions and those that are likely to occur over a business cycle within the respective industry/geographic region. Rating systems should be designed in such a way that idiosyncratic or industry-specific changes are a driver of migrations from one category to another, and business cycle effects may also be a driver.
[Basel Framework, CRE 36.30]

223. PD estimates for borrowers that are highly leveraged or for borrowers whose assets are predominantly traded assets must reflect the performance of the underlying assets based on periods of stressed volatilities. For highly leveraged counterparties where there is likely a significant vulnerability to market risk, the bank must assess the potential impact on the counterparty's ability to perform that arises from periods of stressed volatilities when assigning a rating and corresponding PD to that counterparty under the IRB framework. The reference to highly levered borrowers is intended to capture hedge funds or any other equivalently highly leveraged counterparties that are financial entities.
[Basel Framework, CRE 36.31]

224. Given the difficulties in forecasting future events and the influence they will have on a particular borrower's financial condition, an institution must take a conservative view of projected information. Furthermore, where limited data are available, an institution must adopt a conservative bias to its analysis. [Basel Framework, CRE 36.32]

(v) Use of models

225. The requirements in this section apply to statistical models and other mechanical methods used to assign borrower or facility ratings or in the estimation of PDs, LGDs, or EADs. 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. Sufficient human judgement and human oversight is necessary to ensure that all relevant and material information, including that which is outside the scope of the model, is also taken into consideration, and that the model is used appropriately. [Basel Framework, CRE 36.33]

226. The burden is on the institution to satisfy OSFI that a model or procedure has good predictive power and that regulatory capital requirements will not be distorted as a result of its use. The variables that are input to the model must form a reasonable set of predictors. The model must be accurate on average across the range of borrowers or facilities to which the institution is exposed and there must be no known material biases. [Basel Framework, CRE 36.33]

227. The institution must have in place 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.
[Basel Framework, CRE 36.33]

228. The institution must demonstrate that the data used to build the model are representative of the population of the institution's actual borrowers or facilities. [Basel Framework, CRE 36.33]

229. When combining model results with human judgement, the judgement must take into account all relevant and material information not considered by the model. The institution must have written guidance describing how human judgement and model results are to be combined.
[Basel Framework, CRE 36.33]

230. The institution must have procedures for human review of model-based rating assignments. Such procedures should focus on finding and limiting errors associated with known model weaknesses and must also include credible ongoing efforts to improve the model's performance. [Basel Framework, CRE 36.33]

231. The institution must have a regular cycle of model validation that includes monitoring of model performance and stability; review of model relationships; and testing of model outputs against outcomes. [Basel Framework, CRE 36.33]

(vi) Documentation of rating system design

232. Institutions must document in writing their rating systems' design and operational details. The documentation must evidence institutions' compliance with the minimum standards, and must 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. An institution must document the rationale for its choice of internal rating criteria and must be able to provide analyses demonstrating that rating criteria and procedures are likely to result in ratings that meaningfully differentiate risk. Rating criteria and procedures must be periodically reviewed to determine whether they remain fully applicable to the current portfolio and to external conditions. In addition, an institution must document a history of major changes in

the risk rating process, and such documentation must support identification of changes made to the risk rating process subsequent to the last supervisory review. The organization of rating assignment, including the internal control structure, must also be documented.
[Basel Framework, CRE 36.34]

233. Institutions must document the specific definitions of default and loss used internally and demonstrate consistency with the reference definitions set out in paragraphs 266 to 275.
[Basel Framework, CRE 36.35]

234. If the institution employs statistical models in the rating process, the institution must document their methodologies. This material must:

a. Provide a detailed outline of 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 calibrate 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.

[Basel Framework, CRE 36.36]

235. Use of a model obtained from a third-party vendor that claims proprietary technology is not a justification for an exemption from documentation or any other of the requirements for internal rating systems. The burden is on the model's vendor and the institution to satisfy OSFI.
[Basel Framework, CRE 36.37]

5.8.4 Risk rating system operations

(i) Coverage of ratings

236. For corporate, sovereign, PSE, and bank exposures, each borrower and all recognized guarantors must be assigned a rating and each exposure must be associated with a facility rating as part of the loan approval process. Similarly, for retail exposures, each borrower must be assigned to a pool as part of the loan approval process. [Basel Framework, CRE 36.38]

237. Each separate legal entity to which the institution is exposed must be separately rated. An institution must have policies acceptable to OSFI regarding the treatment of individual entities in a connected group including circumstances under which the same rating may or may not be assigned to some or all related entities. Those policies must include a process for the identification of specific wrong way risk for each legal entity to which the institution is exposed. Transactions with counterparties where specific wrong way risk has been identified need to be treated differently when calculating the EAD for such exposures (see section 7.1.5.6 of Chapter 7).

[Basel Framework, CRE 36.39]

(ii) Integrity of rating process

Standards for corporate, sovereign, PSE, and bank exposures

238. Rating assignments and periodic rating reviews must be completed or approved by a party that does not directly stand to benefit from the extension of credit. Independence of the rating assignment process can be achieved through a range of practices that will be carefully reviewed by OSFI. These operational processes must be documented in the institution's procedures and incorporated into the institution's policies. Credit policies and underwriting procedures must reinforce and foster the independence of the rating process. [Basel Framework, CRE 36.40]

239. Borrowers and facilities must have their ratings refreshed at least on an annual basis. Certain credits, especially higher risk borrowers or problem exposures, must be subject to more frequent review. In addition, institutions must initiate a new rating if material information on the borrower or facility comes to light. [Basel Framework, CRE 36.41]

240. The institution must have an effective process to obtain and update relevant and material information on the borrower's financial condition, and on facility characteristics that affect LGDs and EADs (such as the condition of collateral). Upon receipt, the institution needs to have a procedure to update the borrower's rating in a timely fashion. [Basel Framework, CRE 36.42]

Standards for retail exposures

241. An institution must review the loss characteristics and delinquency status of each identified pool on at least an annual basis. It must also review the status of individual borrowers within each pool as a means of ensuring that exposures continue to be assigned to the correct pool. This requirement may be satisfied by review of a representative sample of exposures in the pool.
[Basel Framework, CRE 36.43]

(iii) Overrides

242. For rating assignments based on expert judgement, institutions must clearly articulate the situations in which an institution's officers may override the outputs of the rating process, including how and to what extent such overrides can be used and by whom. For model-based ratings, the institution must have guidelines and processes for monitoring cases where human judgement has overridden the model's rating, variables were excluded or inputs were altered. These guidelines must include identifying personnel that are responsible for approving these overrides. Institutions must identify overrides and separately track their performance.
[Basel Framework, CRE 36.44]

(iv) Data maintenance

243. An institution must collect and store data on key borrower and facility characteristics to provide effective support to its internal credit risk measurement and management process, to enable the institution to meet the other requirements in this document, and to serve as a basis for supervisory reporting. These data should be sufficiently detailed to allow retrospective re-allocation of obligors and facilities to grades. For example if increasing sophistication of the internal rating system suggests that finer segregation of portfolios can be achieved. Furthermore, institutions must collect and retain data on aspects of their internal ratings as required under OSFI's *Pillar 3 Disclosure Expectations*. [Basel Framework, CRE 36.45]

For corporate, sovereign, PSE, and bank exposures

244. Institutions must maintain rating histories on borrowers and recognized guarantors, including the rating since the borrower/guarantor was assigned an internal grade, the dates the ratings were assigned, the methodology and key data used to derive the rating and the person/model responsible. The identity of borrowers and facilities that default, and the timing and circumstances of such defaults, must be retained. Institutions must also retain data on the PDs and realized default rates associated with rating grades and ratings migration in order to track the predictive power of the borrower rating system. [Basel Framework, CRE 36.46]

245. Institutions using the advanced IRB approach must also collect and store a complete history of data on the LGD and EAD estimates associated with each facility and the key data used to derive the estimate and the person/model responsible. Institutions must also collect data on the estimated and realized LGDs and EADs associated with each defaulted facility. Institutions that reflect the credit risk mitigating effects of guarantees/credit derivatives through LGD must retain data on the LGD of the facility before and after evaluation of the effects of the guarantee/credit derivative. Information about the components of loss or recovery for each defaulted exposure must be retained, such as amounts recovered, source of recovery (e.g. collateral, liquidation proceeds and guarantees), time period required for recovery, and administrative costs.
[Basel Framework, CRE 36.47]

246. Institutions under the foundation approach which utilize supervisory estimates are encouraged to retain the relevant data (i.e. data on loss and recovery experience for exposures under the foundation approach, data on realized losses for institutions using the supervisory slotting criteria for SL). [Basel Framework, CRE 36.48]

For retail exposures

247. Institutions must retain data used in the process of allocating exposures to pools, including data on borrower and transaction risk characteristics used either directly or through use of a model, as well as data on delinquency. Institutions must also retain data on the estimated PDs, LGDs and EADs, associated with pools of exposures. For defaulted exposures, institutions must retain the data on the pools to which the exposure was assigned over the year prior to default and the realized outcomes on LGD and EAD. [Basel Framework, CRE 36.49]

(v) Stress tests used in assessment of capital adequacy

248. An IRB institution must have in place sound stress testing processes for use in the assessment of capital adequacy. Stress testing must involve identifying possible events or future changes in economic conditions that could have unfavourable effects on an institution's credit exposures and assessment of the institution's ability to withstand such changes. Examples of scenarios that could be used are (i) economic or industry downturns; (ii) market-risk events; and (iii) liquidity conditions. [Basel Framework, CRE 36.50]

249. In addition to the more general tests described above, the institution must perform a credit risk stress test to assess the effect of certain specific conditions on its IRB regulatory capital requirements. The test to be employed would be one chosen by the institution, subject to OSFI review. The test to be employed must be meaningful and reasonably conservative. Individual institutions may develop different approaches to undertaking this stress test requirement, depending on their circumstances. For this purpose, the objective is not to require institutions to consider worst-case scenarios. The institution's stress test in this context should, however, consider at least the effect of mild recession scenarios. In this case, one example might be to use two consecutive quarters of zero growth to assess the effect on the institution's PDs, LGDs and EADs, taking account – on a conservative basis – of the institution's international diversification.
[Basel Framework, CRE 36.51]

250. Whatever method is used, the institution must include a consideration of the following sources of information. First, an institution's own data should allow estimation of the ratings migration of at least some of its exposures. Second, institutions should consider information about the impact of smaller deterioration in the credit environment on an institution's ratings, giving some information on the likely effect of bigger, stress circumstances. Third, institutions should evaluate evidence of ratings migration in external ratings. This would include the institution broadly matching its buckets to rating categories. [Basel Framework, CRE 36.52]

251. Where an institution operates in several markets, it does not need to test for such conditions in all of those markets, but an institution should stress portfolios containing the vast majority of its total exposures. [Basel Framework, CRE 36.53]

5.8.5 Corporate governance and oversight

(i) Corporate governance

252. All material aspects of the rating and estimation processes must be approved by the institution's senior management. Senior management must possess a general understanding of the institution's risk rating system and detailed comprehension of its associated management reports. [Basel Framework, CRE 36.54]

253. Senior management also must have a good understanding of the rating system's design and operation, and must approve material differences between established procedure and actual practice. Management must also ensure, on an ongoing basis, that the rating system is operating properly. Management and staff in the credit control function must meet regularly to discuss the

performance of the rating process, areas needing improvement, and the status of efforts to improve previously identified deficiencies. [Basel Framework, CRE 36.55]

254. Internal ratings must be an essential part of the reporting to these parties. Reporting must include risk profile by grade, migration across grades, estimation of the relevant parameters per grade, and comparison of realized default rates (and LGDs and EADs for institutions on advanced approaches) against expectations. Reporting frequencies may vary with the significance and type of information and the level of the recipient. [Basel Framework, CRE 36.56]

(ii) Credit risk control

255. Institutions must have independent credit risk control units that are responsible for the design or selection, implementation and performance of their internal rating systems. The unit(s) must be functionally independent from the personnel and management functions responsible for originating exposures. Areas of responsibility must include:

a. Testing and monitoring internal grades;

b. Production and analysis of summary reports from the institution's rating system, to 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 rating criteria;

c. Implementing procedures to verify that rating definitions are consistently applied across departments and geographic areas;

d. Reviewing and documenting any changes to the rating process, including the reasons for the changes; and

e. Reviewing the rating criteria to evaluate if they remain predictive of risk. Changes to the rating process, criteria or individual rating parameters must be documented and retained for OSFI to review.

[Basel Framework, CRE 36.57]

256. A credit risk control unit must actively participate in the development, selection, implementation and validation of rating models. It must assume oversight and supervision responsibilities for any models used in the rating process, and ultimate responsibility for the ongoing review and alterations to rating models. [Basel Framework, CRE 36.58]

(iii) Internal and external audit

257. Internal audit or an equally independent function must review at least annually the institution's rating system and its operations, including the operations of the credit function and the estimation of PDs, LGDs and EADs. Areas of review include adherence to all applicable minimum requirements. Internal audit must document its findings.
[Basel Framework, CRE 36.59]

Use of internal ratings

258. Internal ratings and default and loss estimates must play an essential role in the credit approval, risk management, internal capital allocations, and corporate governance functions of institutions using the IRB approach. Ratings systems and estimates designed and implemented exclusively for the purpose of qualifying for the IRB approach and used only to provide IRB inputs are not acceptable. It is recognized that institutions will not necessarily be using exactly the same estimates for both IRB and all internal purposes. For example, pricing models are likely to use PDs and LGDs relevant to the life of the asset. Where there are such differences, an institution must document them and demonstrate their reasonableness to OSFI. [Basel Framework, CRE 36.60]

259. An institution must have a credible track record in the use of internal ratings information. Thus, the institution must demonstrate that it has been using a rating system that was broadly in line with the minimum requirements articulated in this guideline for at least the three years prior to qualification. An institution using the advanced IRB approach must demonstrate that it has been estimating and employing LGDs and EADs in a manner that is broadly consistent with the minimum requirements for use of own estimates of LGDs and EADs for at least the three years prior to qualification. Improvements to an institution's rating system will not render an institution non-compliant with the three-year requirement. [Basel Framework, CRE 36.61]

5.8.6 Risk quantification

(i) Overall requirements for estimation

Structure and intent

260. This section addresses the broad standards for own-estimates of PD, LGD, and EAD. Generally, all institutions using the IRB approaches must estimate a PD[28] for each internal borrower grade for corporate, sovereign, PSE, and bank exposures or for each pool in the case of retail exposures. [Basel Framework, CRE 36.62]

261. PD estimates must be a long-run average of one-year default rates for borrowers in the grade, with the exception of retail exposures. Requirements specific to PD estimation are provided in paragraphs 276 to 281. Institutions on the advanced approach must estimate an appropriate LGD (as defined in paragraphs 283 to 288) for each of its facilities (or retail pools). For exposures subject to the advanced approach, institutions must also estimate an appropriate long-run default-weighted average EAD for each of its facilities as defined in paragraphs 290 and 291. Requirements specific to EAD estimation appear in paragraphs 290 to 300. For corporate, sovereign, PSE, and bank exposures, institutions that do not meet the requirements for own-estimates of EAD or LGD, above, must use the supervisory estimates of these parameters. Standards for use of such estimates are set out in paragraphs 333 to 352.
[Basel Framework, CRE 36.63]

[28] Institutions are not required to produce their own estimates of PD for exposures subject to the supervisory slotting approach.

262. Internal estimates of PD, LGD, and EAD must incorporate all relevant, material and available data, information and methods. An institution may utilize internal data and data from external sources (including pooled data). Where internal or external data is used, the institution must demonstrate that its estimates are representative of long run (PD) or downturn (LGD and EAD) experience. [Basel Framework, CRE 36.64]

263. Estimates must be grounded in historical experience and empirical evidence, and not based purely on subjective or judgmental considerations. Any changes in lending practice or the process for pursuing recoveries over the observation period must be taken into account. An institution's estimates must promptly reflect the implications of technical advances and new data and other information, as it becomes available. Institutions must review their estimates on a yearly basis or more frequently. [Basel Framework, CRE 36.65]

264. The population of exposures represented in the data used for estimation, and lending standards in use when the data were generated, and other relevant characteristics should be closely matched to or at least comparable with those of the institution's exposures and standards. The institution must also demonstrate that economic or market conditions that underlie the data are relevant to current and foreseeable conditions. For estimates of LGD and EAD, institutions must take into account paragraphs 283 to 300. The number of exposures in the sample and the data period used for quantification must be sufficient to provide the institution with confidence in the accuracy and robustness of its estimates. The estimation technique must perform well in out-of-sample tests. [Basel Framework, CRE 36.66]

265. In general, estimates of PDs, LGDs, and EADs are likely to involve unpredictable errors. In order to avoid over-optimism, an institution must add to its estimates a margin of conservatism that is related to the likely range of errors. Where methods and data are less satisfactory and the likely range of errors is larger, the margin of conservatism must be larger.
[Basel Framework, CRE 36.67]

(ii) Definition of default

266. A default is considered to have occurred with regard to a particular obligor when either or both of the two following events have taken place.

a. The institution considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the institution to actions such as realizing security (if held).

b. The obligor is past due more than 90 days on any material credit obligation to the banking group. Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstandings.

[Basel Framework, CRE 36.68]

267. The elements to be taken as indications of unlikeliness to pay include:

a. The institution puts the credit obligation on non-accrued status.

b. The institution makes a charge-off or specific allowance resulting from a significant perceived decline in credit quality subsequent to the institution taking on the exposure.

c. The institution sells the credit obligation at a material credit-related economic loss.

d. The institution consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.

e. The institution has filed for the obligor's bankruptcy or a similar order in respect of the obligor's credit obligation to the banking group.

f. The obligor has sought or has been placed in bankruptcy or similar protection where this would avoid or delay repayment of the credit obligation to the banking group.

[Basel Framework, CRE 36.69]

268. Additional guidance on indications of unlikeliness to pay can be found in OSFI Implementation Notes, IFRS 9 Guidance and applicable accounting standards.
[Basel Framework, CRE 36.70]

269. For retail exposures, the definition of default can be applied at the level of a particular facility, rather than at the level of the borrower, with the exception of combined loan products (CLP) discussed below in paragraph 270. As such, default by a borrower on one facility does not require an institution to treat all other facilities from that borrower to the banking group as defaulted. In addition, for QRRE exposures, institutions may wait until a borrower is more than 180 days past due on any material facility to the banking group (instead of the 90 days mentioned in paragraph 266) prior to determining that a default has occurred.

270. All products secured by the same property issued as part of the same CLP are to be considered a single facility. That is, 1) if a retail borrower is deemed to have defaulted on any product within a CLP facility, it is deemed to have defaulted on all products in the CLP facility and 2) as of fiscal Q3 2027, all products within a single CLP facility shall be assigned the same PD and LGD estimates for purposes of calculating minimum capital requirements. In the case where the CLP contains products with different contractual or legal seniority (e.g., insured mortgages), products with the same seniority will need to be assigned the same LGD. However, products with different seniority may be assigned LGDs reflecting the different contractual or legal seniority. [Basel Framework, CRE 36.71]

271. An institution must record actual defaults on IRB exposure classes using this reference definition. An institution must also use the reference definition for its estimation of PDs, and (where relevant) LGDs and EADs. In arriving at these estimations, an institution may use external data available to it that is not itself consistent with that definition, subject to the requirements set out in paragraph 277. However, in such cases, institutions must demonstrate to OSFI that appropriate adjustments to the data have been made to achieve broad equivalence with the reference definition. [Basel Framework, CRE 36.72]

272. If the institution considers that a previously defaulted exposure's status is such that no trigger of the reference definition any longer applies, the institution must rate the borrower and estimate LGD as they would for a non-defaulted facility. Should the reference definition subsequently be triggered, a second default would be deemed to have occurred.
[Basel Framework, CRE 36.73]

(iii) Re-ageing

273. The institution must have clearly articulated and documented policies in respect of the counting of days past due, in particular in respect of the re-ageing of the facilities and the granting of extensions, deferrals, renewals and rewrites to existing accounts. At a minimum, the re-ageing policy must include: (a) approval authorities 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-ageings per facility; and (e) a reassessment of the borrower's capacity to repay. These policies must be applied consistently over time, and must support the 'use test' (i.e. if an institution treats a re-aged exposure in a similar fashion to other delinquent exposures more than the past-due cut off point, this exposure must be recorded as in default for IRB purposes). [Basel Framework, CRE 36.74]

(iv) Treatment of overdrafts

274. Authorized overdrafts must be subject to a credit limit set by the institution and brought to the knowledge of the client. Any break of this limit must be monitored; if the account were not brought under the limit after 90 to 180 days (subject to the applicable past-due trigger), it would be considered as defaulted. Non-authorized overdrafts will be associated with a zero limit for IRB purposes. Thus, days past due commence once any credit is granted to an unauthorized customer; if such credit were not repaid within 90 to 180 days, the exposure would be considered in default. Institutions must have in place rigorous internal policies for assessing the creditworthiness of customers who are offered overdraft accounts. [Basel Framework, CRE 36.75]

(v) Definition of loss for all asset classes

275. The definition of loss used in estimating LGD is economic loss. When measuring economic loss, all relevant factors should be taken into account. This must include material discount effects and material direct and indirect costs associated with collecting on the exposure. Institutions must not simply measure the loss recorded in accounting records, although they must be able to compare accounting and economic losses. The institution's own workout and collection expertise significantly influences their recovery rates and must be reflected in their LGD estimates, but adjustments to estimates for such expertise must be conservative until the institution has sufficient internal empirical evidence of the impact of its expertise. [Basel Framework, CRE 36.76]

(vi) Requirements specific to PD estimation

Corporate, sovereign, PSE, and bank exposures

276. Institutions must use information and techniques that take appropriate account of the long-run experience when estimating the average PD for each rating grade. For example, institutions may use one or more of the three specific techniques set out below: internal default experience, mapping to external data, and statistical default models. [Basel Framework, CRE 36.77]

277. Institutions may have a primary technique and use others as a point of comparison and potential adjustment. OSFI will not be satisfied by mechanical application of a technique without supporting analysis. Institutions must recognize the importance of judgmental considerations in combining results of techniques and in making adjustments for limitations of techniques and information. For all methods listed below, institutions must 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). Weighting approaches, such as EAD weighting, are not permitted.

a. An institution may use data on internal default experience for the estimation of PD. An institution must demonstrate in its analysis 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. Where only limited data are available, or where underwriting standards or rating systems have changed, the institution must add a greater margin of conservatism in its estimate of PD. The use of pooled data across institutions may also be recognized. An institution must demonstrate that the internal rating systems and criteria of other institutions in the pool are comparable with its own.
b. Institutions may associate or map their internal grades to the scale used by an external credit assessment institution or similar institution and then attribute the default rate observed for the external institution's grades to the institution's grades. Mappings must be based on a comparison of internal rating criteria to the criteria used by the external institution and on a comparison of the internal and external ratings of any common borrowers. Biases or inconsistencies in the mapping approach or underlying data must be avoided. The external institution's criteria underlying the data used for quantification must be oriented to the risk of the borrower and not reflect transaction characteristics. The institution's analysis must include a comparison of the default definitions used, subject to the requirements in paragraph 266 to 272. The institution must document the basis for the mapping.
c. An institution is allowed to 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. The institution's use of default probability models for this purpose must meet the standards specified in paragraph 225.

[Basel Framework, CRE 36.78]

278. Irrespective of whether an institution is using external, internal, or pooled data sources, or a combination of the three, for its PD estimation, the length of the underlying historical observation period used must be at least five years for at least one source. If the available observation period spans a longer period for any source, and this data are relevant and material, this longer period must be used. The data should include a representative mix of good and bad years and must at a minimum include 10% of data from downturn (or bad) years. To determine the downturn period, institutions may use their existing process for determine a downturn period with respect to LGDs. However, if an institution deems a separate process more suitable for determining downturn years for PDs (e.g. due to lag effects between PDs and LGDs), it may do so. The 10% minimum is to be measured in the number of years used to calibrate parameter estimates. For example, if a PD model is based on 10 years of data, then at least 1 year from that 10 years must be a downturn year. For datasets with less than 10% of data coming from downturn years, there are multiple ways institutions could adjust their estimates to compensate for the lack of downturn years. For example,

institutions could put more weight on the downturn data in the dataset or incorporate margins of conservatism into their estimates. Institutions are asked to consult with OSFI on their approach used to adjust their estimates where datasets do not include at least 10% of data from downturn years. [Basel Framework, CRE 36.79]

Retail exposures

279. Given the institution-specific basis of assigning exposures to pools, institutions must regard internal data as the primary source of information for estimating loss characteristics. Institutions are permitted to use external data or statistical models for quantification provided a strong link can be demonstrated between (a) the institution's process of assigning exposures to a pool and the process used by the external data source, and (b) between the institution's internal risk profile and the composition of the external data. In all cases institutions must use all relevant and material data sources as points of comparison. [Basel Framework, CRE 36.80]

280. One method for deriving long-run average estimates of PD and default-weighted average loss rates given default (as defined in paragraph 283) for retail would be based on an estimate of the expected long-run loss rate. An institution may (i) use an appropriate PD estimate to infer the long-run default-weighted average loss rate given default, or (ii) use a long-run default-weighted average loss rate given default to infer the appropriate PD. In either case, it is important to recognize that the LGD used for the IRB capital calculation cannot be less than the long-run default-weighted average loss rate given default and must be consistent with the concepts defined in paragraph 283. [Basel Framework, CRE 36.81]

281. Irrespective of whether institutions are using external, internal, pooled data sources, or a combination of the three, for their estimation of loss characteristics, the length of the underlying historical observation period used must be at least five years. If the available observation spans a longer period for any source, and these data are relevant, this longer period must be used. The data should include a representative mix of good and bad years of the economic cycle relevant for the portfolio. The data should include a representative mix of good and bad years and must at a minimum include 10% of data from downturn (or bad) years. To determine the downturn period, institutions may use their existing process for determine a downturn period with respect to LGDs. However, if an institution deems a separate process more suitable for determining downturn years for PDs (e.g. due to lag effects between PDs and LGDs), it may do so. The PD should be based on the observed historical average one-year default rate. The 10% minimum is to be measured in the number of years used to calibrate parameter estimates. For example, if a PD model is based on 10 years of data, then at least 1 year from that 10 years must be a downturn year. For datasets with less than 10% of data coming from downturn years, there are multiple ways institutions could adjust their estimates to compensate for the lack of downturn years. For example, institutions could put more weight on the downturn data in the dataset or incorporate margins of conservatism into their estimates. Institutions are asked to consult with OSFI on their approach used to adjust their estimates where datasets do not include at least 10% of data from downturn years. [Basel Framework, CRE 36.82]

Retail Margin lending

282. Institutions have the option of using either the standardized approach without credit risk mitigation or the retail IRB approach using the method outlined in paragraph 280 that treats all margin loans as a single risk segment. Prime brokerage business may not be classified as a retail exposure.

a. Standardized approach without credit risk mitigation
Notwithstanding that institutions are required to use the IRB approach for retail, appropriately margined retail loans are not considered a significant credit risk. Therefore retail margin loans are eligible for a permanent waiver to use the standardized approach without credit risk mitigation.

b. IRB approach

This approach is permitted for institutions that wish to extend IRB retail methods to retail margin loans as a single risk segment. In such a case the institution would be eligible to derive either a PD or LGD for the segment from the segment's expected long-run loss rate (see paragraph 280).

(vii) Requirements specific to own-LGD estimates

Standards for all asset classes

283. An institution must estimate an LGD for each facility that aims to reflect economic downturn conditions where necessary to capture the relevant risks. This LGD cannot be less than the long-run default-weighted average loss rate given default calculated based on the average economic loss[29] of all observed defaults within the data source for that type of facility. In addition, an institution must take into account the potential for the LGD of the facility to be higher than the default-weighted average during a period when credit losses are substantially higher than average. 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. However, for other exposures, this cyclical variability in loss severities may be important and institutions will need to incorporate it into their LGD estimates. For this purpose, institutions may use averages of loss severities observed during periods of high credit losses, forecasts based on appropriately conservative assumptions, or other similar methods. Appropriate estimates of LGD during periods of high credit losses might be formed using either internal and/or external data.
[Basel Framework, CRE 36.83]

284. In its analysis, the institution must consider the extent of any dependence between the risk of the borrower and that of the collateral or collateral provider. Cases where there is a significant degree of dependence must be addressed in a conservative manner. Any currency mismatch between the underlying obligation and the collateral must also be considered and treated conservatively in the institution's assessment of LGD. [Basel Framework, CRE 36.84]

[29] Post-default advances and corresponding accrued interest can be captured in LGD or EAD estimates, provided it is done consistently across the institution.

285. LGD estimates must be grounded in historical recovery rates and, when applicable, must not solely be based on the collateral's estimated market value. This requirement recognizes the potential inability of institutions to gain both control of their collateral and liquidate it expeditiously. To the extent, that LGD estimates take into account the existence of collateral, institutions must establish internal requirements for collateral management, operational procedures, legal certainty and risk management process that are generally consistent with those required for the foundation IRB approach. [Basel Framework, CRE 36.85]

286. Recognizing the principle that realized losses can at times systematically exceed expected levels, the LGD assigned to a defaulted asset should reflect the possibility that the institution would have to recognize additional, unexpected losses during the recovery period. For each defaulted asset, the institution must also construct its best estimate of the expected loss on that asset based on current economic circumstances and facility status. The amount, if any, by which the LGD on a defaulted asset exceeds the institution's best estimate of expected loss on the asset represents the capital requirement for that asset, and should be set by the institution on a risk-sensitive basis in accordance with section 5.3. Instances where the best estimate of expected loss on a defaulted asset is less than the sum of specific[30] allowances on that asset will attract supervisory scrutiny and must be justified by the institution. [Basel Framework, CRE 36.86]

Additional standards for corporate, sovereign, PSE, and bank exposures

287. Estimates of LGD must be based on a minimum data observation period that should ideally cover at least one complete economic cycle but must in any case be no shorter than a period of seven years for at least one source. If the available observation period spans a longer period for any source, and the data are relevant, this longer period must be used.
[Basel Framework, CRE 36.87]

Additional standards for retail exposures

288. The minimum data observation period for LGD estimates for retail exposures is five years. The less data an institution has, the more conservative it must be in its estimation.
[Basel Framework, CRE 36.88]

[30] Under IFRS 9, Stage 3 allowances and partial write-offs are considered to be specific allowances, while Stage 1 and Stage 2 allowances are considered to be general allowances.

Downturn LGD Floor

289. Effective November 1, 2016, new exposures secured by residential real estate[31] located in Canada are subject to a downturn LGD (DLGD) floor equivalent to the sum of the segment's long-run default-weighted average LGD and an add-on.

DLGD Floor = Bank's Estimate of Long Run LGD + Add-on

Where the value of DLGD Floor is capped at a maximum value of 100%.

The DLGD floor is applied at the loan level to the pre-mitigation[32] DLGD.

The add-on formula is as follows:

$$Add - on = \frac{\text{Max}(\text{CLTV} - 80\% \times (100\% - \Delta\text{P}), 0)}{\text{CLTV}}$$

Where:

- *CLTV* (*Current Loan-To-Value*) is defined as the ratio of the exposure at default[33] over the updated property value.
- ΔP (*Price Correction*) is defined as the decrease in house prices necessary to reach a determined level of house prices. For example, if house prices were 10% lower 12 quarters ago than they are today, ΔP would be 10% and the corrected house prices would be equal to 90% of their current value.

  Formulaically, ΔP is defined as follows:

$$\Delta P = \max\left(\left(1 - \frac{House\ Price\ Value\ 12\ quarters\ ago}{Current\ House\ Price\ Value}\right) \times 100\%, 0\%\right)$$

The calculation of ΔP is performed using data from the Teranet – National Bank House Price Index™ ("Teranet index"). Institutions will be required to use the data from all 32 of the public metropolitan area indices, as of January 1, 2022, in the Teranet index for exposures located in the corresponding metropolitan areas[34] and the composite-11 for loans outside of those 32 cities. Quarterly recalculation of the floor is required. A list of the 32 public metropolitan area indicies has been provided in Appendix 5-3.

When multiple loans are secured by the same property, the cumulative CLTV (CCLTV) represents the sum of the exposures at default of all loans with equal or higher seniority, divided by the updated value of the property. CLTV is the ratio of the sum of the exposure at default of all equally ranked loans over the updated value of the property. The following formula applies when multiple loans are secured by the same property:

$$Add-on = Max\left(\frac{Min(CLTV, Max(CCLTV - 80\% \times (100\% - \Delta P), 0))}{CLTV}, 0\right)$$

The DLGD floor must be considered as an additional requirement to the 10% LGD floor described in paragraph 98, specifically the 10% LGD floor will be applied after the application of the floor described in this paragraph.

(viii) Requirements specific to own-EAD estimates

Standards for all asset classes

290. EAD for an on-balance sheet or off-balance sheet item is defined as the expected gross exposure of the facility upon default of the obligor.[35] For on-balance sheet items, institutions must estimate EAD at no less than the current drawn amount, subject to recognizing the effects of on-balance sheet netting as specified in the foundation approach. The minimum requirements for the recognition of netting are the same as those under the foundation approach. The additional minimum requirements for internal estimation of EAD under the advanced approach, therefore, focus on the estimation of EAD for off-balance sheet items (excluding transactions that expose institutions to counterparty credit risk as set out in Chapter 7). Institutions using the advanced approach must have established procedures in place for the estimation of EAD for off-balance sheet items. These must specify the estimates of EAD to be used for each facility type. Institutions estimates of EAD should reflect the possibility of additional drawings by the borrower up to and after the time a default event is triggered. Where estimates of EAD differ by facility type, the delineation of these facilities must be clear and unambiguous. [Basel Framework, CRE 36.89]

291. Under the advanced approach, institutions must assign an estimate of EAD for each facility. It must 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. If a positive correlation can reasonably be expected between the default frequency and the magnitude of EAD, the EAD estimate must incorporate a larger margin of conservatism. Moreover, for exposures for which EAD estimates are volatile over the economic cycle, the institution must use EAD estimates that are appropriate for an economic downturn, if these are more conservative than the long-run average. For institutions that have been able to develop their own EAD models, this could be achieved by considering the cyclical nature, if any, of the drivers of such models. Other institutions may have sufficient internal data to examine the impact of previous recession(s). However, some institutions may only have the option of making conservative use of external data. Moreover, where an institution bases its estimates on

31 Exposures secured by residential real estate refer to all retail lending products for which the collateral is residential real estate. New exposures include newly originated mortgages, refinances, and renewals.

32 The DLGD floor applies to new insured mortgages effective November 1, 2017.

33 The estimation of the exposure at default must be performed according to the requirements specified in this chapter.

34 The metropolitan areas' geographical limits are determined using Statistics Canada's definition of Census Metropolitan Areas.

35 Post-default advances and corresponding accrued interest can be captured in LGD or EAD estimates, provided it is done consistently across the institution.

alternative measures of central tendency (such as the median or a higher percentile estimate) or only on 'downturn' data, it should explicitly confirm that the basic downturn requirement of the framework is met, i.e. the institution's estimates do not fall below a (conservative) estimate of the long-run default-weighted average EAD for similar facilities. [Basel Framework, CRE 36.90]

292. The criteria by which estimates of EAD are derived must be plausible and intuitive, and represent what the institution believes to be the material drivers of EAD. The choices must be supported by credible internal analysis by the institution. The institution must be able to provide a breakdown of its EAD experience by the factors it sees as the drivers of EAD. An institution must use all relevant and material information in its derivation of EAD estimates. Across facility types, an institution must review its estimates of EAD when material new information comes to light and at least on an annual basis. [Basel Framework, CRE 36.91]

293. Due consideration must be paid by the institution to its specific policies and strategies adopted in respect of account monitoring and payment processing. The institution must also consider its ability and willingness to prevent further drawings in circumstances short of payment default, such as covenant violations or other technical default events. Institutions must also have adequate systems and procedures in place to monitor facility amounts, current outstandings against committed lines and changes in outstandings per borrower and per grade. The institution must be able to monitor outstanding balances on a daily basis. [Basel Framework, CRE 36.92]

294. Institutions' EAD estimates must be developed using a 12-month fixed-horizon approach (i.e. for each observation in the reference data set, default outcomes must be linked to relevant obligor and facility characteristics twelve months prior to default.) This does not preclude relevant additional obligor and facility information from less than twelve months prior to default to be used in estimates of EAD. In addition, the use of a 12-month fixed horizon approach does not prevent the institution from using information from facilities that defaulted within twelve months of the origination of the facility. [Basel Framework, CRE 36.93]

295. As set out in paragraph 264, institutions' EAD estimates should be based on reference data that reflect the obligor, facility and institution management practice characteristics of the exposures to which the estimates are applied. Consistent with this principle, EAD estimates applied to particular exposures should not be based on data that comingle the effects of disparate characteristics or data from exposures that exhibit different characteristics (e.g. same broad product grouping but different customers that are managed differently by the institution). The estimates should be based on appropriately homogenous segments. Alternatively, the estimates should be based on an estimation approach that effectively disentangles the impact of the different characteristics exhibited within the relevant dataset. Practices that generally do not comply with this principle include use of estimates based or partly based on:

a. SME/mid-market 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 institution, subject to recent institution-initiated limit

reductions, blocked from further drawdowns or subject to other types of collections activity).

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. OSFI expects institutions to demonstrate a detailed understanding of the impact of changes in customer product mix on EAD reference data sets (and associated EAD estimates) and that the impact is immaterial or has been effectively mitigated within each institution's estimation process. Institutions' analyses in this regard will be actively challenged by OSFI. Effective mitigation would not include: setting floors to credit conversion factor (CCF)/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 (e.g. revolving and non-revolving products); adjusting only 'material' observations affected by product transformation; generally excluding observations affected by product profile transformation (thereby potentially distorting the representativeness of the remaining data). [Basel Framework, CRE 36.94]

296. A well-known feature of the commonly used undrawn limit factor (ULF) approach[36] to estimating CCFs is the region of instability associated with facilities close to being fully drawn at reference date. Institutions should ensure that their EAD estimates are effectively quarantined from the potential effects of this region of instability.

a. An acceptable approach could include using an estimation method other than the ULF approach that avoids the instability issue by not using potentially small undrawn limits that could approach zero in the denominator or, as appropriate, switching to a method other than the ULF as the region of instability is approached, e.g. a limit factor, balance factor or additional utilization factor approach.[37] Note that, consistent with paragraph 295, including limit utilization as a driver in EAD models could quarantine much of the relevant portfolio from this issue but, in the absence of other actions, leaves open how to develop appropriate EAD estimates to be applied to exposures within the region of instability.

[36] 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=B0=Bt+ULF[Lt –Bt], where B0 = facility balance at date of default; Bt = current balance (for predicted EAD) or balance at reference date (for observed EAD); Lt = current limit (for predicted EAD) or limit at reference date (for realized/observed EAD).

[37] 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=B0= LF[Lt], where B0 = facility balance at date of default; Bt = current balance (for predicted EAD) or balance at reference date (for observed EAD); Lt = current limit (for predicted EAD) or limit at reference date (for realized/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=B0=BF[Bt]. An additional utilization 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 = B0 = Bt + AUF[Lt].

b. Common but ineffective approaches to mitigating this issue include capping and flooring reference data (e.g. observed CCFs at 100 per cent and zero respectively) or omitting observations that are judged to be affected.

[Basel Framework, CRE 36.95]

297. EAD reference data must not be capped to the principal amount outstanding or facility limits. Accrued interest, other due payments and limit excesses should be included in EAD reference data. [Basel Framework, CRE 36.96]

298. For transactions that expose institutions to counterparty credit risk, estimates of EAD must fulfil the requirements set forth in Chapter 7. [Basel Framework, CRE 36.97]

Additional standards for corporate, sovereign, PSE, and bank exposures

299. Estimates of EAD must be based on a time period that must ideally cover a complete economic cycle but must in any case be no shorter than a period of seven years. If the available observation period spans a longer period for any source, and the data are relevant, this longer period must be used. EAD estimates must be calculated using a default-weighted average and not a time-weighted average. [Basel Framework, CRE 36.98]

Additional standards for retail exposures

300. The minimum data observation period for EAD estimates for retail exposures is five years. The less data an institution has, the more conservative it must be in its estimation. [Basel Framework, CRE 36.99]

(ix) Minimum requirements for assessing effect of guarantees and credit derivatives

Standards for corporate, sovereign, and PSE exposures where own estimates of LGD are used and standards for retail exposures

Guarantees

301. When an institution uses its own estimates of LGD, it may reflect the risk-mitigating effect of guarantees through an adjustment to PD or LGD estimates. The option to adjust LGDs is available only to those institutions that have been approved to use their own internal estimates of LGD. For retail exposures, where guarantees exist, either in support of an individual obligation or a pool of exposures, an institution may reflect the risk-reducing effect either through its estimates of PD or LGD, provided this is done consistently. In adopting one or the other technique, an institution must adopt a consistent approach, both across types of guarantees and over time.
[Basel Framework, CRE 36.100]

302. The benefits of credit risk mitigation from both borrowers and guarantors can be recognized for capital purposes only if an institution can establish that it can simultaneously and independently realize on both the benefits (e.g. collateral provided by the borrower and a third party guarantee). In a scenario where a bank has obtained both collateral and a guarantee for a

particular exposure and it cannot establish that it can simultaneously and independently realize on the benefits of both, the risk mitigating benefits of the collateral will be recognized.

303. Any recognition of the mitigating effect of a guarantee arrangement under the Canada Small Business Financing Act must recognize the risk of non-performance by the guarantor due to a cap on the total claims that can be made on defaulted loans covered by the guarantee arrangement.

304. The following requirements will apply to institutions that reflect the effect of guarantees through adjustments to the LGD:

a. No recognition of double default: Paragraph 110 of this chapter permits institutions to adjust either PD or LGD to reflect guarantees, but paragraph 306 and paragraph 110 stipulate that the risk weight resulting from these adjustments must not be lower than that of a comparable exposure to the guarantor (see the discussion in paragraph 306 below). An institution using LGD adjustments must demonstrate that its methodology does not incorporate the effects of double default. Furthermore, the institution must demonstrate that its LGD adjustments do not incorporate implicit assumptions about the correlation of guarantor default to that of the obligor.
b. No recognition of double recovery: Since collateral is reflected through an adjustment to LGD, an institution using a separate adjustment to LGD to reflect a guarantee must be able to distinguish the effects of the two sources of mitigation and to demonstrate that its methodology does not incorporate double recovery.
c. Requirement to track guarantor PDs: Any institution that measures credit risk comprehensively must track exposures to guarantors for the purpose of assessing concentration risk, and by extension must still track the guarantors' PDs.
d. Requirement to recognize the possibility of guarantor default in the adjustment: Any LGD adjustment must fully reflect the likelihood of guarantor default – an institution may not assume that the guarantor will always perform under the guarantee. For this purpose, it will not be sufficient only to demonstrate that the risk weight resulting from an LGD adjustment is no lower than that of the guarantor.
e. Requirement for credible data: Any estimates used in an LGD adjustment must be based on credible, relevant data, and the relation between the source data and the amount of the adjustment should be transparent. Institutions should also analyse the degree of uncertainty inherent in the source data and resulting estimates.
f. Use of consistent methodology for similar types of guarantees: Under paragraph 110, an institution must use the same method for all guarantees of a given type. This means that an institution will be required to have one single method for guarantees, one for credit default swaps, one for insurance, and so on. Institutions will not be permitted to selectively choose the exposures having a particular type of guarantee to receive an LGD adjustment, and any adjustment methodology must be broadly applicable to all exposures that are mitigated in the same way.

305. In all cases, both the borrower and all recognized guarantors must be assigned a borrower rating at the outset and on an ongoing basis. An institution must follow all minimum requirements

for assigning borrower ratings set out in this document, including the regular monitoring of the guarantor's condition and ability and willingness to honour its obligations. Consistent with the requirements in paragraphs 244 and 245, an institution must retain all relevant information on the borrower absent the guarantee and the guarantor. In the case of retail guarantees, these requirements also apply to the assignment of an exposure to a pool, and the estimation of PD. [Basel Framework, CRE 36.101]

306. In no case can the institution assign the guaranteed exposure an adjusted PD or LGD such that the adjusted risk weight would be lower than that of a comparable, direct exposure to the guarantor. A comparable, direct exposure to the guarantor is one using the PD of the guarantor and the LGD for an unsecured exposure to the guarantor. If the case where a guarantor pledges additional collateral beyond that of the original borrower, this additional collateral may be reflected in the LGD of a comparable, direct exposure to the guarantor. Consistent with the standardized approach, institutions may choose not to recognize credit protection if doing so would result in a higher capital requirement. Neither criteria nor rating processes are permitted to consider possible favourable effects of imperfect expected correlation between default events for the borrower and guarantor for purposes of regulatory minimum capital requirements. As such, the adjusted risk weight must not reflect the risk mitigation of "double default."
[Basel Framework, CRE 36.102]

307. In case the institution applies the standardized approach to direct exposures to the guarantor, the guarantee may only be recognized by treating the covered portion of the exposure as a direct exposure to the guarantor under the standardized approach. Similarly, in case the institution applies the foundation IRB approach to direct exposures to the guarantor, the guarantee may only be recognized by applying the foundation IRB approach to the covered portion of the exposure. Alternatively, institutions may choose to not recognize the effect of guarantees on their exposures. [Basel Framework, CRE 36.103]

Eligible guarantors and guarantees

308. There are no restrictions on the types of eligible guarantors. The institution must, however, have clearly specified criteria for the types of guarantors it will recognize for regulatory capital purposes. [Basel Framework, CRE 36.104]

309. An institution may not reduce the risk weight of an exposure to a third party on account of a guarantee or credit protection provided by a related party (parent, subsidiary or affiliate) of the institution. This treatment follows the principle that guarantees within a corporate group are not a substitute for capital in the regulated Canadian institution. An exception is made for self-liquidating trade-related transactions that have a tenure of 360 days or less, are market-driven and are not structured to avoid the requirements of OSFI guidelines. The requirement that the transaction be "market-driven" necessitates that the guarantee or letter of credit is requested and paid for by the customer and/or that the market requires the guarantee in the normal course.

310. The guarantee must be evidenced in writing, non-cancellable on the part of the guarantor, in force until the debt is satisfied in full (to the extent of the amount and tenor of the guarantee) and legally enforceable against the guarantor in a jurisdiction where the guarantor has assets to

attach and enforce a judgement. The guarantee must also be unconditional; there should be no clause in the protection contract outside the direct control of the institution that could prevent the protection provider from being obliged to pay out in a timely manner in the event that the original counterparty fails to make the payment(s) due. However, under the advanced IRB approach, guarantees that only cover loss remaining after the institution has first pursued the original obligor for payment and has completed the workout process may be recognized.
[Basel Framework, CRE 36.105]

311. In case of guarantees where the institution applies the standardized approach to the covered portion of the exposure, the scope of guarantors and the minimum requirements as under the standardized approach apply. [Basel Framework, CRE 36.106]

Adjustment criteria

312. An institution must have clearly specified 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. These criteria must be as detailed as the criteria for assigning exposures to grades consistent with paragraphs 217 and 218, and must follow all minimum requirements for assigning borrower or facility ratings set out in this document. [Basel Framework, CRE 36.107]

313. The criteria must be plausible and intuitive, and must address the guarantor's ability and willingness to perform under the guarantee. The criteria must also 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. The institution's criteria must also consider the extent to which residual risk to the borrower remains, for example a currency mismatch between the guarantee and the underlying exposure. [Basel Framework, CRE 36.108]

314. In adjusting borrower grades or LGD estimates (or in the case of retail and eligible purchased receivables, the process of allocating exposures to pools), institutions must take all relevant available information into account. [Basel Framework, CRE 36.109]

Credit derivatives

315. The minimum requirements for guarantees are relevant also for single-name credit derivatives. Additional considerations arise in respect of asset mismatches. The criteria used for assigning adjusted borrower grades or LGD estimates (or pools) for exposures hedged with credit derivatives must require that the asset on which the protection is based (the reference asset) cannot be different from the underlying asset, unless the conditions outlined in the foundation approach are met. [Basel Framework, CRE 36.110]

316. In addition, the criteria must address the payout structure of the credit derivative and conservatively assess the impact this has on the level and timing of recoveries. The institution must also consider the extent to which other forms of residual risk remain.
[Basel Framework, CRE 36.111]

For banks using foundation LGD estimates

317. The minimum requirements outlined in paragraphs 301 to 316 apply to institutions using the foundation LGD estimates with the following exceptions:

a. The institution is not able to use an 'LGD-adjustment' option; and
b. The range of eligible guarantees and guarantors is limited to those outlined in paragraph 105.

[Basel Framework, CRE 36.112]

(x) Requirements specific to estimating PD and LGD (or EL) for qualifying purchased receivables

318. The following minimum requirements for risk quantification must be satisfied for any purchased receivables (corporate or retail) making use of the top-down treatment of default risk and/or the IRB treatments of dilution risk. [Basel Framework, CRE 36.113]

319. The purchasing institution will be required to group the receivables into sufficiently homogeneous 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. In general, the risk bucketing process will reflect the seller's underwriting practices and the heterogeneity of its customers. In addition, methods and data for estimating PD, LGD, and EL must comply with the existing risk quantification standards for retail exposures. In particular, quantification should reflect all information available to the purchasing institution regarding the quality of the underlying receivables, including data for similar pools provided by the seller, by the purchasing institution, or by external sources. The purchasing institution must determine whether the data provided by the seller are consistent with expectations agreed upon by both parties concerning, for example, the type, volume and on-going quality of receivables purchased. Where this is not the case, the purchasing institution is expected to obtain and rely upon more relevant data.
[Basel Framework, CRE 36.114]

Minimum operational requirements

320. An institution purchasing receivables has to justify that current and future advances can be repaid from the liquidation of (or collections against) the receivables pool. To qualify for the top-down treatment of default risk, the receivable pool and overall lending relationship should be closely monitored and controlled. Specifically, an institution will have to demonstrate the following:

a. Legal certainty;
b. Effectiveness of monitoring systems;
c. Effectiveness of work-out systems;
d. Effectiveness of systems for controlling collateral, credit availability, and cash; and
e. Compliance with the institution's internal policies and procedures.

[Basel Framework, CRE 36.1115]

Legal certainty

321. The structure of the facility must ensure that under all foreseeable circumstances the institution has effective ownership and control of the cash remittances from the receivables, including incidences of seller or servicer distress and bankruptcy. When the obligor makes payments directly to a seller or servicer, the institution must verify regularly that payments are forwarded completely and within the contractually agreed terms. As well, ownership over the receivables and cash receipts should be protected against bankruptcy 'stays' or legal challenges that could materially delay the lender's ability to liquidate/assign the receivables or retain control over cash receipts. [Basel Framework, CRE 36.116]

Effectiveness of monitoring systems

322. The institution must be able to monitor both the quality of the receivables and the financial condition of the seller and servicer. In particular:

a. The institution must (a) assess the correlation among the quality of the receivables and the financial condition of both the seller and servicer, and (b) have in place 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.

b. The institution must have clear and effective policies and procedures for determining seller and servicer eligibility. The institution or its agent must conduct periodic reviews of sellers and servicers in order to verify the accuracy of reports from the seller/servicer, detect fraud or operational weaknesses, and verify the quality of the seller's credit policies and servicer's collection policies and procedures. The findings of these reviews must be well documented.

c. The institution must have the ability to assess the characteristics of the receivables pool, including (a) over-advances; (b) history of the seller's arrears, bad debts, and bad debt allowances; (c) payment terms, and (d) potential contra accounts.

d. The institution must have effective policies and procedures for monitoring on an aggregate basis single-obligor concentrations both within and across receivables pools.

e. The institution must receive timely and sufficiently detailed reports of receivables ageings and dilutions to: (a) ensure compliance with the institution's eligibility criteria and advancing policies governing purchased receivables, and (b) provide an effective means with which to monitor and confirm the seller's terms of sale (e.g. invoice date ageing) and dilution.

[Basel Framework, CRE 36.117]

Effectiveness of work-out systems

323. An effective programme requires systems and procedures not only for detecting deterioration in the seller's financial condition and deterioration in the quality of the receivables at an early stage, but also for addressing emerging problems pro-actively. In particular,

a. The institution should have clear and effective policies, procedures, and information systems to monitor compliance with (a) all contractual terms of the facility (including

covenants, advancing formulas, concentration limits, early amortization triggers, etc.) as well as (b) the institution's internal policies governing advance rates and receivables eligibility. The institution's systems should track covenant violations and waivers as well as exceptions to established policies and procedures.

b. To limit inappropriate draws, the institution should have effective policies and procedures for detecting, approving, monitoring, and correcting over-advances.

c. The institution should have effective policies and procedures for dealing with financially weakened sellers or servicers and/or deterioration in the quality of receivable pools. These include, but are not necessarily 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.

[Basel Framework, CRE 36.118]

Effectiveness of systems for controlling collateral, credit availability, and cash

324. The institution must have clear and effective policies and procedures governing the control of receivables, credit, and cash. In particular,

a. Written internal policies must 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. 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.

b. Internal systems must ensure that funds are advanced only against specified supporting collateral and documentation (such as servicer attestations, invoices, shipping documents, etc.) [Basel Framework, CRE 36.119]

Compliance with the institution's internal policies and procedures

325. Given the reliance on monitoring and control systems to limit credit risk, the institution should have an effective internal process for assessing compliance with all critical policies and procedures, including:

a. Regular internal and/or external audits of all critical phases of the 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. [Basel Framework, CRE 36.120]

326. An institution's effective internal process for assessing compliance with all critical policies and procedures should also include evaluations of back office operations, with particular focus on qualifications, experience, staffing levels, and supporting systems.
[Basel Framework, CRE 36.121]

5.8.7 Validation of internal estimates

327. Institutions must have a robust system in place to validate the accuracy and consistency of rating systems, processes, and the estimation of all relevant risk components. An institution must demonstrate to OSFI that the internal validation process enables it to assess the performance of internal rating and risk estimation systems consistently and meaningfully.
[Basel Framework, CRE 36.122]

328. Institutions must regularly compare realized default rates with estimated PDs for each grade and be able to demonstrate that the realized default rates are within the expected range for that grade. Institutions using the advanced IRB approach must complete such analysis for their estimates of LGDs and EADs. Such comparisons must make use of historical data that are over as long a period as possible. The methods and data used in such comparisons by the institution must be clearly documented by the institution. This analysis and documentation must be updated at least annually. [Basel Framework, CRE 36.123]

329. Institutions must also use other quantitative validation tools and comparisons with relevant external data sources. The analysis must be based on data that are appropriate to the portfolio, are updated regularly, and cover a relevant observation period. Institutions' internal assessments of the performance of their own rating systems must be based on long data histories, covering a range of economic conditions, and ideally one or more complete business cycles.
[Basel Framework, CRE 36.124]

330. Institutions must demonstrate that quantitative testing methods and other validation methods do not vary systematically with the economic cycle. Changes in methods and data (both data sources and periods covered) must be clearly and thoroughly documented.
[Basel Framework, CRE 36.125]

331. Institutions must have well-articulated internal standards for situations where deviations in realized PDs, LGDs and EADs from expectations become significant enough to call the validity of the estimates into question. These standards must take account of business cycles and similar systematic variability in default experiences. Where realized values continue to be higher than expected values, institutions must revise estimates upward to reflect their default and loss experience. [Basel Framework, CRE 36.126]

332. Where institutions rely on supervisory, rather than internal, estimates of risk parameters, they are encouraged to compare realized LGDs and EADs to those set by the OSFI. The information on realized LGDs and EADs should form part of the institution's assessment of economic capital. [Basel Framework, CRE 36.127]

5.8.8 Supervisory LGD and EAD estimates

333. Institutions under the foundation IRB approach, which do not meet the requirements for own-estimates of LGD and EAD above, must meet the minimum requirements described in the standardized approach to receive recognition for eligible financial collateral (as set out in Chapter 4). They must meet the following additional minimum requirements in order to receive recognition for additional collateral types. [Basel Framework, CRE 36.128]

(i) Definition of eligibility of CRE and RRE as collateral

334. Eligible CRE and RRE collateral for corporate, sovereign, PSE, and bank exposures are defined as:

a. Collateral where 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. As such, repayment of the facility is not materially dependent on any cash flow generated by the underlying CRE/RRE serving as collateral; and

b. Additionally, the value of the collateral pledged must not be materially dependent on the performance of the borrower. 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. [Basel Framework, CRE 36.129]

335. Income producing real estate that falls under the SL asset class is specifically excluded from recognition as collateral for corporate exposures. [Basel Framework, CRE 36.130]

(ii) Operational requirements for eligible CRE/RRE

336. Subject to meeting the definition above, CRE and RRE will be eligible for recognition as collateral for corporate claims only if all of the following operational requirements are met.

a. *Legal enforceability*: any claim on a collateral taken must be legally enforceable in all relevant jurisdictions, and any claim on collateral must be properly filed on a timely basis. Collateral interests must reflect a perfected lien (i.e. all legal requirements for establishing the claim have been fulfilled). Furthermore, the collateral agreement and the legal process underpinning it must be such that they provide for the institution to realize the value of the collateral within a reasonable timeframe.

b. *Objective market value of collateral*: the collateral must be valued at or less 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 institution is expected to monitor the value of the collateral on a frequent basis and at a minimum once every year. More frequent monitoring is suggested where the market is subject to significant changes in conditions. Statistical methods of evaluation (e.g. reference to house price indices, sampling) may be used to update estimates or to identify collateral that may have declined in value and that may need re-appraisal. A qualified professional must evaluate the property when information indicates that the value of the collateral may have declined materially relative to general market prices or when a credit event, such as default, occurs.

d. *Junior liens*: Residential and commercial real estate may be recognized as collateral for FIRB only when the institution's collateral interest is the first lien on the property, and there is no more senior or intervening claim.[38] Junior liens are recognized as collateral only

[38] In some jurisdictions, first liens are subject to the prior right of preferential creditors, such as outstanding tax claims and employees' wages.

where the institution holds the senior lien and where no other party holds an intervening lien on the property. Where junior liens are recognized the institution must first take the haircut value of the collateral, then reduce it by the sum of all loans with liens that rank higher than the junior lien, the remaining value is the collateral that supports the loan with the junior lien. In cases where liens are held by third parties that rank pari passu with the lien of the institution, only the proportion of the collateral (after the application of haircuts and reductions due to the value of loans with liens that rank higher than the lien of the institution) that is attributable to the institution may be recognized.

[Basel Framework, CRE 36.131]

337. Additional collateral management requirements are as follows:

a. The types of CRE and RRE collateral accepted by the institution and lending policies (advance rates) when this type of collateral is taken must be clearly documented.

b. The institution must take steps to ensure that the property taken as collateral is adequately insured against damage or deterioration.

c. The institution must monitor on an ongoing basis the extent of any permissible prior claims (e.g. tax) on the property.

d. The institution must appropriately monitor the risk of environmental liability arising in respect of the collateral, such as the presence of toxic material on a property.

[Basel Framework, CRE 36.132]

(iii) Requirements for recognition of financial receivables

Definition of eligible receivables

338. Eligible financial receivables are 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. 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 governmental authorities, or other non-affiliated parties not related to the sale of goods or services linked to a commercial transaction. Eligible receivables do not include those associated with securitizations, sub-participations or credit derivatives.
[Basel Framework, CRE 36.133]

Operational requirements

Legal certainty

339. The legal mechanism by which collateral is given must be robust and ensure that the lender has clear rights over the proceeds from the collateral. [Basel Framework, CRE 36.134]

340. Institutions must take all steps necessary to fulfil local requirements in respect of the enforceability of security interest, e.g. by registering a security interest with a registrar. There should be a framework that allows the potential lender to have a perfected first priority claim over the collateral. [Basel Framework, CRE 36.135]

341. All documentation used in collateralized transactions must be binding on all parties and legally enforceable in all relevant jurisdictions. Institutions must have conducted 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.
[Basel Framework, CRE 36.136]

342. The collateral arrangements must be properly documented, with a clear and robust procedure for the timely collection of collateral proceeds. Institutions' procedures should ensure that any legal conditions required for declaring the default of the customer and timely collection of collateral are observed. In the event of the obligor's financial distress or default, the institution should have legal authority to sell or assign the receivables to other parties without consent of the receivables' obligors. [Basel Framework, CRE 36.137]

Risk management

343. The institution must have a sound process for determining the credit risk in the receivables. Such a process should include, among other things, analyses of the borrower's business and industry (e.g. effects of the business cycle) and the types of customers with whom the borrower does business. Where the institution relies on the borrower to ascertain the credit risk of the customers, the institution must review the borrower's credit policy to ascertain its soundness and credibility. [Basel Framework, CRE 36.138]

344. The margin between the amount of the exposure and the value of the receivables must reflect all appropriate factors, including the cost of collection, concentration within the receivables pool pledged by an individual borrower, and potential concentration risk within the institution's total exposures. [Basel Framework, CRE 36.139]

345. The institution must maintain a continuous monitoring process that is appropriate for the specific exposures (either immediate or contingent) attributable to the collateral to be utilized as a risk mitigant. This process may include, as appropriate and relevant, ageing reports, control of trade documents, borrowing base certificates, frequent audits of collateral, confirmation of accounts, control of the proceeds of accounts paid, analyses of dilution (credits given by the borrower to the issuers) and regular financial analysis of both the borrower and the issuers of the receivables, especially in the case when a small number of large-sized receivables are taken as collateral. Observance of the institution's overall concentration limits should be monitored. Additionally, compliance with loan covenants, environmental restrictions, and other legal requirements should be reviewed on a regular basis. [Basel Framework, CRE 36.140]

346. The receivables pledged by a borrower should be diversified and not be unduly correlated with the borrower. Where the correlation is high, e.g. where some issuers of the receivables are reliant on the borrower for their viability or the borrower and the issuers belong to a common industry, the attendant risks should be taken into account in the setting of margins for the collateral pool as a whole. Receivables from affiliates of the borrower (including subsidiaries and employees) will not be recognized as risk mitigants. [Basel Framework, CRE 36.141]

347. The institution should have a documented process for collecting receivable payments in distressed situations. The requisite facilities for collection should be in place, even when the institution normally looks to the borrower for collections. [Basel Framework, CRE 36.142]

Requirements for recognition of other physical collateral

348. OSFI will allow for recognition of the credit risk mitigating effect of certain other physical collateral when the following conditions are met:

a. The institution demonstrates to the satisfaction of OSFI that there are liquid markets for disposal of collateral in an expeditious and economically efficient manner. Institutions must carry out a reassessment of this condition both periodically and when information indicates material changes in the market.

b. The institution demonstrates to the satisfaction of OSFI that there are well established, publicly available market prices for the collateral. Institutions must also demonstrate that the amount they receive when collateral is realized does not deviate significantly from these market prices. [Basel Framework, CRE 36.143]

349. In order for a given institution to receive recognition for additional physical collateral, it must meet all the standards in paragraphs 336 and 337, subject to the following modifications.

a. With the sole exception of permissible prior claims specified in footnote 38 in paragraph 336 , only first liens on, or charges over, collateral are permissible. As such, the institution must have priority over all other lenders to the realized proceeds of the collateral.

b. The loan agreement must include detailed descriptions of the collateral and the right to examine and revalue the collateral whenever this is deemed necessary by the lending institution.

c. The types of physical collateral accepted by the institution and policies and practices in respect of the appropriate amount of each type of collateral relative to the exposure amount must be clearly documented in internal credit policies and procedures and available for examination and/or audit review.

d. Institutions' credit policies with regard to the transaction structure must 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 must 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.

e. In cases of inventories (e.g. raw materials, work-in-process, finished goods, dealers' inventories of autos) and equipment, the periodic revaluation process must include physical inspection of the collateral.

[Basel Framework, CRE 36.144]

350. General Security Agreements, and other forms of floating charge, can provide the lending institution with a registered claim over a company's assets. In cases where the registered claim includes both assets that are not eligible as collateral under the foundation IRB and assets that are eligible as collateral under the foundation IRB, the institution may recognize the latter. Recognition is conditional on the claims meeting the operational requirements set out in paragraphs 333 to 349. [Basel Framework, CRE 36.145]

5.8.9 Requirements for recognition of leasing

351. Leases other than those that expose the institution to residual value risk (see paragraph 352) will be accorded the same treatment as exposures collateralized by the same type of collateral. The minimum requirements for the collateral type must be met (CRE/RRE or other collateral). In addition, the institution must also meet the following standards:

a. Robust risk management on the part of the lessor with respect to the location of the asset, the use to which it is put, its age, and planned obsolescence;

b. A robust legal framework establishing the lessor's legal ownership of the asset and its ability to exercise its rights as owner in a timely fashion; and

c. The difference between the rate of depreciation of the physical asset and the rate of amortization of the lease payments must not be so large as to overstate the CRM attributed to the leased assets. [Basel Framework, CRE 36.146]

352. Leases that expose the institution to residual value risk will be treated in the following manner. Residual value risk is the institution's exposure to potential loss due to the fair value of the equipment declining below its residual estimate at lease inception.

a. The discounted lease payment stream will receive a risk weight appropriate for the lessee's financial strength (PD) and supervisory or own-estimate of LGD, whichever is appropriate.

b. The residual value will be risk-weighted at 100%.

[Basel Framework, CRE 36.147]

5.8.10 Disclosure requirements

353. In order to be eligible for the IRB approach, institutions must meet the disclosure requirements set out in OSFI's Pillar 3 Disclosure Expectations.These are minimum requirements for use of IRB: failure to meet these will render institutions ineligible to use the relevant IRB approach. [Basel Framework, CRE 36.148]

Appendix 5-1 - Illustrative IRB Risk Weights

1. Table 1 provides illustrative risk weights calculated for four asset class types under the IRB approach to credit risk. Each set of risk weights for unexpected loss (UL) was produced using the appropriate risk-weight function of the risk-weight functions set out in this chapter. The inputs used to calculate the illustrative risk weights include measures of the PD, LGD, and an assumed effective maturity (M) of 2.5 years. [Basel Framework, CRE 99.2]

2. A firm-size adjustment applies to exposures made to small- and medium-sized entity (SME) borrowers (defined as corporate exposures where the reported sales for the consolidated group of which the firm is a part is less than $75 million). Accordingly, the firm size adjustment was made in determining the second set of risk weights provided in column two given that the turnover of the firm receiving the exposure is assumed to be $7.5 million. [Basel Framework, CRE 99.3]

Table 1: Illustrative IRB risk weights for UL

Asset class	Corporate Exposures		Residential Mortgages		All other regulatory Retail Exposures		Qualifying Revolving Retail Exposures	
LGD	40%	40%	45%	25%	45%	85%	50%	85%
Turnover ($ millions)	50	5						
Maturity	2.5 years	2.5 years						
PD:								
0.05%	15.32%	11.93%	6.23%	3.46%	6.63%	12.52%	1.68%	2.86%
0.10%	23.15%	18.08%	10.69%	5.94%	11.16%	21.08%	3.01%	5.12%
0.25%	38.71%	30.33%	21.30%	11.83%	21.15%	39.96%	6.40%	10.88%
0.40%	49.10%	38.47%	29.94%	16.64%	28.42%	53.69%	9.34%	15.88%
0.50%	54.94%	42.65%	35.08%	19.49%	32.36%	61.13%	11.16%	18.97%
0.75%	64.74%	50.46%	46.46%	25.81%	40.10%	75.74%	15.33%	26.06%
1.00%	72.09%	55.88%	56.40%	31.33%	45.77%	86.46%	19.14%	32.53%
1.30%	78.66%	60.52%	67.00%	37.22%	50.80%	95.95%	23.35%	39.70%
1.50%	82.15%	62.88%	73.45%	40.80%	53.37%	100.81%	25.99%	44.19%
2.00%	89.01%	67.26%	87.94%	48.85%	57.99%	109.53%	32.14%	54.63%
2.50%	94.34%	70.42%	100.64%	55.91%	60.90%	115.03%	37.75%	64.18%
3.00%	98.91%	73.03%	111.99%	62.22%	62.79%	118.61%	42.96%	73.03%
4.00%	107.07%	77.75%	131.63%	73.13%	65.01%	122.80%	52.40%	89.08%
5.00%	114.78%	82.52%	148.22%	82.35%	66.42%	125.45%	60.83%	103.41%
6.00%	122.28%	87.51%	165.52%	90.29%	67.73%	127.94%	68.45%	116.37%
10.00%	149.15%	107.64%	204.41%	113.56%	75.54%	142.69%	93.21%	158.47%
15.00%	173.21%	127.86%	235.72%	130.96%	88.60%	167.36%	115.43%	196.23%
20.00%	188.17%	141.69%	253.12%	140.62%	100.28%	189.41%	131.09%	222.86%

Appendix 5-2 - Supervisory Slotting Criteria for Specialized Lending

[Basel Framework, CRE 33.13-33.16]

Table 1a ─ Financial strength ─ Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
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), loan life coverage ratio (LLCR), project life coverage ratio (PLCR), and debt-to-equity ratio)*	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
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

Table 1b – Financial structure – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
Duration of the credit compared to the duration of the project	Useful life of the project significantly exceeds tenor of the loan	Useful life of the project exceeds tenor of the loan	Useful life of the project exceeds tenor of the loan	Useful life of the project may not exceed tenor of the loan
Amortization schedule	Amortizing debt	Amortizing debt	Amortizing debt repayments with limited bullet payment	Bullet repayment or amortizing debt repayments with high bullet repayment

Table 1c – Political and legal environment – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
Political risk, including transfer risk, considering project type and mitigants	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
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, collateral and security	Contracts, collateral and security are enforceable	Contracts, collateral and security are enforceable	Contracts, collateral and security are considered enforceable even if certain non-key issues may exist	There are unresolved key issues in respect if actual enforcement of contracts, collateral and security

Table 1d – Transaction characteristics – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
Design and technology risk	Fully proven technology and design	Fully proven technology and design	Proven technology and design – start-up issues are mitigated by a strong completion package	Unproven technology and design; technology issues exist and/or complex design

Table 1e – Construction risk – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
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 EPC (engineering and procurement contract)	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 excellent financial standing	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
Track record and financial strength of contractor in constructing similar projects.	Strong	Good	Satisfactory	Weak

Table 1f – Operating risk – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
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

Table 1g – Off-take risk – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
(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 exceeds the maturity of the debt	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 generally matches the maturity of the debt	Weak off-taker; weak termination clauses; tenor of contract does not exceed 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 organized market

Table 1h – Supply risk – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
Price, volume and transportation risk of feed-stocks; 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

Table 1i – Strength of Sponsor – Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
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

Table 1j – Security Package – Supervisory Rating Grades for Project Finance Exposures

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

Table 2a ─ Financial strength ─ Supervisory Rating Grades for Income-Producing Real Estate Exposures and High-Volatility Commercial Real Estate Exposures

	Strong	Good	Satisfactory	Weak
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 debt service coverage ratio (DSCR) is considered strong (DSCR is not relevant for the construction phase) and its loan to value ratio (LTV) 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 LTV 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 LTV	The property's DSCR has deteriorated significantly and its LTV is well above underwriting standards for new loans
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

Table 2b – Cash-flow predictability – Supervisory Rating Grades for Income-Producing Real Estate Exposures and High-Volatility Commercial Real Estate Exposures

	Strong	Good	Satisfactory	Weak
(a) For complete and stabilized 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 not stabilized property	Leasing activity meets or exceeds projections. The project should achieve stabilization in the near future	Leasing activity meets or exceeds projections. The project should achieve stabilization in the near future	Most leasing activity is within projections; however, stabilization will not occur for some time	Market rents do not meet expectations. Despite achieving target occupancy rate, cash flow coverage is tight due to disappointing revenue
(c) For construction phase	The property is entirely pre-leased through the tenor of the loan or pre-sold to an investment grade tenant or buyer, or the institution has a binding commitment for take-out financing from an investment grade lender	The property is entirely pre-leased or pre-sold to a creditworthy tenant or buyer, or the institution has a binding commitment for permanent financing from a creditworthy lender	Leasing activity is within projections but the building may not be pre-leased and there may not exist a take-out financing. The institution may be the permanent lender	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

Table 2c – Asset characteristics – Supervisory Rating Grades for Income-Producing Real Estate Exposures and High-Volatility Commercial Real Estate Exposures

	Strong	Good	Satisfactory	Weak
Location	Property is located in highly desirable location that is convenient to services that tenants desire	Property is located in 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 competitive with new properties	Property is adequate in terms of its configuration, design and maintenance	Weaknesses exist in the property's configuration, design or maintenance
Property is under construction	Construction budget is conservative and technical hazards are limited. Contractors are highly qualified	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

Table 2d – Strength of Sponsor/ Developer – Supervisory Rating Grades for Income-Producing Real Estate Exposures and High-Volatility Commercial Real Estate Exposures

	Strong	Good	Satisfactory	Weak
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 similar properties.	Experienced management and high sponsors' quality. Strong reputation and lengthy and successful record with similar properties	Appropriate management and sponsors' quality. The sponsor or management has a successful record with similar properties	Moderate management and sponsors' quality. Management or sponsor track record does not raise serious concerns	Ineffective management and substandard sponsors' quality. Management and sponsor difficulties have contributed to 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

Table 2e – Security Package – Supervisory Rating Grades for Income-Producing Real Estate Exposures and High-Volatility Commercial Real Estate Exposures

	Strong	Good	Satisfactory	Weak
Nature of lien	Perfected first lien[39]	Perfected first lien	Perfected first lien	Ability of lender to foreclose is constrained
Assignment of rents (for projects leased to long-term tenants)	The lender has obtained an assignment. They maintain current tenant information that would facilitate providing notice to remit rents directly to the lender, such as a current rent roll and copies of the project's leases	The lender has obtained an assignment. They maintain current tenant information that would facilitate providing notice to the tenants to remit rents directly to the lender, such as current rent roll and copies of the project's leases	The lender has obtained an assignment. They maintain current tenant information that would facilitate providing notice to the tenants to remit rents directly to the lender, such as current rent roll and copies of the project's leases	The lender 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	Appropriate	Appropriate	Substandard

[39] Lenders in some markets extensively use loan structures that include junior liens. Junior liens may be indicative of this level of risk if the total LTV inclusive of all senior positions does not exceed a typical first loan LTV.

Table 3a ─ Financial strength ─ Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
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 (debt service coverage ratio and loan-to-value ratio)	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. Loan 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 loan 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

Table 3b – Political and legal environment – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
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 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

Table 3c – Transaction characteristics – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
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 with potentially grace periods	Repayment in fine or high balloon

Table 3d – Operating risk – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
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 O&M contracts	Strong long-term O&M contract, preferably with contractual performance incentives, and/or O&M reserve accounts (if needed)	Long-term O&M contract, and/or O&M reserve accounts (if needed)	Limited O&M contract or O&M reserve account (if needed)	No O&M contract: risk of high operational cost overruns beyond mitigants
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

Table 3e – Asset characteristics – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
Configuration, size, design and maintenance (i.e. 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

Table 3f – Strength of sponsor – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
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

Table 3g – Security Package – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
Asset control	Legal documentation provides the lender 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 lender effective control (e.g. a perfected security interest, or a leasing structure including such security) on the asset, or on the company owning it	Legal documentation provides the lender 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 lender and leaves room to some risk of losing control on the asset
Rights and means at the lender's disposal to monitor the location and condition of the asset	The lender is able to monitor the location and condition of the asset, at any time and place (regular reports, possibility to lead inspections)	The lender is able to monitor the location and condition of the asset, almost at any time and place	The lender is able to monitor the location and condition of the asset, almost at any time and place	The lender 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

Table 4a ─ Financial strength ─ Supervisory Rating Grades for Commodities Finance Exposures

	Strong	Good	Satisfactory	Weak
Degree of over-collateralization of trade	Strong	Good	Satisfactory	Weak

Table 4b – Political and legal environment – Supervisory Rating Grades for Commodities Finance Exposures

	Strong	Good	Satisfactory	Weak
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: Strong offshore mechanisms Strategic commodity 1st class buyer	Strong mitigation: Offshore mechanisms Strategic commodity Strong buyer	Acceptable mitigation: Offshore mechanisms Less strategic commodity Acceptable buyer	Only partial mitigation: No offshore mechanisms Non-strategic commodity Weak buyer

Table 4c – Asset characteristics – Supervisory Rating Grades for Commodities Finance Exposures

	Strong	Good	Satisfactory	Weak
Liquidity and susceptibility to damage	Commodity is quoted and can be hedged through futures or OTC instruments. Commodity is not susceptible to damage	Commodity is quoted and can be hedged through OTC instruments. Commodity is not susceptible to damage	Commodity is not quoted but is liquid. There is uncertainty about the possibility of hedging. Commodity is not susceptible to damage	Commodity is not quoted. Liquidity is limited given the size and depth of the market. No appropriate hedging instruments. Commodity is susceptible to damage

Table 4d – Strength of sponsor – Supervisory Rating Grades for Commodities Finance Exposures

	Strong	Good	Satisfactory	Weak
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

Table 4e – Security package – Supervisory Rating Grades for Commodities Finance Exposures

	Strong	Good	Satisfactory	Weak
Asset control	First perfected security interest provides the lender legal control of the assets at any time if needed	First perfected security interest provides the lender 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 lender. 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 jeopardized
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 5-3 – Teranet metropolitan area house price indices to be used in the calculation of the DLGD floor

1. The Teranet index values are available on a monthly basis for the following 32 census metropolitan areas, the 11 cities of the Ternet Composite 11 index have been **bolded***:

British Columbia

- Abbotsford-Mission
- Kelowna
- **Vancouver***
- **Victoria***

Alberta

- **Calgary***
- **Edmonton***
- Lethbridge

Manitoba

- **Winnipeg***

Ontario

- Barrie
- Belleville
- Brantford
- Guelph
- **Hamilton***
- Kingston
- Kitchener-Cambridge-Waterloo
- London
- Oshawa
- **Ottawa-Gatineau***
- Peterborough
- St. Catherines-Niagara
- Sudbury
- Thunder Bay
- **Toronto***
- Windsor

Quebec

- **Montreal***
- **Quebec City***
- Sherbrooke
- Trois-Rivieres

Maritimes

- Moncton
- Saint John
- St. John's
- **Halifax***