Guideline

Subject: Capital Adequacy Requirements (CAR)

Chapter 6 – Credit Risk – Internal Ratings Based Approach

Effective Date: November 2018 / January 2019[1]

The Capital Adequacy Requirements (CAR) for banks (including federal credit unions), bank holding companies, federally regulated trust companies, federally regulated loan companies and cooperative retail associations are set out in nine chapters, each of which has been issued as a separate document. This document, Chapter 6 – Credit Risk – Internal Ratings Based Approach, should be read in conjunction with the other CAR chapters which include:

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

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

[1] For institutions with a fiscal year ending October 31 or December 31, respectively

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Chapter 6 - Credit Risk – Internal Ratings Based Approach

1. This chapter is drawn from the Basel Committee on Banking Supervision (BCBS) Basel II and Basel III frameworks, *International Convergence of Capital Measurement and Capital Standards-June 2006* and *Basel III: A global regulatory framework for more resilient banks and banking systems – December 2010 (rev June 2011)*. For reference, the Basel II text paragraph numbers that are associated with the text appearing in this chapter are indicated in square brackets at the end of each paragraph[2].

6.1. Overview

2. This section of the guideline describes the IRB approach to credit risk. Subject to certain minimum conditions and disclosure requirements, banks that have received supervisory 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, banks may be required to use a supervisory value as opposed to an internal estimate for one or more of the risk components. [BCBS June 2006 par 211]

3. The IRB approach is based on measures of unexpected losses (UL) and expected losses (EL). The risk-weight functions produce capital requirements for the UL portion. Expected losses are treated separately, as outlined in Chapter 2 – Definition of capital section 2.1.3.7 and section 6.7. [BCBS June 2006 par 212]

4. In this section, the asset classes are defined first. Adoption of the IRB approach across all asset classes is also discussed early in this section, as are transitional arrangements. The risk components, each of which is defined later in this section, serve as inputs to the risk-weight functions that have been developed for separate asset classes. For example, there is a risk-weight function for corporate exposures and another one for qualifying revolving retail exposures. The treatment of each asset class begins with a presentation of the relevant risk-weight function(s) followed by the risk components and other relevant factors, such as the treatment of credit risk mitigants. The legal certainty standards for recognising CRM as set out in chapter 5 apply for both the foundation and advanced IRB approaches. The minimum requirements that banks must satisfy to use the IRB approach are presented at the end of this chapter starting at Section 6.8. [BCBS June 2006 par 213]

6.2. Mechanics of the IRB approach

5. In this section, the risk components (e.g. PD and LGD) and asset classes (e.g. corporate exposures and retail exposures) of the IRB approach are defined. Section 6.2.2 provides a description of the risk components to be used by banks by asset class. Sections 6.2.3. and 6.2.4. discuss a bank's adoption of the IRB approach and transitional arrangements, respectively. In cases where an IRB treatment is not specified, the risk weight for those other exposures is 100%, except

[2] Following the format: [BCBS June 2011 par x]

when a 0% risk weight applies under the standardised approach and the resulting risk-weighted assets are assumed to represent UL only. [BCBS June 2006 par 214]

OSFI Notes

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 per this chapter and the exposure to the counterparty of the repo-style transaction per Chapter 5 – Credit Risk Mitigation.

6.2.1 Categorisation of exposures

7. Under the IRB approach, banks must categorise banking-book exposures into broad classes of assets with different underlying risk characteristics, subject to the definitions set out below. The classes of assets are (a) corporate, (b) sovereign, (c) bank, (d) retail, and (e) equity. Within the corporate asset class, five sub-classes of specialised 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. [BCBS June 2006 par 215]

8. The classification of exposures in this way is broadly consistent with established bank practice. However, some banks may use different definitions in their internal risk management and measurement systems. While it is not the intention of the Committee to require banks to change the way in which they manage their business and risks, banks are required to apply the appropriate treatment to each exposure for the purposes of deriving their minimum capital requirement. Banks must demonstrate to supervisors that their methodology for assigning exposures to different classes is appropriate and consistent over time. [BCBS June 2006 par 216]

9. For a discussion of the IRB treatment of securitisation exposures, see chapter 7 – Securitization. [BCBS June 2006 par 217]

(i) Definition of corporate exposures

10. In general, a corporate exposure is defined as a debt obligation of a corporation, partnership, or proprietorship. Banks are permitted to distinguish separately exposures to small- and medium-sized entities (SME), as defined in paragraph 82. [BCBS June 2006 par 218]

OSFI Notes

11. Corporate exposures include debt obligations and obligations under derivatives contracts of corporations, partnerships, limited liability companies, proprietorships and special purpose entities (including those created specifically to finance and /or operate physical assets).

12. Loans to or derivative contracts with a pension fund, mutual fund, or similar counterparty are treated as corporate exposures unless the institution is able to use a look through approach. Pension/mutual/hedge funds and income trust contracts are also treated as corporate exposures.

13. Within the corporate asset class, five sub-classes of specialised lending (SL) are identified. Such lending possesses all the following characteristics, either in legal form or economic substance:

- The exposure is typically to an entity (often a special purpose entity (SPE)) which was created specifically to finance and/or operate physical assets;
- 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;
- The terms of the obligation give the lender a substantial degree of control over the asset(s) and the income that it generates; and
- 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.

[BCBS June 2006 par 219]

14. The five sub-classes of specialised lending are project finance, object finance, commodities finance, income-producing real estate, and high-volatility commercial real estate. Each of these sub-classes is defined below. [BCBS June 2006 par 220]

Project finance

15. Project finance (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. [BCBS June 2006 par 221]

16. 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. [BCBS June 2006 par 222]

Object finance

17. Object finance (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 collateralised corporate exposure. [BCBS June 2006 par 223]

Commodities finance

18. Commodities finance (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. [BCBS June 2006 par 224]

19. The Committee believes that such lending can be distinguished from exposures financing the reserves, inventories, or receivables of other more diversified corporate borrowers. Banks 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. [BCBS June 2006 par 225]

Income-producing real estate

20. Income-producing real estate (IPRE) 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 collateralised 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. [BCBS June 2006 par 226]

High-volatility commercial real estate

21. High-volatility commercial real estate (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:

- Commercial real estate exposures secured by properties of types that are categorised by the national supervisor as sharing higher volatilities in portfolio default rates;

- Loans financing any of the land acquisition, development and construction (ADC) phases for properties of those types in such jurisdictions; and
- Loans financing ADC of any other 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. Commercial ADC loans exempted from 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 89.

[BCBS June 2006 par 227]

OSFI Notes

22. Loans financing the construction of pre-sold one- to four-family residential properties are excluded from the ADC category.

23. Where supervisors categorise certain types of commercial real estate exposures as HVCRE in their jurisdictions, they are required to make public such determinations. Other supervisors need to ensure that such treatment is then applied equally to banks under their supervision when making such HVCRE loans in that jurisdiction. [BCBS June 2006 par 228]

OSFI Notes

24. No specific Canadian property types fall into the HVCRE category. Thus, the optional risk weight choices in paragraphs 94, 96 and 99 do not apply in Canada.

25. The HVCRE risk weights apply to Canadian institution foreign operations' loans on properties in jurisdictions where the national supervisor has designated specific property types as HVCRE.

(ii) Definition of sovereign exposures

26. This asset class covers all exposures to counterparties treated as sovereigns under the standardised approach. This includes sovereigns (and their central banks), certain PSEs identified as sovereigns in the standardised approach, MDBs that meet the criteria for a 0% risk weight under the standardised approach, and the entities referred to in Chapter 3 – Credit Risk – Standardized Approach, section 3.1.4.
[BCBS June 2006 par 229]

OSFI Notes

27. To maintain some consistency between the treatment of high quality sovereign exposures in the Standardized and IRB Approaches, the same definition of sovereign applies. Claims on or directly guaranteed by the Government of Canada, the Bank of Canada, a Canadian province, a Canadian territorial government, foreign central governments, foreign central banks and qualifying Multilateral Development Banks are not subject to the 0.03% floor on PDs estimated by an institution.

(iii) Definition of bank exposures

28. This asset class covers exposures to banks and those securities firms outlined in Chapter 3 – Credit Risk – Standardized approach, section 3.1.6. Bank exposures also include claims on domestic PSEs that are treated like claims on banks under the standardised approach, and MDBs that do not meet the criteria for a 0% risk weight under the standardised approach. [BCBS June 2006 par 230]

(iv) Definition of retail exposures

29. An exposure is categorised as a retail exposure if it meets all of the following criteria:

Nature of borrower or low value of individual exposures

- 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 generally eligible for retail treatment regardless of exposure size, although supervisors may wish to establish exposure thresholds to distinguish between retail and corporate exposures.

  OSFI Notes

  No exposure thresholds will be established to distinguish between retail and corporate exposures.

- Residential mortgage loans (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 the credit is extended to an individual that is an owner-occupier of the property (with the understanding that supervisors exercise reasonable flexibility regarding buildings containing only a few rental units ─ otherwise they are treated as corporate). Loans secured by a single or small number of condominium or co-operative residential housing units in a single building or complex also fall within the scope of the residential mortgage category. National supervisors may set limits on the maximum number of housing units per exposure.
- 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 CAD $1.25 million. Small business loans extended through or guaranteed by an individual are subject to the same exposure threshold.

- It is expected that supervisors provide flexibility in the practical application of such thresholds such that banks are not forced to develop extensive new information systems simply for the purpose of ensuring perfect compliance. It is, however, important for supervisors to ensure that such flexibility (and the implied acceptance of exposure amounts in excess of the thresholds that are not treated as violations) is not being abused.

[BCBS June 2006 par 231]

OSFI Notes

30. Residential mortgage exposures are limited to one- to four-unit residences as set out in Chapter 3 – Credit Risk – Standardized Approach, section 3.1.9.

Large number of exposures

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

- Small business exposures below CAD $1.25 million may be treated as retail exposures if the bank treats such exposures in its internal risk management systems consistently over time and in the same manner as other retail exposures. This requires that such an exposure be originated in a similar manner to other 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 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 retail exposure.

[BCBS June 2006 par 232]

32. Within the retail asset class category, banks are required to identify separately three sub-classes of exposures: (a) exposures secured by residential properties as defined above, (b) qualifying revolving retail exposures, as defined in the following paragraph, and (c) all other retail exposures. [BCBS June 2006 par 233]

(v) Definition of qualifying revolving retail exposures

33. 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 bank's segmentation of its retail activities generally. 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 bank.

(b) The exposures are to individuals.

(c) The maximum exposure to a single individual in the sub-portfolio is CAD $125000 or less.

(d) Because the asset correlation assumptions for the QRRE risk-weight function are markedly below those for the other retail risk-weight function at low PD values, banks 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. Supervisors will review the relative volatility of loss rates across the QRRE subportfolios, as well as the aggregate QRRE portfolio, and intend to share information on the typical characteristics of QRRE loss rates across jurisdictions.

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

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

[BCBS June 2006 par 234]

OSFI Notes

34. If credit cards are managed separately from lines of credit (LOC), then credit cards and LOCs may be considered as separate sub-portfolios.

(vi) Definition of equity exposures

35. In general, equity exposures are defined on the basis of the economic substance of the instrument. They include both direct and indirect ownership interests,[3] whether voting or non-voting, in the assets and income of a commercial enterprise or of a financial institution that is not consolidated or deducted pursuant to Chapter 1 – Overview, section 1.1. An instrument is considered to be an equity exposure if it meets all of the following requirements:

- It is irredeemable in the sense that the return of invested funds can be achieved only by the sale of the investment or sale of the rights to the investment or by the liquidation of the issuer;
- It does not embody an obligation on the part of the issuer; and
- It conveys a residual claim on the assets or income of the issuer.

[BCBS June 2006 par 235]

36. Additionally any of the following instruments must be categorised as an equity exposure:

- An instrument with the same structure as those permitted as Tier 1 capital for banking organisations.
- An instrument that embodies an obligation on the part of the issuer and meets any of the following conditions:

  (1) The issuer may defer indefinitely the settlement of the obligation;

[3] Indirect equity interests include holdings of derivative instruments tied to equity interests, and holdings in corporations, partnerships, limited liability companies or other types of enterprises that issue ownership interests and are engaged principally in the business of investing in equity instruments.

(2) The obligation requires (or permits at the issuer's discretion) settlement by issuance of a fixed number of the issuer's equity shares;

(3) The obligation requires (or permits at the issuer's discretion) settlement by issuance of a variable number of the issuer's equity shares and (ceteris paribus) any change in the value of the obligation is attributable to, comparable to, and in the same direction as, the change in the value of a fixed number of the issuer's equity shares;[4] or,

(4) The holder has the option to require that the obligation be settled in equity shares, unless either (i) in the case of a traded instrument, the supervisor is content that the bank has demonstrated that the instrument trades more like the debt of the issuer than like its equity, or (ii) in the case of non-traded instruments, the supervisor is content that the bank has demonstrated that the instrument should be treated as a debt position. In cases (i) and (ii), the bank may decompose the risks for regulatory purposes, with the consent of the supervisor.

[BCBS June 2006 par 236]

37. Debt obligations and other securities, partnerships, derivatives or other vehicles structured with the intent of conveying the economic substance of equity ownership are considered an equity holding.[5] This includes liabilities from which the return is linked to that of equities.[6] Conversely, equity investments that are structured with the intent of conveying the economic substance of debt holdings or securitisation exposures would not be considered an equity holding. [BCBS June 2006 par 237]

OSFI Notes

38. Mezzanine issues

- without warrants to convert into common shares are treated as debt
- with warrants to convert into common shares – the warrant* is treated as equity and the loan agreement is treated as debt

39. Preferred shares

- convertible preferreds with or without a redeemable feature are treated as equity

[4] For certain obligations that require or permit settlement by issuance of a variable number of the issuer's equity shares, the change in the monetary value of the obligation is equal to the change in the fair value of a fixed number of equity shares multiplied by a specified factor. Those obligations meet the conditions of item 3 if both the factor and the referenced number of shares are fixed. For example, an issuer may be required to settle an obligation by issuing shares with a value equal to three times the appreciation in the fair value of 1,000 equity shares. That obligation is considered to be the same as an obligation that requires settlement by issuance of shares equal to the appreciation in the fair value of 3,000 equity shares.

[5] Equities that are recorded as a loan but arise from a debt/equity swap made as part of the orderly realisation or restructuring of the debt are included in the definition of equity holdings. However, these instruments may not attract a lower capital charge than would apply if the holdings remained in the debt portfolio.

[6] Supervisors may decide not to require that such liabilities be included where they are directly hedged by an equity holding, such that the net position does not involve material risk.

- perpetual preferreds with a redeemable option that the holder may exercise at any time are treated as debt.
- term preferreds are treated as debt

*These should be detachable and separate from the loan agreement, and can be valued, i.e. there is a valuation mechanism.

40. Footnote 6: Where an IRB approach is required, equity-linked GIC business and related hedging should be scoped into an IRB capital charge.

41. The national supervisor has the discretion to re-characterise debt holdings as equities for regulatory purposes and to otherwise ensure the proper treatment of holdings under Pillar 2. [BCBS June 2006 par 238]

OSFI Notes

42. On a case-by-case basis, OSFI will use its discretion to re-characterize debt holdings as equity exposures or equity holdings as debt for regulatory capital purposes.

(vii) Definition of eligible purchased receivables

43. Eligible purchased receivables are divided into retail and corporate receivables as defined below. [BCBS June 2006 par 239]

Retail receivables

44. Purchased retail receivables, provided the purchasing bank complies with the IRB rules for retail exposures, are eligible for the top-down approach as permitted within the existing standards for retail exposures. The bank must also apply the minimum operational requirements as set forth in sections 6.6 and 6.8. [BCBS June 2006 par 240]

Corporate receivables

45. In general, for purchased corporate receivables, banks are expected to assess the default risk of individual obligors as specified in section 6.3.1 consistent with the treatment of other corporate exposures. However, the top-down approach may be used, provided that the purchasing bank's programme for corporate receivables complies with both the criteria for eligible receivables and the minimum operational requirements of this approach. The use of the top-down purchased receivables treatment is limited to situations where it would be an undue burden on a bank 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 securitisation structures, but banks may also use this approach, with the approval of national supervisors, for appropriate on-balance sheet exposures that share the same features. [BCBS June 2006 par 241]

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

- The receivables are purchased from unrelated, third party sellers, and as such the bank has not originated the receivables either directly or indirectly.
- 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])
- The purchasing bank has a claim on all proceeds from the pool of receivables or a *pro-rata* interest in the proceeds.[8]
- National supervisors must also establish concentration limits above which capital charges must be calculated using the minimum requirements for the bottom-up approach for corporate exposures. Such concentration limits may refer to one or a combination of the following measures: the size of one individual exposure relative to the total pool, the size of the pool of receivables as a percentage of regulatory capital, or the maximum size of an individual exposure in the pool.

[BCBS June 2006 par 242]

OSFI Notes

47. If any single receivable or group of receivables guaranteed by the same seller represents more than 3.5% of the pool of receivables, capital charges must be calculated using the minimum requirements for the bottom-up approach for corporate exposures.

48. The existence of full or partial recourse to the seller does not automatically disqualify a bank 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 182 to 185 for purchased receivables and the bank meets the eligibility criteria and operational requirements. [BCBS June 2006 par 243]

(viii) Definition of a Commitment

49. Commitments are arrangements that obligate an institution, at a client's request, to:

- Extend credit in the form of loans or participations in loans, lease financing receivables, mortgages (including the undrawn portion of HELOCs), overdrafts, acceptances, letters of credit, guarantees or loan substitutes, or;
- Purchase loans, securities, or other assets.

[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 securitisation treatment.

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.

Normally, commitments involve a written contract or agreement and some form of consideration, such as a commitment fee.

6.2.2 Foundation and advanced approaches

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

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

[BCBS June 2006 par 244]

51. For many of the asset classes, the Committee has made available two broad approaches: a foundation and an advanced. Under the foundation approach, as a general rule, banks provide their own estimates of PD and rely on supervisory estimates for other risk components. Under the advanced approach, banks provide more of 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, banks must always use the risk-weight functions provided in this Framework for the purpose of deriving capital requirements. The full suite of approaches is described below. [BCBS June 2006 par 245]

(i) Corporate, sovereign, and bank exposures

52. Under the foundation approach, banks must provide their own estimates of PD associated with each of their borrower grades, but must use supervisory estimates for the other relevant risk components. The other risk components are LGD, EAD and M.[9] [BCBS June 2006 par 246]

53. Under the advanced approach, banks must calculate the effective maturity (M)[10] and provide their own estimates of PD, LGD and EAD. [BCBS June 2006 par 247]

54. There is an exception to this general rule for the five sub-classes of assets identified as SL. [BCBS June 2006 par 248]

[9] As noted in paragraph 117 to 118, some supervisors may require banks using the foundation approach to calculate M using the definition provided in paragraphs 121 to 126.

[10] At the discretion of the national supervisor, certain domestic exposures may be exempt from the calculation of M (see paragraph 119 to 120).

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

55. Banks that do not meet the requirements for the estimation of PD under the corporate foundation approach for their SL assets are required to map their internal risk grades to five supervisory categories, each of which is associated with a specific risk weight. This version is termed the 'supervisory slotting criteria approach'. [BCBS June 2006 par 249]

56. Banks 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. At national discretion, banks meeting the requirements for HVCRE exposure are 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 99.
[BCBS June 2006 par 250]

57. Banks that meet the requirements for the estimation of PD, LGD and EAD are able to use the advanced approach to corporate exposures to derive risk weights for all classes of SL exposures except HVCRE. At national discretion, banks meeting these requirements for HVCRE exposure are able 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 99.
[BCBS June 2006 par 251]

(ii) Retail exposures

58. For retail exposures, banks must provide their own estimates of PD, LGD and EAD. There is no distinction between a foundation and advanced approach for this asset class.
[BCBS June 2006 par 252]

(iii) Equity exposures

59. There are two broad approaches to calculate risk-weighted assets for equity exposures not held in the trading book: a market-based approach and a PD/LGD approach. These are set out in full in paragraphs 147 to 178. [BCBS June 2006 par 253]

60. The PD/LGD approach to equity exposures remains available for banks that adopt the advanced approach for other exposure types. [BCBS June 2006 par 254]

(iv) Eligible purchased receivables

61. The treatment potentially straddles two asset classes. For eligible corporate receivables, both a foundation and advanced approach are available subject to certain operational requirements being met. For eligible retail receivables, as with the retail asset class, there is no distinction between a foundation and advanced approach. [BCBS June 2006 par 255]

6.2.3 Adoption of the IRB approach across asset classes

62. Once a bank adopts an IRB approach for part of its holdings, it is expected to extend it across the entire banking group, with the exception of the banking group's exposures to CCPs

treated in Chapter 4, Section 4.1.9. The Committee recognises however, that, for many banks, 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 banks can meet the standards for the use of own estimates of LGD and EAD for some but not all of their asset classes/business units at the same time. [BCBS June 2006 par 256]

63. As such, supervisors may allow banks to adopt a phased rollout of the IRB approach across the banking group. The phased rollout includes (i) adoption of IRB across asset classes within the same business unit (or in the case of retail exposures across individual sub-classes); (ii) adoption of IRB across business units in the same banking group; and (iii) move from the foundation approach to the advanced approach for certain risk components. However, when a bank 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. [BCBS June 2006 par 257]

64. A bank must produce an implementation plan, specifying to what extent and when it intends to roll out IRB approaches across significant asset classes (or sub-classes in the case of retail) and business units over time. The plan should be exacting, yet realistic, and must be agreed with the supervisor. It should be driven by the practicality and feasibility of moving to the more advanced approaches, and not motivated by a desire to adopt a Pillar 1 approach that minimises its capital charge. During the roll-out period, supervisors 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 standardised approach, foundation and advanced IRB approaches. This includes, but is not limited to, asset sales or cross guarantees. [BCBS June 2006 par 258]

65. Some exposures in non-significant business units as well as asset classes (or sub-classes in the case of retail) that are immaterial in terms of size and perceived risk profile may be exempt from the requirements in the previous two paragraphs, subject to supervisory approval. Capital requirements for such operations will be determined according to the standardised approach, with the national supervisor determining whether a bank should hold more capital under Pillar 2 for such positions. [BCBS June 2006 par 259]

66. Notwithstanding the above, once a bank has adopted the IRB approach for all or part of any of the corporate, bank, sovereign, or retail asset classes, it will be required to adopt the IRB approach for its equity exposures at the same time, subject to materiality. Supervisors may require a bank to employ one of the IRB equity approaches if its equity exposures are a significant part of the bank's business, even though the bank may not employ an IRB approach in other business lines. Further, once a bank has adopted the general IRB approach for corporate exposures, it will be required to adopt the IRB approach for the SL sub-classes within the corporate exposure class. [BCBS June 2006 par 260]

67. Banks adopting an IRB approach are expected to continue to employ an IRB approach. A voluntary return to the standardised or foundation approach is permitted only in extraordinary circumstances, such as divestiture of a large fraction of the bank's credit-related business, and must be approved by the supervisor. [BCBS June 2006 par 261]

68. Given the data limitations associated with SL exposures, a bank 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 other sub-classes within the corporate asset class. However, a bank should not move to the advanced approach for the HVCRE sub-class without also doing so for material IPRE exposures at the same time.

[BCBS June 2006 par 262]

69. Irrespective of the materiality, exposures to CCPs arising from OTC derivatives, exchange traded derivatives transactions and SFTs must be treated according to the dedicated treatment laid down in Chapter 4, Section 4.1.9. When assessing the materiality for the purposes of paragraph 68, the IRB coverage measure used must not be affected by the bank's amount of exposures to CCPs treated in Chapter 4, Section 4.1.9 – i.e. such exposures must be excluded from both the numerator and the denominator of the IRB coverage ratio used.

6.2.4 Transition arrangements

(i) Parallel calculation

70. Banks adopting the foundation or advanced approaches are required to calculate their capital requirement using these approaches, as well as the standardized approach as set out in Chapter 1 – Overview, section 1.9. Banks moving directly from the standardized to the advanced approaches to credit and/or operational risk will be subject to parallel calculations or impact studies in the years leading up to their adoption of the advanced approaches. [BCBS June 2006 par 263]

(ii) Corporate, sovereign, bank, and retail exposures

71. The transition period starts on the date of implementation of this Framework and will last for 3 years from that date. [BCBS June 2006 par 264]

72. Under these transitional arrangements banks are required to have a minimum of two years of data at the implementation of this Framework. This requirement will increase by one year for each of three years of transition. [BCBS June 2006 par 265]

73. Owing to the potential for very long-run cycles in house prices which short-term data may not adequately capture, during this transition period, LGDs for retail exposures secured by residential properties cannot be set below 10% for any sub-segment of exposures to which the formula in paragraph 130 is applied.[11] During the transition period the Committee will review the potential need for continuation of this floor. [BCBS June 2006 par 266]

[11] The 10% LGD floor shall not apply, however, to sub-segments that are subject to/benefit from sovereign guarantees. Further, the existence of the floor does not imply any waiver of the requirements of LGD estimation as laid out in the minimum requirements starting with paragraph 294.

OSFI Notes

74. Footnote 11: The 10% floor on LGD for residential mortgages applies to any portion of a residential mortgage that is not guaranteed or otherwise insured by the Government of Canada. Residential mortgage exposures that are insured by a private mortgage insurer having a Government of Canada backstop guarantee may be separated into a sovereign-guaranteed mortgage exposure and a corporate-guaranteed mortgage exposure, as described in Chapter 3 – Credit Risk – Standardized Approach, section 3.1.9.

(iii) Equity exposures

75. For a maximum of ten years, supervisors may exempt from the IRB treatment particular equity investments held at the time of the publication of this Framework.[12] The exempted position is measured as the number of shares as of that date and any additional arising directly as a result of owning those holdings, as long as they do not increase the proportional share of ownership in a portfolio company. [BCBS June 2006 par 267]

OSFI Notes

76. Equity investments held as of July 1, 2004, are exempt from the AIRB equity capital charge for a period of ten years commencing Q4 2007 and ending in Q4 2017. During this time, these holdings are risk weighted at 100%. This exemption also applies to commitments to invest in private equity funds that were entered into before July 1, 2004 and that remain undrawn.

77. If an acquisition increases the proportional share of ownership in a specific holding (e.g. due to a change of ownership initiated by the investing company subsequent to the publication of this Framework) the exceeding part of the holding is not subject to the exemption. Nor will the exemption apply to holdings that were originally subject to the exemption, but have been sold and then bought back. [BCBS June 2006 par 268]

78. Equity holdings covered by these transitional provisions will be subject to the capital requirements of the standardised approach. [BCBS June 2006 par 269]

6.3. Rules for corporate, sovereign, and bank exposures

79. Section 6.3 presents the method of calculating the unexpected loss (UL) capital requirements for corporate, sovereign and bank exposures. As discussed in section 6.3.1., one risk-weight function is provided for determining the capital requirement for all three asset classes with one exception. Supervisory risk weights are provided for each of the specialised lending sub-classes of corporates, and a separate risk-weight function is also provided for HVCRE. Section 6.3.2 discusses the risk components. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in section 6.7.

[12] This exemption does not apply to investments in entities where some countries will retain the existing risk weighting treatment.

[BCBS June 2006 par 270]

6.3.1. Risk-weighted assets for corporate, sovereign, and bank exposures

(i) Formula for derivation of risk-weighted assets

80. 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. Paragraphs 117 to 126 discuss the circumstances in which the maturity adjustment applies. [BCBS June 2006 par 271]

81. Throughout this section, PD and LGD are measured as decimals, and EAD is measured as currency (e.g. euros), except where explicitly noted otherwise. For exposures not in default, the formula for calculating risk-weighted assets is:[13, 14]

Correlation (R) = $0.12 \times (1 - EXP(-50 \times PD)) / (1 - EXP(-50)) + 0.24 \times [1 - (1 - EXP(-50 \times PD))/(1 - EXP(-50))]$

Maturity adjustment (b) = $(0.11852 - 0.05478 \times \ln(PD))^2$

Capital requirement[15] (K) = $[LGD \times N[(1 - R)^{-0.5} \times G(PD) + (R / (1 - R))^{0.5} \times G(0.999)] - PD \times LGD] \times (1 - 1.5 \times b)^{-1} \times (1 + (M - 2.5) \times b)$

Risk-weighted assets (RWA) = K x 12.5 x EAD

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 294) and the bank's best estimate of expected loss (described in paragraph 297). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

Illustrative risk weights are shown in Appendix 6-1.
[BCBS June 2006 par 272]

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

- Regulated financial institutions whose total assets are greater than or equal to US $100 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

[13] Ln denotes the natural logarithm.

[14] 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). 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 normal cumulative distribution function and the inverse of the normal cumulative distribution function are, for example, available in Excel as the functions NORMSDIST and NORMSINV.

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

where any substantial legal entity in the consolidated group 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;

- 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, securitisation, investments, financial custody, central counterparty services, proprietary trading and other financial services activities identified by supervisors.

Correlation (R_FI) = 1.25 x [0.12 x (1 – EXP (-50 x PD)) / (1 – EXP (-50))+
0.24 x [1 - (1 – EXP (-50xPD)) / (1 – EXP (-50))]]
[BCBS June 2011 par 102]

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

82. Under the IRB approach for corporate credits, banks 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 €50 million) from those to large firms. A firm-size adjustment (i.e. 0.04 x (1- (S-5)/45)) is made to the corporate risk weight formula for exposures to SME borrowers. S is expressed as total annual sales in millions of euros with values of S falling in the range of equal to or less than €50 million or greater than or equal to €5 million. Reported sales of less than €5 million will be treated as if they were equivalent to €5 million for the purposes of the firm-size adjustment for SME borrowers.

Correlation (R) = 0.12 × (1 – EXP (-50 × PD)) / (1 - EXP(-50)) +
0.24 × [1 - (1 - EXP(-50 × PD))/(1 - EXP(-50))] – 0.04 × (1 – (S-5)/45)

[BCBS June 2006 par 273]

OSFI Notes

83. Thresholds in the Basel II framework have been converted into Canadian dollar amounts at an exchange rate of 1.25. The rate for this one-time conversion was chosen to ensure competitive equity with US banks.

84. The firm-size adjustment may not be used under the PD/LGD approach for equities.

85. Subject to national discretion, supervisors may allow banks, as a failsafe, to substitute total assets of the consolidated group for total sales in calculating the SME threshold and the firm-size adjustment. However, total assets should be used only when total sales are not a meaningful indicator of firm size. [BCBS June 2006 par 274]

OSFI Notes

86. 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 CAD $6.25 million. For borrower sizes below CAD $6.25 million, borrower size is set equal to CAD $6.25 million. The adjustment shrinks to zero as borrower size approaches CAD $62.5 million. The term "Consolidated Group" is understood to mean all firms that are consolidated for the purposes of OSFI's Large Exposures Guideline B-2.

(iii) Risk weights for specialised lending

Risk weights for PF, OF, CF, and IPRE

87. Banks 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 6-2. The risk weights for unexpected losses associated with each supervisory category are:

Supervisory categories and UL risk weights for other SL exposures

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

[BCBS June 2006 par 275]

88. Although banks are expected to map their internal ratings to the supervisory categories for specialised lending using the slotting criteria provided in Appendix 6-2, each supervisory category broadly corresponds to a range of external credit assessments as outlined below.

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

[BCBS June 2006 par 276]

89. At national discretion, supervisors may allow banks 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 the supervisor determines that banks' underwriting and other risk characteristics are substantially stronger than specified in the slotting criteria for the relevant supervisory risk category. [BCBS June 2006 par 277]

90. Banks that meet the requirements for the estimation of PD will be able to use the general foundation approach for the corporate asset class to derive risk weights for SL sub-classes. [BCBS June 2006 par 278]

91. Banks that meet the requirements for the estimation of PD and LGD and/or EAD will be able to use the general advanced approach for the corporate asset class to derive risk weights for SL sub-classes. [BCBS June 2006 par 279]

Risk weights for HVCRE

OSFI Notes

92. No specific Canadian property types fall into the HVCRE category. Thus, the optional risk weight choices in paragraphs 94, 96 and 99 do not apply in Canada.

93. The HVCRE risk weights apply to Canadian institution foreign operations' loans on properties in jurisdictions where the national supervisor has designated specific property types as HVCRE.

94. Banks that do not meet the requirements for estimation of PD, or whose supervisor has chosen not to implement the foundation or advanced approaches to HVCRE, 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 6-2. 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%

[BCBS June 2006 par 280]

95. As indicated in paragraph 88, each supervisory category broadly corresponds to a range of external credit assessments. [BCBS June 2006 par 281]

96. At national discretion, supervisors may allow banks to 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 banks' underwriting and other risk characteristics are substantially stronger than specified in the slotting criteria for the relevant supervisory risk category. [BCBS June 2006 par 282]

OSFI Notes

97. The HVCRE category does not apply to commercial real estate in Canada. Thus the preferential risk weights set out in this paragraph may not be applied to loans secured by Canadian properties.

98. However, the HVCRE risk weights do apply 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 HVCE risk weights required by the foreign supervisor in calculating its consolidated capital requirements for loans secure d by these properties.

99. Banks that meet the requirements for the estimation of PD and whose supervisor has chosen to implement a foundation or advanced approach to HVCRE exposures will use the same formula for the derivation of risk weights that is used for other SL exposures, except that they will apply the following asset correlation formula:

Correlation (R) = 0.12 x (1 - EXP (-50 x PD)) / (1 - EXP (-50)) +
0.30 x [1 - (1 - EXP (-50 x PD)) / (1 - EXP (-50))]

[BCBS June 2006 par 283]

100. Banks 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. [BCBS June 2006 par 284]

Calculation of risk-weighted assets for exposures subject to the double default framework

101. For hedged exposures to be treated within the scope of the double default framework, capital requirements may be calculated according to paragraphs 102 and 103. [BCBS June 2006 par 284(i)]

102. The capital requirement for a hedged exposure subject to the double default treatment (K_{DD}) is calculated by multiplying K_0 as defined below by a multiplier depending on the PD of the protection provider (PD_g):

$$K_{DD} = K_0 \cdot \left(0.15 + 160 \cdot PD_g\right).$$

K_0 is calculated in the same way as a capital requirement for an unhedged corporate exposure (as defined in paragraphs 81 and 82), but using different parameters for LGD and the maturity adjustment.

$$K_0 = LGD_g \cdot \left[N\left(\frac{G\left(PD_o\right) + \sqrt{\rho_{os}} \cdot G\left(0.999\right)}{\sqrt{1-\rho_{os}}} \right) - PD_o \right] \cdot \frac{1 + \left(M - 2.5\right) \cdot b}{1 - 1.5 \cdot b}$$

PD_o and PD_g are the probabilities of default of the obligor and guarantor, respectively, both subject to the PD floor set out in paragraph 104. The correlation ρ_{os} is calculated according to the formula for correlation (R) in paragraph 81 (or, if applicable, paragraph 82), with PD being equal to PD_o, and LGD_g is the LGD of a comparable direct exposure to the guarantor (i.e., consistent with Chapter 5 – Credit Risk Mitigation, paragraph 131, the LGD associated with an unhedged facility to the guarantor or the unhedged facility to the obligor, depending upon whether in the event both

the guarantor and the obligor default during the life of the hedged transaction available evidence and the structure of the guarantee indicate that the amount recovered would depend on the financial condition of the guarantor or obligor, respectively; in estimating either of these LGDs, a bank may recognise collateral posted exclusively against the exposure or credit protection, respectively, in a manner consistent with paragraph 91 or Chapter 5 – Credit Risk Mitigation, paragraph 133 and paragraphs 294 to 299, as applicable). There may be no consideration of double recovery in the LGD estimate. The maturity adjustment coefficient b is calculated according to the formula for maturity adjustment (b) in paragraph 81, with PD being the minimum of PD_o and PD_g. M is the effective maturity of the credit protection, which may under no circumstances be below the one-year floor if the double default framework is to be applied. [BCBS June 2006 par 284(ii)]

103. The risk-weighted asset amount is calculated in the same way as for unhedged exposures, i.e.

$$RWA_{DD} = K_{DD} \cdot 12.5 \cdot EAD_g.$$

[BCBS June 2006 par 284]

6.3.2. Risk components

(i) Probability of default (PD)

104. For corporate and bank exposures, the PD is the greater of the one-year PD associated with the internal borrower grade to which that exposure is assigned, or 0.03%. For sovereign 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 286 to 288.
[BCBS June 2006 par 285]

(ii) Loss given default (LGD)

105. A bank must provide an estimate of the LGD for each corporate, sovereign and bank exposure. There are two approaches for deriving this estimate: a foundation approach and an advanced approach. [BCBS June 2006 par 286]

LGD under the foundation approach

Treatment of unsecured claims and non-recognised collateral

106. Under the foundation approach, senior claims on corporates, sovereigns and banks not secured by recognised collateral will be assigned a 45% LGD. [BCBS June 2006 par 287]

107. All subordinated claims on corporates, sovereigns and banks will be assigned a 75% LGD. A subordinated loan is a facility that is expressly subordinated to another facility. At national discretion, supervisors may choose to employ a wider definition of subordination. This might

include economic subordination, such as cases where the facility is unsecured and the bulk of the borrower's assets are used to secure other exposures. [BCBS June 2006 par 288]

OSFI Notes

108. The legal definition of subordination applies for the purpose of applying the 75% supervisory LGD.

Refer to Chapter 5 – Credit Risk Mitigation for credit risk mitigation rules for corporate, sovereign and bank exposures.

Exposure measurement for off-balance sheet items (with the exception of FX and interest-rate, equity, and commodity-related derivatives)

109. For off-balance sheet items, exposure is calculated as the committed but undrawn amount multiplied by a CCF. There are two approaches for the estimation of CCFs: a foundation approach and an advanced approach. [BCBS June 2006 par 310]

EAD under the foundation approach

110. The types of instruments and the CCFs applied to them are the same as those in the standardised approach, as outlined in chapter 3 with the exception of commitments, Note Issuance Facilities (NIFs) and Revolving Underwriting Facilities (RUFs). [BCBS June 2006 par 311]

111. A CCF of 75% will be applied to commitments, NIFs and RUFs regardless of the maturity of the underlying facility. This does not apply to those facilities which are uncommitted, that are unconditionally cancellable, or that effectively provide for automatic cancellation, for example due to deterioration in a borrower's creditworthiness, at any time by the bank without prior notice. A CCF of 0% will be applied to these facilities. [BCBS June 2006 par 312]

112. 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 bank must have sufficient line monitoring and management procedures to support this contention. [BCBS June 2006 par 313]

113. In order to apply a 0% CCF for unconditionally and immediately cancellable corporate overdrafts and other facilities, banks must demonstrate that they actively monitor the financial condition of the borrower, and that their internal control systems are such that they could cancel the facility upon evidence of a deterioration in the credit quality of the borrower.
[BCBS June 2006 par 314]

114. Where a commitment is obtained on another off-balance sheet exposure, banks under the foundation approach are to apply the lower of the applicable CCFs. [BCBS June 2006 par 315]

EAD under the advanced approach

115. Banks which meet the minimum requirements for use of their own estimates of EAD (see paragraphs 302 to 306) will be allowed to use their own internal estimates of CCFs across different product types provided the exposure is not subject to a CCF of 100% in the foundation approach (see paragraph 110). [BCBS June 2006 par 316]

Exposure measurement for transactions that expose banks to counterparty credit risk

116. Measures of exposure for SFTs and OTC derivatives that expose banks to counterparty credit risk under the IRB approach will be calculated as per the rules set forth in Chapter 4 – Settlement and Counterparty Risk. [BCBS June 2006 par 317]

(iv) Effective maturity (M)

117. For banks using the foundation approach for corporate exposures, effective maturity (M) will be 2.5 years except for repo-style transactions where the effective maturity will be 6 months. National supervisors may choose to require all banks in their jurisdiction (those using the foundation and advanced approaches) to measure M for each facility using the definition provided below. [BCBS June 2006 par 318]

OSFI Notes

118. Institutions using the FIRB approach are required to calculate an explicit M adjustment.

119. Banks using any element of the advanced IRB approach are required to measure effective maturity for each facility as defined below. However, national 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 CAD $625 million. The consolidated group has to be a domestic company based in the country where the exemption is applied. If adopted, national supervisors must apply such an exemption to all IRB banks using the advanced approach in that country, rather than on a bank-by-bank basis. If the exemption is applied, all exposures to qualifying smaller domestic firms will be assumed to have an average maturity of 2.5 years, as under the foundation IRB approach. [BCBS June 2006 par 319]

OSFI Notes

120. The exemption does not apply when lending to borrowers in Canada.

121. Except as noted in paragraph 122, M is defined as the greater of one year and the remaining effective maturity in years as defined below. In all cases, M will be no greater than 5 years.

- For an instrument subject to a determined cash flow schedule, effective maturity M is defined as:

Effective Maturity (M) = $\sum_t t * CF_t / \sum_t CF_t$

where CF_t denotes the cash flows (principal, interest payments and fees) contractually payable by the borrower in period t.

- If a bank 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.
- For derivatives subject to a master netting agreement, the weighted average maturity of the transactions should be used when applying the explicit maturity adjustment. Further, the notional amount of each transaction should be used for weighting the maturity.

[BCBS June 2006 par 320]

122. The one-year floor does not apply to certain short-term exposures, comprising fully or nearly-fully collateralised[16] 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). [BCBS June 2006 par 321]

123. In addition to the transactions considered in paragraph 122 above, other short-term exposures with an original maturity of less than one year that are not part of a bank's ongoing financing of an obligor may be eligible for exemption from the one-year floor. After a careful review of the particular circumstances in their jurisdictions, national supervisors should define the types of short-term exposures that might be considered eligible for this treatment. The results of these reviews might, for example, include transactions such as:

- Some capital market-driven transactions and repo-style transactions that might not fall within the scope of paragraph 122;

OSFI Notes
These are repo-style transactions, interbank loans and deposits and other economically equivalent products with a maturity of under one-year.

- Some short-term self-liquidating trade transactions. Import and export letters of credit and similar transactions could be accounted for at their actual remaining maturity;

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

- Some exposures arising from settling securities purchases and sales. This could also include overdrafts arising from failed securities settlements provided that such overdrafts do not continue more than a short, fixed number of business days;
- 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
- Some exposures to banks arising from foreign exchange settlements; and
- Some short-term loans and deposits.

[BCBS June 2006 par 322]

OSFI Notes

124. The exposures listed in Paragraph 123 are exempted from the one-year floor on maturity adjustments.

125. For transactions falling within the scope of paragraph 122 subject to a master netting agreement, the weighted average maturity of the transactions should be used when applying the explicit maturity adjustment. A floor equal to the minimum holding period for the transaction type set out in Chapter 5 – Credit Risk Mitigation, paragraph 54 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. [BCBS June 2006 par 323]

126. 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 117. [BCBS June 2006 par 324]

Treatment of maturity mismatches

127. The treatment of maturity mismatches under IRB is identical to that in the standardized approach ─ see Chapter 5 – Credit Risk Mitigation, section 5.1.6. [BCBS June 2006 par 325]

6.4. Rules for Retail Exposures

128. This section presents in detail the method of calculating the UL capital requirements for retail exposures. Section 6.4.1. provides three risk-weight functions, one for residential mortgage exposures, a second for qualifying revolving retail exposures, and a third for other retail exposures. Section 6.4.2. presents the risk components to serve as inputs to the risk-weight functions. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in Section 6.7. [BCBS June 2006 par 326]

6.4.1. Risk-weighted assets for retail exposures

129. There are three separate risk-weight functions for retail exposures, as defined in paragraphs 130 to 132. 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 retail risk-weight functions contains an explicit maturity adjustment. Throughout this section, PD and LGD are measured as decimals, and EAD is measured as currency (e.g. euros). [BCBS June 2006 par 327]

(i) Residential mortgage exposures

130. For exposures defined in paragraph 29 that are not in default and are secured or partly secured[17] by residential mortgages, risk weights will be assigned based on the following formula:

Correlation (R) = 0.15

Capital requirement (K) = LGD × N[(1 - R)^-0.5 × G(PD) + (R / (1 - R))^0.5 × G(0.999)] - PD x LGD

Risk-weighted assets = K x 12.5 x EAD

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 294) and the bank's best estimate of expected loss (described in paragraph 297). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD. [BCBS June 2006 par 328]

(ii) Qualifying revolving retail exposures

131. For qualifying revolving retail exposures as defined in paragraph 33 that are not in default, risk weights are defined based on the following formula:

Correlation (R) = 0.04

Capital requirement (K) = LGD × N[(1 - R)^-0.5 × G(PD) + (R / (1 - R))^0.5 × G(0.999)] - PD x LGD

Risk-weighted assets = K x 12.5 x EAD

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 294) and the bank's best estimate of expected loss (described in paragraph 297). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD. [BCBS June 2006 par 329]

(iii) Other retail exposures

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

[17] This means that risk weights for residential mortgages also apply to the unsecured portion of such residential mortgages.

Correlation (R) = $0.03 \times (1 - EXP(-35 \times PD)) / (1 - EXP(-35)) + 0.16 \times [1 - (1 - EXP(-35 \times PD))/(1 - EXP(-35))]$

Capital requirement (K) = $LGD \times N[(1 - R)^{-0.5} \times G(PD) + (R / (1 - R))^{0.5} \times G(0.999)] - PD \times LGD$

Risk-weighted assets = K x 12.5 x EAD

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph 294) and the bank's best estimate of expected loss (described in paragraph 297). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

Illustrative risk weights are shown in Appendix 6-1. [BCBS June 2006 par 330]

6.4.2. Risk components

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

133. For each identified pool of retail exposures, banks 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 6.8. Additionally, the PD for retail exposures is the greater of the one-year PD associated with the internal borrower grade to which the pool of retail exposures is assigned or 0.03%. [BCBS June 2006 par 331]

(ii) Recognition of guarantees and credit derivatives

134. Banks 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 308 to 322. Whether adjustments are done through PD or LGD, they must be done in a consistent manner for a given guarantee or credit derivative type. [BCBS June 2006 par 332]

135. Consistent with the requirements outlined above for corporate, sovereign, and bank exposures, banks 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 standardised approach, banks may choose not to recognise credit protection if doing so would result in a higher capital requirement. [BCBS June 2006 par 333]

(iii) Exposure at default (EAD)

136. Both on and off-balance sheet retail exposures are measured gross of specific allowances[18]. The EAD on drawn amounts should not be less than the sum of (i) the amount by which a bank's regulatory capital would be reduced if the exposure were written-off fully, and (ii) any specific

[18] 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.

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 198, discounts may be included in the measurement of total eligible allowances for purposes of the EL-provision calculation set out in section 6.7. [BCBS June 2006 par 334]

137. On-balance sheet netting of loans and deposits of a bank to or from a retail customer will be permitted subject to the same conditions outlined in Chapter 5 – Credit Risk Mitigation, section 5.1.4. For retail off-balance sheet items, banks must use their own estimates of CCFs provided the minimum requirements in paragraphs 302 to 305 and 307 are satisfied. [BCBS June 2006 par 335]

138. For retail exposures with uncertain future drawdown such as credit cards, banks 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 a bank 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 bank does not incorporate the possibility of additional drawings in its LGD estimates, it must do so in its EAD estimates.
[BCBS June 2006 par 336]

139. When only the drawn balances of retail facilities have been securitised, banks must ensure that they continue to hold required capital against their share (i.e. seller's interest) of undrawn balances related to the securitised exposures using the IRB approach to credit risk. This means that for such facilities, banks must reflect the impact of CCFs in their EAD estimates rather than in the LGD estimates. . [BCBS June 2006 par 337]

140. To the extent that foreign exchange and interest rate commitments exist within a bank's retail portfolio for IRB purposes, banks are not permitted to provide their internal assessments of credit equivalent amounts. Instead, the rules for the standardised approach continue to apply.
[BCBS June 2006 par 338]

6.5. Rules for Equity Exposures

141. This section presents the method of calculating the UL capital requirements for equity exposures. Section 6.5.1. discusses (a) the market-based approach (which is further sub-divided into a simple risk weight method and an internal models method), and (b) the PD/LGD approach. The risk components are provided in section 6.5.2. Section 6.5.3 discusses capital requirements for equity exposures arising from bank investments in all types of funds, including off-balance sheet exposures (e.g. unfunded commitments to subscribe to a fund's future capital calls). The method of calculating expected losses, and for determining the difference between that measure and provisions is described in section 6.7. [BCBS December 2013 par 339]

6.5.1 Risk-weighted assets for equity exposures

142. Risk-weighted assets for equity exposures in the trading book are subject to the market risk capital rules. [BCBS June 2006 par 340]

143. There are two approaches to calculate risk-weighted assets for equity exposures not held in the trading book: a market-based approach and a PD/LGD approach. Supervisors will decide which approach or approaches will be used by banks, and in what circumstances. Certain equity holdings are excluded as defined in paragraphs 166 to 170 and are subject to the capital charges required under the standardised approach. [BCBS June 2006 par 341]

OSFI Notes

144. Institutions may use the equity PD/LGD approach for non-tier 1 perpetual preferred shares without a redeemable feature and for perpetual preferred shares that are redeemable at the issuer's option. Institutions must use the market-based approach (MBA) to determine capital requirements for all other equity exposures in the banking book. Under the MBA, an institution calculates the minimum capital requirements for its banking book equity holdings using one or both of two separate methods: the simple risk weight method or the internal models method. Where an internal model is used, minimum quantitative and qualitative requirements have to be met on an ongoing basis. Certain equity holdings are excluded as defined in paragraphs 168 and 170 (see Exclusions to the MBA).

145. OSFI expects institutions to be able to calculate their own estimates of LGD for those credit businesses to which an AIRB approach applies from year-end 2007. Where mezzanine debt falls into this category, failure to produce own estimates of LGD will be addressed on a case-by-case basis. Where mezzanine debt is not a material credit business in Canada or the US, then a fall back approach to AIRB could be used as part of a transitional arrangement, provided there is a suitable plan to move to the AIRB approach.

146. Where supervisors permit both methodologies, banks' choices must be made consistently, and in particular not determined by regulatory arbitrage considerations. [BCBS June 2006 par 342]

(i) Market-based approach

147. Under the market-based approach, institutions are permitted to calculate the minimum capital requirements for their banking book equity holdings using one or both of two separate and distinct methods: a simple risk weight method or an internal models method. The method used should be consistent with the amount and complexity of the institution's equity holdings and commensurate with the overall size and sophistication of the institution. Supervisors may require the use of either method based on the individual circumstances of an institution. [BCBS June 2006 par 343]

Simple risk weight method

148. Under the simple risk weight method, a 300% risk weight is to be applied to equity holdings that are publicly traded and a 400% risk weight is to be applied to all other equity holdings. A publicly traded holding is defined as any equity security traded on a recognised security exchange. [BCBS June 2006 par 344]

149. Short cash positions and derivative instruments held in the banking book are permitted to offset long positions in the same individual stocks provided that these instruments have been explicitly designated as hedges of specific equity holdings and that they have remaining maturities of at least one year. Other short positions are to be treated as if they are long positions with the relevant risk weight applied to the absolute value of each position. In the context of maturity mismatched positions, the methodology is that for corporate exposures. [BCBS June 2006 par 345]

OSFI Notes

150. The offset rule in the above paragraph may be used only for equities under the AIRB simple risk weight approach. It may not be used for equities under the standardized approach nor for equities that are exempt from the AIRB capital charge.

151. Where such business involves actively managed options trades, an internal market risk model would be more appropriate to the complexity of the risk profile than the IRB simple risk weight method.

152. When a maturity mismatch occurs for institutions using the simple risk weight method, OSFI will recognize a hedge maturity that is greater than or equal to one year.

153. Since the time horizon for the internal models approach to equity is three months, OSFI will recognize a hedge maturity of three months or more for institutions using the internal models approach.

Internal models method

154. IRB banks may use, or may be required by their supervisor to use, internal risk measurement models to calculate the risk-based capital requirement. Under this alternative, banks must hold capital equal to the potential loss on the institution's equity holdings as derived using internal value-at-risk models subject to the 99th percentile, one-tailed confidence interval of the difference between quarterly returns and an appropriate risk-free rate computed over a long-term sample period. The capital charge would be incorporated into an institution's risk-based capital ratio through the calculation of risk-weighted equivalent assets. [BCBS June 2006 par 346]

155. The risk weight used to convert holdings into risk-weighted equivalent assets would be calculated by multiplying the derived capital charge by 12.5 (i.e. the inverse of the minimum 8% risk-based capital requirement). Capital charges calculated under the internal models method may be no less than the capital charges that would be calculated under the simple risk weight method using a 200% risk weight for publicly traded equity holdings and a 300% risk weight for all other equity holdings. These minimum capital charges would be calculated separately using the methodology of the simple risk weight approach. Further, these minimum risk weights are to apply at the individual exposure level rather than at the portfolio level. [BCBS June 2006 par 347]

OSFI Notes

156. The minimum risk-weighted equivalent assets calculated for a portfolio of equity positions using an approved internal model is the greater of:

- 12.5 times the capital charge for the portfolio derived from the institution's approved equity model, or
- 200% of the total of the portfolio's absolute net positions in publicly traded equities, plus 300% of the total of the portfolio's absolute net positions in all other equities, where short positions and recognition of netting are subject to the same conditions as in paragraph 149.

157. A bank may be permitted by its supervisor to employ different market-based approaches to different portfolios based on appropriate considerations and where the bank itself uses different approaches internally. [BCBS June 2006 par 348]

158. Banks are permitted to recognise guarantees but not collateral obtained on an equity position wherein the capital requirement is determined through use of the market-based approach. [BCBS June 2006 par 349]

(ii) PD/LGD approach

OSFI Notes

159. The PD/LGD approach may be used only for preferred shares which do not qualify as tier 1 capital.

160. The minimum requirements and methodology for the PD/LGD approach for equity exposures (including equity of companies that are included in the retail asset class) are the same as those for the IRB foundation approach for corporate exposures subject to the following specifications:[19]

- The bank's estimate of the PD of a corporate entity in which it holds an equity position must satisfy the same requirements as the bank's estimate of the PD of a corporate entity where the bank holds debt.[20] If a bank does not hold debt of the company in whose equity it has invested, and does not have sufficient information on the position of that company to be able to use the applicable definition of default in practice but meets the other standards, a 1.5 scaling factor will be applied to the risk weights derived from the corporate risk-weight function, given the PD set by the bank. If, however, the bank's equity holdings are material and it is permitted to use a PD/LGD approach for regulatory purposes but the bank has not yet met the relevant standards, the simple risk-weight method under the market-based approach will apply.

[19] There is no advanced approach for equity exposures, given the 90% LGD assumption.

[20] In practice, if there is both an equity exposure and an IRB credit exposure to the same counterparty, a default on the credit exposure would thus trigger a simultaneous default for regulatory purposes on the equity exposure.

- An LGD of 90% would be assumed in deriving the risk weight for equity exposures.
- For these purposes, the risk weight is subject to a five-year maturity adjustment whether or not the bank is using the explicit approach to maturity elsewhere in its IRB portfolio.

[BCBS June 2006 par 350]

161. Under the PD/LGD approach, minimum risk weights as set out in paragraphs 162 and 163 apply. When the sum of UL and EL associated with the equity exposure results in less capital than would be required from application of one of the minimum risk weights, the minimum risk weights must be used. In other words, the minimum risk weights must be applied, if the risk weights calculated according to paragraph 160 plus the EL associated with the equity exposure multiplied by 12.5 are smaller than the applicable minimum risk weights. [BCBS June 2006 par 351]

162. A minimum risk weight of 100% applies for the following types of equities for as long as the portfolio is managed in the manner outlined below:

- Public equities where the investment is part of a long-term customer relationship, any capital gains are not expected to be realised in the short term and there is no anticipation of (above trend) capital gains in the long term. It is expected that in almost all cases, the institution will have lending and/or general banking relationships with the portfolio company so that the estimated probability of default is readily available. Given their long-term nature, specification of an appropriate holding period for such investments merits careful consideration. In general, it is expected that the bank will hold the equity over the long term (at least five years).
- Private equities where the returns on the investment are based on regular and periodic cash flows not derived from capital gains and there is no expectation of future (above trend) capital gain or of realising any existing gain.

[BCBS June 2006 par 352]

163. For all other equity positions, including net short positions (as defined in paragraph 149), capital charges calculated under the PD/LGD approach may be no less than the capital charges that would be calculated under a simple risk weight method using a 200% risk weight for publicly traded equity holdings and a 300% risk weight for all other equity holdings.

[BCBS June 2006 par 353]

164. The maximum risk weight for the PD/LGD approach for equity exposures is 1250%. This maximum risk weight can be applied, if risk weights calculated according to paragraph 160 plus the EL associated with the equity exposure multiplied by 12.5 exceed the 1250% risk weight.

[BCBS June 2006 par 354]

165. Hedging for PD/LGD equity exposures is, as for corporate exposures, subject to an LGD of 90% on the exposure to the provider of the hedge. For these purposes equity positions will be treated as having a five-year maturity. [BCBS June 2006 par 355]

(iii) Exclusions to the market-based and PD/LGD approaches

166. Equity holdings in entities whose debt obligations qualify for a zero risk weight under the standardised approach to credit risk can be excluded from the IRB approaches to equity (including those publicly sponsored entities where a zero risk weight can be applied), at the discretion of the national supervisor. If a national supervisor makes such an exclusion this will be available to all banks. [BCBS June 2006 par 356]

OSFI Notes

167. Only exposures to corporations that are wholly owned by sovereigns may be treated as exposures to sovereigns. This would preclude institutions' ownership interests in these corporations from receiving sovereign treatment. Exceptions, if any, will be treated on a case-by-case basis, and where the exceptions are significant, they will be identified in the instructions to the reporting forms.

168. To promote specified sectors of the economy, supervisors may exclude from the IRB capital charges equity holdings made under legislated programs that provide significant subsidies for the investment to the bank and involve some form of government oversight and restrictions on the equity investments. Example of restrictions are limitations on the size and types of businesses in which the bank is investing, allowable amounts of ownership interests, geographical location and other pertinent factors that limit the potential risk of the investment to the bank. Equity holdings made under legislated programs can only be excluded from the IRB approaches up to an aggregate of 10% of Tier 1 plus Tier 2 capital. [BCBS June 2006 par 357]

OSFI Notes

169. Equity investments made pursuant to the *Specialized Financing (Banks) Regulations* of the *Bank Act* qualify for this exclusion and are risk weighted at 100%. This treatment is extended to Canadian institution foreign operations' holdings of equities made under nationally legislated programs of the countries in which they operate.

170. Supervisors may also exclude the equity exposures of a bank from the IRB treatment based on materiality. The equity exposures of a bank are considered material if their aggregate value, excluding all legislative programs discussed in paragraph 168, exceeds, on average over the prior year, 10% of bank's Tier 1 plus Tier 2 capital. This materiality threshold is lowered to 5% of a bank's Tier 1 plus Tier 2 capital if the equity portfolio consists of less than 10 individual holdings. National supervisors may use lower materiality thresholds. [BCBS June 2006 par 358]

OSFI Notes

171. An institution is not required to use the AIRB approach if the aggregate carrying value of its equities, including holdings subject to transitional provisions (see Transitional Arrangements paragraph 75), but excluding holdings subject to exemptions (see paragraph 168), is less than or equal to 10% of tier 1 and tier 2 capital. Equity investments that qualify for this materiality exemption are risk weighted at 100%. These equity investments include equity exposures

indirectly held by a bank through an investment in funds, but exclude equity exposures to funds themselves. Equity exposures to funds must be risk weighted according to paragraphs 175 and 177. The materiality threshold is to be calculated on a monthly basis as the total equity exposures defined above as a percent of tier 1 and tier 2 capital. If these threshold percentages, averaged on a rolling twelve month basis exceed 10% at any month end, the AIRB approach will apply to the relevant equity exposures going forward. For the purpose of calculating the materiality threshold, institutions should only include equity positions that are recorded as assets on the balance sheet.

172. Grandfathering is a one-time exemption commencing from the implementation date and limited to the total amount of equity investments and commitments held as of July 1, 2004. Switching from materiality to grandfathering after implementation would be inconsistent with the intent of accommodating only those investments made prior to the publication of the new rules.

173. An institution qualifying for the materiality exemption will also be eligible for the nationally legislated programs exemption for investments made pursuant to the Bank Act, Specialized Financing (Banks) Regulations. Holdings that are eligible for the legislated programs exemption but exceed the exemption limit must be included in the calculation of the materiality threshold.

6.5.2 Risk components

174. In general, the measure of an equity exposure on which capital requirements is based is the value presented in the financial statements, which depending on national accounting and regulatory practices may include unrealised revaluation gains. Thus, for example, equity exposure measures will be:

- For investments held at fair value with changes in value flowing directly through income and into regulatory capital, exposure is equal to the fair value presented in the balance sheet.
- For investments held at fair value with changes in value not flowing through income but into a tax-adjusted separate component of equity, exposure is equal to the fair value presented in the balance sheet.
- For investments held at cost or at the lower of cost or market, exposure is equal to the cost or market value presented in the balance sheet.[21]

[BCBS June 2006 par 359]

6.5.3 Equity Investments in Funds

175. Chapter 2 of this Guideline requires banks to deduct certain direct and indirect investments in financial institutions. Exposures, including underlying exposures held by funds, that are required to be deducted according to Chapter 2 should not be risk weighted and therefore are excluded from the treatment in paragraphs 176-178 below.

[21] This does not affect the existing allowance of 45% of unrealised gains to Tier 2 capital in the 1988 Accord.

176. Risk-weighted assets for equity exposures arising from bank investments in funds that are held in the trading book are subject to the market risk capital rules. [BCBS December 2013, par 361(i)]

177. Equity investments in funds that are held in the banking book must be treated in a consistent manner based on paragraphs 51 to 69 of Chapter 3, with the following exceptions:

(i) Under the LTA banks using an IRB approach must calculate the IRB risk components (ie PD of the underlying exposures and, where applicable, LGD and EAD) associated with the fund's underlying exposures. This includes, for example, any underlying exposures arising from the fund's derivatives activities (whenever the underlying receives a risk-weighting treatment under Pillar 1) and the associated counterparty credit risk exposure, as if the bank were exposed to such risk directly[22].

Banks 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 partial use provisions set out in paragraphs 62 to 69 in the case of directly held investments. In addition, when an IRB calculation is not feasible[23] (e.g. the bank cannot assign the necessary risk components to the underlying exposures in a manner consistent with its own underwriting criteria), IRB banks shall use the Standardized Approach risk weights. However, banks must apply the simple risk weight method for equity exposures in the banking book set out in paragraph 148 (unless the exemptions of paragraph 169 or 171 apply), and for securitisation positions, banks must apply the external ratings-based approach set out in section 7.6.2 of Chapter 7.

Banks may rely on third-party calculations for determining the risk weights associated with their equity investments in funds (ie 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 shall use the Standardised Approach risk weights. However, the third party must apply the simple risk weight method for equity exposures in the banking book set out in paragraph 148 (unless the exemptions of paragraph 169 or 171 apply), and for securitisation positions, the third party must apply the external ratings-based approach set out in section 7.6.2 of Chapter 7. In addition, the applicable risk weight shall be 1.2 times higher than the one that would be applicable if the exposure were held directly by the bank.

[22] As set out in paragraph 54 of Chapter 3, instead of determining a CVA charge associated with the fund's derivative exposures in accordance with section 4.1.7 of Chapter 4, banks must multiply the counterparty credit risk exposure by a factor of 1.5 before they apply the risk weight associated with the counterparty.

[23] Feasibility would include operational difficulties in applying the IRB approach to underlying exposures of funds to which the bank would apply the IRB approach if the exposure was held directly. Assessments of feasibility should be done consistently across the bank and not used to arbitrage capital requirements.

Example of the calculation of RWA using the LTA:

Consider a fund that replicates an equity index. Moreover, assume the following:

- Bank uses the IRB Approach for credit risk when calculating its capital requirements;
- Bank owns 20% of the shares of the fund;
- The fund presents the following balance sheet:

Assets:

- Cash: $20;
- Government bonds (AAA rated): $30; and
- Non-significant equity investments in commercial entities: $50

Liabilities:

- Notes payable $5

Equity

- Shares $95

In this example, the bank is indirectly holding equity exposure in commercial entities through its equity investment in the fund. For purposes of determining whether or not a bank is above the materiality threshold in paragraph 170 above, the pro-rata share of a bank's indirect equity holdings through equity investment in funds will count toward the materiality threshold. In this example, the total of amount of equity holdings a bank would have to count toward the materiality threshold due to its equity investment in the fund is 20%*$50 = $10.

For purposes of this example, let us assume the bank's total share of direct plus indirect equity holdings is below the materiality threshold.

Balance sheet exposures of $100 will be risk weighted according to the risk weights applied for cash (RW=0%), government bonds (assuming a PD of 0 implies that RW=0%), and non-significant equity holdings of commercial entities (RW = 100% because the bank is below the materiality threshold in paragraph 170 and therefore utilizing the exemption in paragraph 171).

The leverage of the fund is 100/95≈1.05.

Therefore, the risk-weighted assets for the bank's equity investment in the fund are calculated as follows:

$$Avg\ RW_{fund} * Leverage * Equity\ investment$$

$= ((RWA_{cash}+RWA_{bonds}+RWA_{\text{equities}})/TotalAssets_{fund})* Leverage*Equity\ investment$

= (($20*0% + $30*0% + $50*100%/100) * 1.05 * (20%*95)

= $9.975

(ii) Under the MBA banks using an IRB approach must apply the Standardised Approach risk weights. However, banks must apply the simple risk weight method for equity exposures in the banking book set out in paragraph 148 (unless the exemptions of paragraph 169 or 171 apply), and for securitisation exposures, banks must apply the ratings-based approach set out in paragraphs 103 to 110 of Chapter 7.

[BCBS December 2013, par 361(ii)]

OSFI Notes

178. See section 6.8.11 for the calculation of capital charges for equity exposures.

6.6. Rules for Purchased Receivables

179. Section 6.6 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 6.6.1 discusses the calculation of risk-weighted assets for default risk. The calculation of risk-weighted assets for dilution risk is provided in section 6.6.2. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in section 6.7. [BCBS June 2006 par 362]

6.6.1 Risk-weighted assets for default risk

180. 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 bank can meet the qualification standards for this particular risk-weight function. For example, if banks cannot comply with the standards for qualifying revolving retail exposures (defined in paragraph 33), they should use the risk-weight function for other retail exposures. For hybrid pools containing mixtures of exposure types, if the purchasing bank cannot separate the exposures by type, the risk-weight function producing the highest capital requirements for the exposure types in the receivable pool applies. [BCBS June 2006 par 363]

(i) Purchased retail receivables

181. For purchased retail receivables, a bank must meet the risk quantification standards for retail exposures but can utilise 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. [BCBS June 2006 par 364]

(ii) Purchased corporate receivables

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

- The purchasing bank 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 bank 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.
- 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.[24] As described below, the precise calculation of risk weights for default risk depends on the bank's ability to decompose EL into its PD and LGD components in a reliable manner. Banks can utilise external and internal data to estimate PDs and LGDs. However, the advanced approach will not be available for banks that use the foundation approach for corporate exposures.

[BCBS June 2006 par 365]

Foundation IRB treatment

183. If the purchasing bank 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: if the bank can demonstrate that the exposures are exclusively senior claims to corporate borrowers, an LGD of 45% 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 ($K_{Dilution}$). Otherwise, PD is the bank's estimate of EL; LGD will be 100%; and EAD is the amount outstanding minus $K_{Dilution}$. EAD for a revolving purchase facility is the sum of the current amount of receivables purchased plus 75% of any undrawn purchase commitments minus $K_{Dilution}$. If the purchasing bank 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 106 to 108, 117 and Chapter 5 – Credit Risk Mitigation, paragraphs 119 to 126, 129, 130 and 137. [BCBS June 2006 par 366]

Advanced IRB treatment

184. If the purchasing bank can estimate either the pool's default-weighted average loss rates given default (as defined in paragraph 294) or average PD in a reliable manner, the bank may estimate the other parameter based on an estimate of the expected long-run loss rate. The bank may (i) use an appropriate PD estimate to infer the long-run default-weighted average loss rate

[24] The firm-size adjustment for SME, as defined in paragraph 82, will be the weighted average by individual exposure of the pool of purchased corporate receivables. If the bank does not have the information to calculate the average size of the pool, the firm-size adjustment will not apply.

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 recognise that 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 294. The risk weight for the purchased receivables will be determined using the bank'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 75% of any undrawn purchase commitments minus $K_{Dilution}$ (thus, banks using the advanced IRB approach will not be permitted to use their internal EAD estimates for undrawn purchase commitments). [BCBS June 2006 par 367]

185. For drawn amounts, M will equal the pool's exposure-weighted average effective maturity (as defined in paragraphs 121 to 126). This same value of M will also be used for undrawn amounts under a committed purchase facility provided the facility contains effective covenants, early amortisation triggers, or other features that protect the purchasing bank 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. [BCBS June 2006 par 368]

6.6.2 Risk-weighted assets for dilution risk

186. Dilution refers to the possibility that the receivable amount is reduced through cash or non-cash credits to the receivable's obligor.[25] For both corporate and retail receivables, unless the bank can demonstrate to its supervisor that the dilution risk for the purchasing bank is immaterial, the treatment of dilution risk must be the following: 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 bank will estimate the one-year EL for dilution risk, also expressed in percentage of the receivables amount. Banks can utilise 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. For the purpose of calculating risk weights for dilution risk, the corporate risk-weight function must be used with the following settings: the PD must be set equal to the estimated EL, and the LGD must be set at 100%. An appropriate maturity treatment applies when determining the capital requirement for dilution risk. If a bank can demonstrate that the dilution risk is appropriately monitored and managed to be resolved within one year, the supervisor may allow the bank to apply a one-year maturity. [BCBS June 2006 par 369]

187. 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 computed using the standard IRB treatments or, for corporate receivables, the top-down treatment described above. [BCBS June 2006 par 370]

[25] 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).

6.6.3 Treatment of purchase price discounts for receivables

188. In many cases, the purchase price of receivables will reflect a discount (not to be confused with the discount concept defined in paragraphs 136 and Chapter 5 – Credit Risk Mitigation, paragraph 145) that provides first loss protection for default losses, dilution losses or both (see Chapter 7 – Structured Credit Products, paragraph 121). To the extent a portion of such a purchase price discount will be refunded to the seller, this refundable amount may be treated as first loss protection under the IRB securitisation framework. Non-refundable purchase price discounts for receivables do not affect either the EL-provision calculation in section 6.7. or the calculation of risk-weighted assets. [BCBS June 2006 par 371]

189. 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 securitisation framework (see Chapter 7 – Structured Credit Products, paragraph 121). When the same mitigant covers both default and dilution risk, banks using the Supervisory Formula that are able to calculate an exposure-weighted LGD must do so as defined in Chapter 7 – Structured Credit Products, paragraph 126. [BCBS June 2006 par 372]

6.6.4 Recognition of credit risk mitigants

190. Credit risk mitigants will be recognised generally using the same type of framework as set forth in Chapter 5 – Credit Risk Mitigation, paragraphs 130 to 145.[26] 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.

- If the guarantee covers both the pool's default risk *and* dilution risk, the bank 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.
- If the guarantee covers only default risk or dilution risk, but not both, the bank 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.
- 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).

[BCBS June 2006 par 373]

191. If protection against dilution risk has been purchased, and the conditions of Chapter 5 – Credit Risk Mitigation, paragraphs 143 and 144 are met, the double default framework may be used for the calculation of the risk-weighted asset amount for dilution risk. In this case, paragraphs

[26] At national supervisory discretion, banks may recognise guarantors that are internally rated and associated with a PD equivalent to less than A- under the foundation IRB approach for purposes of determining capital requirements for dilution risk.

101 to 103 apply with PD_o being equal to the estimated EL, LGD_g being equal to 100 percent, and effective maturity being set according to paragraph 186. [BCBS June 2006 par 373(i)]

6.7. Treatment of expected losses and recognition of allowances

192. Section 6.7. discusses the method by which the difference between allowances (e.g. specific allowances or general allowances[27]) and expected losses may be included in or must be deducted from regulatory capital, as outlined in Chapter 2 – Definition of Capital, section 2.1.3.7. [BCBS June 2006 par 374]

6.7.1 Calculation of expected losses

193. A bank must sum the EL amount (defined as EL multiplied by EAD) associated with its exposures (excluding the EL amount associated with equity exposures under the PD/LGD approach and securitisation exposures) to obtain a total EL amount. While the EL amount associated with equity exposures subject to the PD/LGD approach is excluded from the total EL amount, paragraphs 194 and 206 apply to such exposures. The treatment of EL for securitisation exposures is described in Chapter 7 – Structured Credit Products, paragraph 47. [BCBS June 2006 par 375]

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

194. Banks must calculate an EL as PD x LGD for corporate, sovereign, bank, and retail exposures both not in default and not treated as hedged exposures under the double default treatment. For corporate, sovereign, bank, and retail exposures that are in default, banks must use their best estimate of expected loss as defined in paragraph 297 and banks on the foundation approach must use the supervisory LGD. For SL exposures subject to the supervisory slotting criteria EL is calculated as described in paragraphs 195 and 196. For equity exposures subject to the PD/LGD approach, the EL is calculated as PD x LGD unless paragraphs 161 to 164 apply. Securitisation exposures do not contribute to the EL amount, as set out in Chapter 7 – Structured Credit Products, paragraph 47. For all other exposures, including hedged exposures under the double default treatment, the EL is 0. [BCBS June 2006 par 376]

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

195. 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. [BCBS June 2006 par 377]

[27] 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.

Supervisory categories and EL risk weights for other SL exposures

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

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

Where, at national discretion, supervisors allow banks to assign preferential risk weights to other SL exposures falling into the "strong" and "good" supervisory categories as outlined in paragraph 89, the corresponding EL risk weight is 0% for "strong" exposures, and 5% for "good" exposures. [BCBS June 2006 par 378]

Supervisory categories and EL risk weights for HVCRE

197. The risk weights for HVCRE are as follows:

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

Even where, at national discretion, supervisors allow banks to assign preferential risk weights to HVCRE exposures falling into the "strong" and "good" supervisory categories as outlined in paragraph 96, the corresponding EL risk weight will remain at 5% for both "strong" and "good" exposures. [BCBS June 2006 par 379]

6.7.2 Calculation of provisions

(i) Exposures subject to IRB approach

198. Total eligible allowances are defined as the sum of all allowances (e.g. specific allowances, partial write-offs, 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 equity and securitisation exposures must not be included in total eligible allowances. [BCBS June 2006 par 380]

(ii) Portion of exposures subject to the standardised approach to credit risk

199. Banks using the standardized approach for a portion of their credit risk exposures, either on a transitional basis (as defined in paragraphs 63 and 64), or on a permanent basis if the exposures subject to the standardized approach are immaterial (paragraph 65), must determine the portion of general allowances attributed to the standardized or IRB treatment of allowances (see Chapter 2 – Definition of Capital, section 2.1.3.7) according to the methods outlined in paragraphs 200 and 201. [BCBS June 2006 par 381]

200. Banks should generally attribute total general allowances on a pro rata basis according to the proportion of credit risk-weighted assets subject to the standardized and IRB approaches. However, 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 may be attributed to the standardized treatment. Similarly, general allowances booked within entities using the IRB approach may be attributed to the total eligible allowances as defined in paragraph 198. [BCBS June 2006 par 382]

201. At national supervisory discretion, banks using both the standardized and IRB approaches may rely on their internal methods for allocating general provisions for recognition in capital under either the standardized or IRB approach, subject to the following conditions. Where the internal allocation method is made available, the national supervisor will establish the standards surrounding their use. Banks will need to obtain prior approval from their supervisors to use an internal allocation method for this purpose. [BCBS June 2006 par 383]

OSFI Notes

202. Banks using IRB approaches should use the proportional split method to allocate general allowances between portfolios carried on the Standardized Approach and portfolios carried on an IRB approach. Refer to General Allowances Chapter 2 – Definition of Capital, section 2.1.3.7.

6.7.3 Treatment of EL and provisions

203. As specified in Chapter 2 – Definition of Capital, section 2.1.3.7, banks using the IRB approach must compare the total amount of total eligible allowances (as defined in paragraph 198) with the total EL amount as calculated within the IRB approach (as defined in paragraph 193). In addition, Chapter 2 – Definition of Capital, section 2.1.3.7 outlines the treatment for that portion of a bank that is subject to the standardized approach to credit risk when the bank uses both the standardized and IRB approaches. [BCBS June 2006 par 384]

204. Where the calculated EL amount is lower than the allowances of the bank, its supervisors must consider whether the EL fully reflects the conditions in the market in which it operates before allowing the difference to be included in Tier 2 capital. If specific allowances exceed the EL amount on defaulted assets this assessment also needs to be made before using the difference to offset the EL amount on non-defaulted assets. [BCBS June 2006 par 385]

OSFI Notes

205. If EL on defaulted assets is less than the specific allowances, the excess cannot be recognized in capital. OSFI will not require any additional processes to operationalize paragraph 204 over and above what is already being done for the assessment of specific and general allowances, credit reviews, and the self-assessment process.

206. The EL amount for equity exposures under the PD/LGD approach is deducted 50% from Tier 1 and 50% from Tier 2. Provisions or write-offs for equity exposures under the PD/LGD approach will not be used in the EL-provision calculation. The treatment of EL and provisions related to securitisation exposures is outlined in Chapter 7 – Structured Credit Products, paragraph 47. [BCBS June 2006 par 386]

6.8. Minimum requirements for IRB approach

207. This section presents the minimum requirements for entry and on-going use of the IRB approach. The minimum requirements are set out in 12 separate sections concerning: (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, (k) calculation of capital charges for equity exposures, and (l) disclosure requirements. It may be helpful to note that the minimum requirements cut across asset classes. Therefore, more than one asset class may be discussed within the context of a given minimum requirement. [BCBS June 2006 par 387]

6.8.1 Composition of minimum requirements

208. To be eligible for the IRB approach a bank must demonstrate to its supervisor 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 bank's risk rating systems must fulfil. The focus is on banks' abilities to rank order and quantify risk in a consistent, reliable and valid fashion. [BCBS June 2006 par 388]

209. 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. The Committee recognises that differences in markets, rating methodologies, banking products, and practices require banks and supervisors to customise their operational procedures. It is not the Committee's intention to dictate the form or operational detail of banks' risk management policies and practices. Each supervisor will develop detailed review procedures to ensure that banks' systems and controls are adequate to serve as the basis for the IRB approach. [BCBS June 2006 par 389]

210. The minimum requirements set out in this document 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. [BCBS June 2006 par 390]

211. The minimum requirements set out in this document apply to both foundation and advanced approaches unless noted otherwise. Generally, all IRB banks must produce their own estimates of

PD[28] 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. Banks wishing to use their own estimates of LGD and EAD must also meet the incremental minimum requirements for these risk factors included in paragraphs 294 to 322. [BCBS June 2006 par 391]

6.8.2 Compliance with minimum requirements

212. To be eligible for an IRB approach, a bank must demonstrate to its supervisor that it meets the IRB requirements in this document, at the outset and on an ongoing basis. Banks' overall credit risk management practices must also be consistent with the evolving sound practice guidelines issued by the Committee and national supervisors. [BCBS June 2006 par 392]

213. There may be circumstances when a bank is not in complete compliance with all the minimum requirements. Where this is the case, the bank must produce a plan for a timely return to compliance, and seek approval from its supervisor, or the bank 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 supervisors to reconsider the bank's eligibility for the IRB approach. Furthermore, for the duration of any non-compliance, supervisors will consider the need for the bank to hold additional capital under Pillar 2 or take other appropriate supervisory action. [BCBS June 2006 par 393]

6.8.3 Rating system design

214. 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. [BCBS June 2006 par 394]

215. Within each asset class, a bank may utilise multiple rating methodologies/systems. For example, a bank may have customised rating systems for specific industries or market segments (e.g. middle market, and large corporate). If a bank 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. Banks must not allocate borrowers across rating systems inappropriately to minimise regulatory capital requirements (i.e. cherry-picking by choice of rating system). Banks must demonstrate that each system used for IRB purposes is in compliance with the minimum requirements at the outset and on an ongoing basis. [BCBS June 2006 par 395]

(i) Rating dimensions

Standards for corporate, sovereign, and bank exposures

216. A qualifying IRB rating system must have two separate and distinct dimensions: (i) the risk of borrower default, and (ii) transaction-specific factors. [BCBS June 2006 par 396]

[28] Banks are not required to produce their own estimates of PD for certain equity exposures and certain exposures that fall within the SL sub-class.

217. 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 a bank 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. A bank 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. [BCBS June 2006 par 397]

218. The second dimension must reflect transaction-specific factors, such as collateral, seniority, product type, etc. For foundation IRB banks, 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. [BCBS June 2006 par 398]

219. For banks 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. Banks may alter the factors that influence facility grades across segments of the portfolio as long as they can satisfy their supervisor that it improves the relevance and precision of their estimates. [BCBS June 2006 par 399]

220. Banks 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 SL, banks 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 banks using either the general corporate foundation or advanced approach for the SL sub-class.
[BCBS June 2006 par 400]

Standards for retail exposures

221. Rating systems for retail exposures must be oriented to both borrower and transaction risk, and must capture all relevant borrower and transaction characteristics. Banks must assign each exposure that falls within the definition of retail for IRB purposes into a particular pool. Banks 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 pool level. [BCBS June 2006 par 401]

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

- Borrower risk characteristics (e.g. borrower type, demographics such as age/occupation);
- Transaction risk characteristics, including product and/or collateral types (e.g. loan to value measures, seasoning, guarantees; and seniority (first vs. second lien)). Banks must explicitly address cross-collateral provisions where present.
- Delinquency of exposure: Banks are expected to separately identify exposures that are delinquent and those that are not.

[BCBS June 2006 par 402]

(ii) Rating structure

Standards for corporate, sovereign, and bank exposures

223. A bank must have a meaningful distribution of exposures across grades with no excessive concentrations, on both its borrower-rating and its facility-rating scales. [BCBS June 2006 par 403]

To meet this objective, a bank must have a minimum of seven borrower grades for non-defaulted borrowers and one for those that have defaulted. Banks with lending activities focused on a particular market segment may satisfy this requirement with the minimum number of grades. [BCBS June 2006 par 404]

224. 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 bank has developed complete rating descriptions and criteria for their assignment, and separately quantifies PDs for these modified grades. [BCBS June 2006 par 405]

225. Banks 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. [BCBS June 2006 par 406]

226. There is no specific minimum number of facility grades for banks using the advanced approach for estimating LGD. A bank 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. [BCBS June 2006 par 407]

227. Banks 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. [BCBS June 2006 par 408]

Standards for retail exposures

228. For each pool identified, the bank 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 bank's total retail exposure. [BCBS June 2006 par 409]

(iii) Rating criteria

229. A bank 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.

- 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 bank must monitor for possible inconsistency, and must alter rating criteria to improve consistency when appropriate.
- Written rating definitions must be clear and detailed enough to allow third parties to understand the assignment of ratings, such as internal audit or an equally independent function and supervisors, to replicate rating assignments and evaluate the appropriateness of the grade/pool assignments.
- The criteria must also be consistent with the bank's internal lending standards and its policies for handling troubled borrowers and facilities.

[BCBS June 2006 par 410]

230. To ensure that banks 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 a bank 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 bank must ensure that it considers other relevant information. [BCBS June 2006 par 411]

SL product lines within the corporate asset class

231. Banks 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. Banks must then map these internal rating grades into the five supervisory rating categories. Tables 1 to 4 in Annex 6-2 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. [BCBS June 2006 par 412]

232. The Committee recognises that the criteria that banks use to assign exposures to internal grades will not perfectly align with criteria that define the supervisory categories; however, banks 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. Banks should take special care to ensure that any overrides of their internal criteria do not render the mapping process ineffective. [BCBS June 2006 par 413]

(iv) Rating assignment horizon

233. Although the time horizon used in PD estimation is one year (as described in paragraph 267), banks are expected to use a longer time horizon in assigning ratings. [BCBS June 2006 par 414]

234. A borrower rating must represent the bank's assessment of the borrower's ability and willingness to contractually perform despite adverse economic conditions or the occurrence of unexpected events. For example, a bank may base rating assignments on specific, appropriate stress scenarios. Alternatively, a bank may take into account borrower characteristics that are reflective of the borrower's vulnerability to adverse economic conditions or unexpected events, without explicitly specifying a stress scenario. 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. [BCBS June 2006 par 415]

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. [BCBS, June 2011 par 112]

235. Given the difficulties in forecasting future events and the influence they will have on a particular borrower's financial condition, a bank must take a conservative view of projected information. Furthermore, where limited data are available, a bank must adopt a conservative bias to its analysis. [BCBS June 2006 par 416]

(v) Use of models

236. The requirements in this section apply to statistical models and other mechanical methods used to assign borrower or facility ratings or in 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 also is 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.

- The burden is on the bank to satisfy its supervisor 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 bank is exposed and there must be no known material biases.
- The bank 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.
- The bank must demonstrate that the data used to build the model are representative of the population of the bank's actual borrowers or facilities.
- When combining model results with human judgement, the judgement must take into account all relevant and material information not considered by the model. The bank must have written guidance describing how human judgement and model results are to be combined.
- The bank 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.
- The bank 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.

[BCBS June 2006 par 417]

(vi) Documentation of rating system design

237. Banks must document in writing their rating systems' design and operational details. The documentation must evidence banks' 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. A bank 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, a bank 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 organisation of rating assignment, including the internal control structure, must also be documented. [BCBS June 2006 par 418]

238. Banks must document the specific definitions of default and loss used internally and demonstrate consistency with the reference definitions set out in paragraphs 272 to 285. [BCBS June 2006 par 419]

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

- 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 estimate the model;
- Establish a rigorous statistical process (including out-of-time and out-of-sample performance tests) for validating the model; and
- Indicate any circumstances under which the model does not work effectively.

[BCBS June 2006 par 420]

240. Use of a model obtained from a third-party vendor that claims proprietary technology is not a justification for exemption from documentation or any other of the requirements for internal rating systems. The burden is on the model's vendor and the bank to satisfy supervisors.
[BCBS June 2006 par 421]

6.8.4 Risk rating system operations

(i) Coverage of ratings

241. For corporate, sovereign, and bank exposures, each borrower and all recognised 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, each exposure must be assigned to a pool as part of the loan approval process. [BCBS June 2006 par 422]

242. Each separate legal entity to which the bank is exposed must be separately rated. A bank must have policies acceptable to its supervisor 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 bank 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 paragraph 74, Chapter 4).
[BCBS June 2006 par 423 and BCBS June 2011 par 101]

(ii) Integrity of rating process

Standards for corporate, sovereign, and bank exposures

243. 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 supervisors. These operational processes must be documented in the bank's procedures and

incorporated into bank policies. Credit policies and underwriting procedures must reinforce and foster the independence of the rating process. [BCBS June 2006 par 424]

244. 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, banks must initiate a new rating if material information on the borrower or facility comes to light. [BCBS June 2006 par 425]

245. The bank 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 bank needs to have a procedure to update the borrower's rating in a timely fashion. [BCBS June 2006 par 426]

Standards for retail exposures

246. A bank must review the loss characteristics and delinquency status of each identified risk 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. [BCBS June 2006 par 427]

(iii) Overrides

247. For rating assignments based on expert judgement, banks must clearly articulate the situations in which bank 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 bank 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. Banks must identify overrides and separately track their performance. [BCBS June 2006 par 428]

(iv) Data maintenance

248. A bank 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 bank 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, banks must collect and retain data on aspects of their internal ratings as required under Pillar 3 of this Framework. [BCBS June 2006 par 429]

For corporate, sovereign, and bank exposures

249. Banks must maintain rating histories on borrowers and recognised 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. Banks must also retain data on the PDs and realised default rates associated with rating grades and ratings migration in order to track the predictive power of the borrower rating system. [BCBS June 2006 par 430]

250. Banks 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. Banks must also collect data on the estimated and realised LGDs and EADs associated with each defaulted facility. Banks 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. [BCBS June 2006 par 431]

251. Banks under the foundation approach which utilise supervisory estimates are encouraged to retain the relevant data (i.e. data on loss and recovery experience for corporate exposures under the foundation approach, data on realised losses for banks using the supervisory slotting criteria for SL). [BCBS June 2006 par 432]

For retail exposures

252. Banks 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. Banks must also retain data on the estimated PDs, LGDs and EADs, associated with pools of exposures. For defaulted exposures, banks must retain the data on the pools to which the exposure was assigned over the year prior to default and the realised outcomes on LGD and EAD. [BCBS June 2006 par 433]

(v) Stress tests used in assessment of capital adequacy

253. An IRB bank 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 a bank's credit exposures and assessment of the bank'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. [BCBS June 2006 par 434]

254. In addition to the more general tests described above, the bank 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 bank, subject to supervisory review. The test to be employed must be meaningful and reasonably conservative. Individual banks may develop different approaches to undertaking this stress test requirement, depending on their circumstances. For this purpose, the objective is not to require banks to consider worst-case scenarios. The bank'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 bank's PDs, LGDs and EADs, taking account – on a conservative basis – of the bank's international diversification. [BCBS June 2006 par 435]

255. Banks using the double default framework must consider as part of their stress testing framework the impact of a deterioration in the credit quality of protection providers, in particular the impact of protection providers falling outside the eligibility criteria due to rating changes. Banks should also consider the impact of the default of one but not both of the obligor and protection provider, and the consequent increase in risk and capital requirements at the time of that default. [BCBS June 2006 par 435(i)]

256. Whatever method is used, the bank must include a consideration of the following sources of information. First, a bank's own data should allow estimation of the ratings migration of at least some of its exposures. Second, banks should consider information about the impact of smaller deterioration in the credit environment on a bank's ratings, giving some information on the likely effect of bigger, stress circumstances. Third, banks should evaluate evidence of ratings migration in external ratings. This would include the bank broadly matching its buckets to rating categories. [BCBS June 2006 par 436]

257. National supervisors may wish to issue guidance to their banks on how the tests to be used for this purpose should be designed, bearing in mind conditions in their jurisdiction. The results of the stress test may indicate no difference in the capital calculated under the IRB rules described in this section of this Framework if the bank already uses such an approach for its internal rating purposes. Where a bank operates in several markets, it does not need to test for such conditions in all of those markets, but a bank should stress portfolios containing the vast majority of its total exposures. [BCBS June 2006 par 437]

6.8.5 Corporate governance and oversight

(i) Corporate governance

258. All material aspects of the rating and estimation processes must be approved by the bank's senior management. Senior management must possess a general understanding of the bank's risk rating system and detailed comprehension of its associated management reports.
[BCBS June 2006 par 438]

259. 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. [BCBS June 2006 par 439]

260. 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 realised default rates (and LGDs and EADs for banks on advanced

approaches) against expectations. Reporting frequencies may vary with the significance and type of information and the level of the recipient. [BCBS June 2006 par 440]

(ii) Credit risk control

261. Banks 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:

- Testing and monitoring internal grades;
- Production and analysis of summary reports from the bank'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;
- Implementing procedures to verify that rating definitions are consistently applied across departments and geographic areas;
- Reviewing and documenting any changes to the rating process, including the reasons for the changes; and
- 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 supervisors to review.

[BCBS June 2006 par 441]

262. 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. [BCBS June 2006 par 442]

(iii) Internal and external audit

263. Internal audit or an equally independent function must review at least annually the bank'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. [BCBS June 2006 par 443]

6.8.6 Use of internal ratings

264. 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 banks 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 recognised that banks 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, a bank must document them and demonstrate their reasonableness to the supervisor. [BCBS June 2006 par 444]

265. A bank must have a credible track record in the use of internal ratings information. Thus, the bank must demonstrate that it has been using a rating system that was broadly in line with the minimum requirements articulated in this document for at least the three years prior to qualification. A bank 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 a bank's rating system will not render a bank non-compliant with the three-year requirement. [BCBS June 2006 par 445]

6.8.7 Risk quantification

(i) Overall requirements for estimation

Structure and intent

266. This section addresses the broad standards for own-estimates of PD, LGD, and EAD. Generally, all banks using the IRB approaches must estimate a PD[29] for each internal borrower grade for corporate, sovereign and bank exposures or for each pool in the case of retail exposures. [BCBS June 2006 par 446]

267. PD estimates must be a long-run average of one-year default rates for borrowers in the grade, with the exception of retail exposures (see below). Requirements specific to PD estimation are provided in paragraphs 286 to 293. Banks on the advanced approach must estimate an appropriate LGD (as defined in paragraphs 294 to 299) for each of its facilities (or retail pools). Banks on the advanced approach must also estimate an appropriate long-run default-weighted average EAD for each of its facilities as defined in paragraphs 302 and 303. Requirements specific to EAD estimation appear in paragraphs 302 to 307. For corporate, sovereign and bank exposures, banks 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 339 to 358. [BCBS June 2006 par 447]

268. Internal estimates of PD, LGD, and EAD must incorporate all relevant, material and available data, information and methods. A bank may utilise internal data and data from external sources (including pooled data). Where internal or external data is used, the bank must demonstrate that its estimates are representative of long run experience. [BCBS June 2006 par 448]

269. 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. A bank's estimates must promptly reflect the implications of technical advances and new data and other information, as it becomes available. Banks must review their estimates on a yearly basis or more frequently. [BCBS June 2006 par 449]

[29] Banks are not required to produce their own estimates of PD for certain equity exposures and certain exposures that fall within the SL sub-classes.

270. 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 bank's exposures and standards. The bank 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, banks must take into account paragraphs 294 to 307. The number of exposures in the sample and the data period used for quantification must be sufficient to provide the bank with confidence in the accuracy and robustness of its estimates. The estimation technique must perform well in out-of-sample tests. [BCBS June 2006 par 450]

271. In general, estimates of PDs, LGDs, and EADs are likely to involve unpredictable errors. In order to avoid over-optimism, a bank 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. Supervisors may allow some flexibility in application of the required standards for data that are collected prior to the date of implementation of this Framework. However, in such cases banks must demonstrate to their supervisors that appropriate adjustments have been made to achieve broad equivalence to the data without such flexibility. Data collected beyond the date of implementation must conform to the minimum standards unless otherwise stated. [BCBS June 2006 par 451]

(ii) Definition of default

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

- The bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as realising security (if held).
- The obligor is past due more than 90 days on any material credit obligation to the banking group.[30] 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.

[BCBS June 2006 par 452]

OSFI Notes

273. Institutions are permitted, at their discretion, to use a definition in which Qualifying Revolving Retail Exposures (QRRE) that are 90 days past due may be considered to be in default for IRB purposes.

274. Any institution using the 90-day definition for regulatory capital purposes should be able to provide evidence that it uses the same definition in practice. The application of the use test in this case would impose several conditions on a bank using the earlier definition, the most important of which would be a requirement to establish allowances for credit losses for accounts

[30] In the case of retail and PSE obligations, for the 90 days figure, a supervisor may substitute a figure up to 180 days for different products, as it considers appropriate to local conditions. In one member country, local conditions make it appropriate to use a figure of up to 180 days also for lending by its banks to corporates; this applies for a transitional period of 5 years.

that are 90 days past-due. An institution would also have to demonstrate that the 90 days past-due mark is a genuine actionable threshold after which it takes steps to manage the account actively.

275. For institutions adopting the 90-day definition, the following conditions apply:

- provisions must be booked at 90 days past due;
- the difference between 90-day and 180-day capital charges should not be significant;
- the institution must track the cure rate between 90 and 180 days. Cure rates exceeding 50%, or exhibiting significant variability over time will attract supervisory attention.

276. During the parallel reporting period, OSFI will closely monitor both the capital charge and the cure rate for institutions using the 90-day definition for this asset class. Any clear instances of capital arbitrage would be considered in future Pillar 2 assessments.

277. For collectively assessed allowances, the methodology must be objective, transparent, replicable, and not subject to adjustment through management discretion or subjective criteria.

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

- The bank puts the credit obligation on non-accrued status.
- The bank makes a charge-off or specific allowance resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.[31]
- The bank sells the credit obligation at a material credit-related economic loss.
- The bank consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.[32]
- The bank has filed for the obligor's bankruptcy or a similar order in respect of the obligor's credit obligation to the banking group.
- The obligor has sought or has been placed in bankruptcy or similar protection where this would avoid or delay repayment of the credit obligation to the banking group.

[BCBS June 2006 par 453]

279. National supervisors will provide appropriate guidance as to how these elements must be implemented and monitored. Additional guidance on indications of unlikeliness to pay can be found in OSFI Implementation Notes, Guidance on Impairment and applicable accounting standards. [BCBS June 2006 par 454]

[31] In some jurisdictions, specific provisions on equity exposures are set aside for price risk and do not signal default.

[32] Including, in the case of equity holdings assessed under a PD/LGD approach, such distressed restructuring of the equity itself.

280. For retail exposures, the definition of default can be applied at the level of a particular facility, rather than at the level of the obligor. As such, default by a borrower on one obligation does not require a bank to treat all other obligations to the banking group as defaulted. [BCBS June 2006 par 455]

281. A bank must record actual defaults on IRB exposure classes using this reference definition. A bank must also use the reference definition for its estimation of PDs, and (where relevant) LGDs and EADs. In arriving at these estimations, a bank may use external data available to it that is not itself consistent with that definition, subject to the requirements set out in paragraph 287. However, in such cases, banks must demonstrate to their supervisors that appropriate adjustments to the data have been made to achieve broad equivalence with the reference definition. This same condition would apply to any internal data used up to implementation of this Framework. Internal data (including that pooled by banks) used in such estimates beyond the date of implementation of this Framework must be consistent with the reference definition. [BCBS June 2006 par 456]

282. If the bank considers that a previously defaulted exposure's status is such that no trigger of the reference definition any longer applies, the bank 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. [BCBS June 2006 par 457]

(iii) Re-ageing

283. The bank 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 a bank 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). [BCBS June 2006 par 458]

(iv) Treatment of overdrafts

284. Authorised overdrafts must be subject to a credit limit set by the bank 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-authorised overdrafts will be associated with a zero limit for IRB purposes. Thus, days past due commence once any credit is granted to an unauthorised customer; if such credit were not repaid within 90 to 180 days, the exposure would be considered in default. Banks must have in place rigorous internal policies for assessing the creditworthiness of customers who are offered overdraft accounts. [BCBS June 2006 par 459]

(v) Definition of loss for all asset classes

285. 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. Banks must not simply measure the loss recorded in accounting records, although they must be able to compare accounting and economic losses. The bank'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 bank has sufficient internal empirical evidence of the impact of its expertise. [BCBS June 2006 par 460]

(vi) Requirements specific to PD estimation

Corporate, sovereign, and bank exposures

286. Banks 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, banks may use one or more of the three specific techniques set out below: internal default experience, mapping to external data, and statistical default models. [BCBS June 2006 par 461]

287. Banks may have a primary technique and use others as a point of comparison and potential adjustment. Supervisors will not be satisfied by mechanical application of a technique without supporting analysis. Banks must recognise the importance of judgmental considerations in combining results of techniques and in making adjustments for limitations of techniques and information.

- A bank may use data on internal default experience for the estimation of PD. A bank 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 bank must add a greater margin of conservatism in its estimate of PD. The use of pooled data across institutions may also be recognised. A bank must demonstrate that the internal rating systems and criteria of other banks in the pool are comparable with its own.
- Banks 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 bank'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 bank's analysis must include a comparison of the default definitions used, subject to the requirements in paragraph 272 to 282. The bank must document the basis for the mapping.
- A bank 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 bank's use of default probability models for this purpose must meet the standards specified in paragraph 236.

[BCBS June 2006 par 462]

288. Irrespective of whether a bank 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. [BCBS June 2006 par 463]

Retail exposures

289. Given the bank-specific basis of assigning exposures to pools, banks must regard internal data as the primary source of information for estimating loss characteristics. Banks are permitted to use external data or statistical models for quantification provided a strong link can be demonstrated between (a) the bank's process of assigning exposures to a pool and the process used by the external data source, and (b) between the bank's internal risk profile and the composition of the external data. In all cases banks must use all relevant and material data sources as points of comparison. [BCBS June 2006 par 464]

290. One method for deriving long-run average estimates of PD and default-weighted average loss rates given default (as defined in paragraph 294) for retail would be based on an estimate of the expected long-run loss rate. A bank 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 recognise 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 294. [BCBS June 2006 par 465]

OSFI Notes

<u>Retail Margin lending</u>

291. Institutions will have the option of using either the standardized approach without credit risk mitigation or the retail IRB approach using the method outlined in paragraph 290 that treats all margin loans as a single risk segment. Prime brokerage business may not be classified as a retail exposure.

(i) 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.

(ii) IRB approach

- This approach is permitted for banks 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 290).

292. Irrespective of whether banks 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. A bank need not give equal importance to historic data if it can convince its supervisor that more recent data are a better predictor of loss rates. [BCBS June 2006 par 466]

293. The Committee recognises that seasoning can be quite material for some long-term retail exposures characterised by seasoning effects that peak several years after origination. Banks should anticipate the implications of rapid exposure growth and take steps to ensure that their estimation techniques are accurate, and that their current capital level and earnings and funding prospects are adequate to cover their future capital needs. In order to avoid gyrations in their required capital positions arising from short-term PD horizons, banks are also encouraged to adjust PD estimates upward for anticipated seasoning effects, provided such adjustments are applied in a consistent fashion over time. Within some jurisdictions, such adjustments might be made mandatory, subject to supervisory discretion. [BCBS June 2006 par 467]

(vii) Requirements specific to own-LGD estimates

Standards for all asset classes

294. A bank 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 of all observed defaults within the data source for that type of facility. In addition, a bank 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 (or possibly at all) from the long-run default-weighted average. However, for other exposures, this cyclical variability in loss severities may be important and banks will need to incorporate it into their LGD estimates. For this purpose, banks 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. Supervisors will continue to monitor and encourage the development of appropriate approaches to this issue. [BCBS June 2006 par 468]

295. In its analysis, the bank 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 bank's assessment of LGD. [BCBS June 2006 par 469]

296. 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 recognises the potential inability of banks to gain both control of their collateral and liquidate it expeditiously. To the extent, that LGD estimates take into account the existence of collateral, banks must establish internal requirements for collateral management, operational procedures, legal certainty and risk management process that are generally consistent with those required for the standardised approach. [BCBS June 2006 par 470]

297. Recognising the principle that realised losses can at times systematically exceed expected levels, the LGD assigned to a defaulted asset should reflect the possibility that the bank would have to recognise additional, unexpected losses during the recovery period. For each defaulted asset, the bank 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 bank's best estimate of expected loss on the asset represents the capital requirement for that asset, and should be set by the bank on a risk-sensitive basis in accordance with paragraphs 81 and 130 to 132. Instances where the best estimate of expected loss on a defaulted asset is less than the sum of specific[33] allowances on that asset will attract supervisory scrutiny and must be justified by the bank. [BCBS June 2006 par 471]

Additional standards for corporate, sovereign, and bank exposures

298. 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. [BCBS June 2006 par 472]

Additional standards for retail exposures

299. The minimum data observation period for LGD estimates for retail exposures is five years. The less data a bank has, the more conservative it must be in its estimation. A bank need not give equal importance to historic data if it can demonstrate to its supervisor that more recent data are a better predictor of loss rates. [BCBS June 2006 par 473]

[33] 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.

OSFI Notes

Downturn LGD Floor

300. Effective November 1, 2016, new exposures secured by residential real estate[34] 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[35] DLGD.

The add-on formula is as follows:

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

Where:

- *CLTV* (*Current Loan-To-Value*) is defined as the ratio of the exposure at default[36] 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.

  If, according to the methodology explained in Appendix 6-3, there is a threshold breach, then ΔP is subject to a minimum value of 25%:

$$\Delta P = \max\left(\left(1 - \frac{House\ Price\ Value\ 12\ quarters\ ago}{Current\ House\ Price\ Value}\right) \times 100\%, 25\%\right)$$

  Otherwise, ΔP is not constrained and 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 the publicly available data from the Teranet – National Bank House Price Index™ ("Teranet index")[37]. Banks will be required to use the data from the 11 cities in the Teranet index for exposures located in the corresponding metropolitan areas[38] and the composite-11 for loans outside of those 11 cities. Quarterly recalculation of the floor is required.

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:

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

The DLGD floor must be considered as an additional requirement to the 10% LGD floor described in paragraph 73, specifically the 10% LGD floor will be applied after the application of the floor described in this paragraph.

301. Institutions are required to notify OSFI's Capital Division through their Lead Supervisors when the thresholds specified in Appendix 6-3 are initially breached and the minimum price correction is applied. Similarly, institutions should notify OSFI when the application of the minimum price correction is no longer required. These notifications should be made to OSFI prior to the beginning of the quarter in which the minimum price correction applies (or is no longer applied).

(viii) Requirements specific to own-EAD estimates

Standards for all asset classes

302. 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. For on-balance sheet items, banks must estimate EAD at no less than the current drawn amount, subject to recognising 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 banks to counterparty credit risk as set out in Chapter 4 – Settlement and Counterparty Risk). Advanced approach banks 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. Banks estimates of EAD should reflect the possibility of additional drawings by the borrower

[34] 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.

[35] The DLGD floor will apply to new insured mortgages effective November 1, 2017.

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

[37] In the future, OSFI may consider allowing banks to use equivalent house price indices with the same geographic coverage. OSFI may also consider expanding the geographical coverage beyond the 11 cities as more data becomes available.

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

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. [BCBS June 2006 par 474]

303. Advanced approach banks 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 bank must use EAD estimates that are appropriate for an economic downturn, if these are more conservative than the long-run average. For banks 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 banks may have sufficient internal data to examine the impact of previous recession(s). However, some banks may only have the option of making conservative use of external data. [BCBS June 2006 par 475]

304. The criteria by which estimates of EAD are derived must be plausible and intuitive, and represent what the bank believes to be the material drivers of EAD. The choices must be supported by credible internal analysis by the bank. The bank must be able to provide a breakdown of its EAD experience by the factors it sees as the drivers of EAD. A bank must use all relevant and material information in its derivation of EAD estimates. Across facility types, a bank must review its estimates of EAD when material new information comes to light and at least on an annual basis. [BCBS June 2006 par 476]

305. (i) Due consideration must be paid by the bank to its specific policies and strategies adopted in respect of account monitoring and payment processing. The bank 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. Banks 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 bank must be able to monitor outstanding balances on a daily basis. [BCBS June 2006 par 477]

(ii) For transactions that expose banks to counterparty credit risk, estimates of EAD must fulfil the requirements set forth in Chapter 4 – Settlement and Counterparty Risk. [BCBS June 2006 par 477(i)]

Additional standards for corporate, sovereign, and bank exposures

306. 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. [BCBS June 2006 par 478]

Additional standards for retail exposures

307. The minimum data observation period for EAD estimates for retail exposures is five years. The less data a bank has, the more conservative it must be in its estimation. A bank need not give equal importance to historic data if it can demonstrate to its supervisor that more recent data are a better predictor of drawdowns. [BCBS June 2006 par 479]

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

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

Guarantees

308. When a bank 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 banks 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, a bank 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, a bank must adopt a consistent approach, both across types of guarantees and over time. [BCBS June 2006 par 480]

OSFI Notes

309. The risk-mitigating benefits of collateral 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 collateral and guarantee. A guarantee is normally obtained to perfect an interest in collateral. In this case, the risk mitigation effect of the collateral, and not the guarantee, will be recognized.

310. 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.

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

- <u>No recognition of double default</u>: Chapter 5 – Credit Risk Mitigation, paragraphs 138-142 of the Framework permit banks to adjust either PD or LGD to reflect guarantees, but paragraph 313 and Chapter 5 – Credit Risk Mitigation, paragraph 138 stipulate that the risk weight resulting from these adjustments must not be lower than that of a comparable exposure to the guarantor. A bank using LGD adjustments must demonstrate that its methodology does not incorporate the effects of double default. Furthermore, the bank must demonstrate that its LGD adjustments do not incorporate implicit assumptions about the correlation of guarantor default to that of the obligor. (Although paragraphs 100 and Chapter 5 – Credit Risk Mitigation, paragraph 142 to

144 permit recognition of double default in some instances, they stipulate that it must be recognized through adjustments to PD, not LGD. LGD adjustments will not be permitted for exposures that are recognised under the double default framework).

- No recognition of double recovery: Under the double default framework, banks are prohibited from recognizing double recovery from both collateral and a guarantee on the same exposure. Since collateral is reflected through an adjustment to LGD, a bank 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.
- 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.
- Requirement to recognize the possibility of guarantor default in the adjustment: Any LGD adjustment must fully reflect the likelihood of guarantor default – a bank 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.
- 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. Banks should also analyse the degree of uncertainty inherent in the source data and resulting estimates.
- Use of consistent methodology for similar types of guarantees: Under Chapter 5 – Credit Risk Mitigation, paragraph 138, a bank must use the same method for all guarantees of a given type. This means that a bank will be required to have one single method for guarantees, one for credit default swaps, one for insurance, and so on. Banks 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.

312. In all cases, both the borrower and all recognised guarantors must be assigned a borrower rating at the outset and on an ongoing basis. A bank 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 249 and 250, a bank 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. [BCBS June 2006 par 481]

313. In no case can the bank 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. 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." [BCBS June 2006 par 482]

Eligible guarantors and guarantees

314. There are no restrictions on the types of eligible guarantors. The bank must, however, have clearly specified criteria for the types of guarantors it will recognise for regulatory capital purposes. [BCBS June 2006 par 483]

OSFI Notes

315. 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.

316. 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.

317. 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. However, in contrast to the foundation approach to corporate, bank, and sovereign exposures, guarantees prescribing conditions under which the guarantor may not be obliged to perform (conditional guarantees) may be recognised under certain conditions. Specifically, the onus is on the bank to demonstrate that the assignment criteria adequately address any potential reduction in the risk mitigation effect. [BCBS June 2006 par 484]

Adjustment criteria

318. A bank 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 229 and 230, and must follow all minimum requirements for assigning borrower or facility ratings set out in this document. [BCBS June 2006 par 485]

319. 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 bank'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. [BCBS June 2006 par 486]

320. In adjusting borrower grades or LGD estimates (or in the case of retail and eligible purchased receivables, the process of allocating exposures to pools), banks must take all relevant available information into account. [BCBS June 2006 par 487]

Credit derivatives

321. 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. [BCBS June 2006 par 488]

322. 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 bank must also consider the extent to which other forms of residual risk remain. [BCBS June 2006 par 489]

For banks using foundation LGD estimates

323. The minimum requirements outlined in paragraphs 308 to 322 apply to banks using the foundation LGD estimates with the following exceptions:

(1) The bank is not able to use an 'LGD-adjustment' option; and

(2) The range of eligible guarantees and guarantors is limited to those outlined in Chapter 5 – Credit Risk Mitigation, paragraph 132.

[BCBS June 2006 par 490]

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

324. 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. [BCBS June 2006 par 491]

325. The purchasing bank 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 bank regarding the quality of the underlying receivables, including data for similar pools provided by the seller, by the purchasing bank, or by external sources. The purchasing bank 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 bank is expected to obtain and rely upon more relevant data. [BCBS June 2006 par 492]

Minimum operational requirements

326. A bank purchasing receivables has to justify confidence 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, a bank will have to demonstrate the following: [BCBS June 2006 par 493]

Legal certainty

327. The structure of the facility must ensure that under all foreseeable circumstances the bank 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 bank 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. [BCBS June 2006 par 494]

Effectiveness of monitoring systems

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

- The bank 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.
- The bank must have clear and effective policies and procedures for determining seller and servicer eligibility. The bank 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.
- The bank 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.
- The bank must have effective policies and procedures for monitoring on an aggregate basis single-obligor concentrations both within and across receivables pools.
- The bank must receive timely and sufficiently detailed reports of receivables ageings and dilutions to (a) ensure compliance with the bank'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.

[BCBS June 2006 par 495]

Effectiveness of work-out systems

329. 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,

- The bank 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 amortisation triggers, etc.) as well as (b) the bank's internal policies governing advance rates and receivables eligibility. The bank's systems should track covenant violations and waivers as well as exceptions to established policies and procedures.
- To limit inappropriate draws, the bank should have effective policies and procedures for detecting, approving, monitoring, and correcting over-advances.
- The bank 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.

[BCBS June 2006 par 496]

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

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

- 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.
- Internal systems must ensure that funds are advanced only against specified supporting collateral and documentation (such as servicer attestations, invoices, shipping documents, etc.)

[BCBS June 2006 par 497]

Compliance with the bank's internal policies and procedures

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

- regular internal and/or external audits of all critical phases of the bank's receivables purchase programme.

- 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.

[BCBS June 2006 par 498]

332. A bank'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. [BCBS June 2006 par 499]

6.8.8 Validation of internal estimates

333. Banks 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. A bank must demonstrate to its supervisor that the internal validation process enables it to assess the performance of internal rating and risk estimation systems consistently and meaningfully. [BCBS June 2006 par 500]

334. Banks must regularly compare realised default rates with estimated PDs for each grade and be able to demonstrate that the realised default rates are within the expected range for that grade. Banks 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 bank must be clearly documented by the bank. This analysis and documentation must be updated at least annually. [BCBS June 2006 par 501]

335. Banks 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. Banks' 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. [BCBS June 2006 par 502]

336. Banks 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. [BCBS June 2006 par 503]

337. Banks must have well-articulated internal standards for situations where deviations in realised 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 realised values continue to be higher than expected values, banks must revise estimates upward to reflect their default and loss experience.

[BCBS June 2006 par 504]

338. Where banks rely on supervisory, rather than internal, estimates of risk parameters, they are encouraged to compare realised LGDs and EADs to those set by the supervisors. The information on realised LGDs and EADs should form part of the bank's assessment of economic capital. [BCBS June 2006 par 505]

6.8.9 Supervisory LGD and EAD estimates

339. Banks 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 standardised 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. [BCBS June 2006 par 506]

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

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

- 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;[39] and
- 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.

[BCBS June 2006 par 507]

OSFI Notes

340(i). Footnote 39 does not apply.

341. In light of the generic description above and the definition of corporate exposures, income producing real estate that falls under the SL asset class is specifically excluded from recognition as collateral for corporate exposures.[40] [BCBS June 2006 par 508]

(ii) Operational requirements for eligible CRE/RRE

342. 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.

[39] The Committee recognises that in some countries where multifamily housing makes up an important part of the housing market and where public policy is supportive of that sector, including specially established public sector companies as major providers, the risk characteristics of lending secured by mortgage on such residential real estate can be similar to those of traditional corporate exposures. The national supervisor may under such circumstances recognise mortgage on multifamily residential real estate as eligible collateral for corporate exposures.

[40] As noted in Chapter 5 – Credit Risk Mitigation, footnote 24, in exceptional circumstances for well-developed and long-established markets, mortgages on office and/or multi-purpose commercial premises and/or multi-tenanted commercial premises may have the potential to receive recognition as collateral in the corporate portfolio.

- *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 bank to realise the value of the collateral within a reasonable timeframe.
- *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.
- *Frequent revaluation*: the bank 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.
- *Junior liens*: In some member countries, eligible collateral will be restricted to situations where the lender has a first charge over the property.[41] Junior liens may be taken into account where there is no doubt that the claim for collateral is legally enforceable and constitutes an efficient credit risk mitigant. When recognised, junior liens are to be treated using the C*/C** threshold, which is used for senior liens. In such cases, the C* and C** are calculated by taking into account the sum of the junior lien and all more senior liens.

[BCBS June 2006 par 509]

OSFI Notes

343. 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. Junior liens are recognized as collateral only where the institution holds the senior lien and where no other party holds an intervening lien on the property.

344. Additional collateral management requirements are as follows:

- The types of CRE and RRE collateral accepted by the bank and lending policies (advance rates) when this type of collateral is taken must be clearly documented.
- The bank must take steps to ensure that the property taken as collateral is adequately insured against damage or deterioration.
- The bank must monitor on an ongoing basis the extent of any permissible prior claims (e.g. tax) on the property.

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

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

[BCBS June 2006 par 510]

(iii) Requirements for recognition of financial receivables

Definition of eligible receivables

345. 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.

[BCBS June 2006 par 511]

Operational requirements

Legal certainty

346. 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. [BCBS June 2006 par 512]

347. Banks 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. [BCBS June 2006 par 513]

348. All documentation used in collateralised transactions must be binding on all parties and legally enforceable in all relevant jurisdictions. Banks 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. [BCBS June 2006 par 514]

349. The collateral arrangements must be properly documented, with a clear and robust procedure for the timely collection of collateral proceeds. Banks' 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 bank should have legal authority to sell or assign the receivables to other parties without consent of the receivables' obligors. [BCBS June 2006 par 515]

Risk management

350. The bank 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 bank relies on the borrower to ascertain the credit risk of the customers, the bank must review the borrower's credit policy to ascertain its soundness and credibility. [BCBS June 2006 par 516]

351. 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 bank's total exposures. [BCBS June 2006 par 517]

352. The bank must maintain a continuous monitoring process that is appropriate for the specific exposures (either immediate or contingent) attributable to the collateral to be utilised 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 bank'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. [BCBS June 2006 par 518]

353. 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 recognised as risk mitigants. [BCBS June 2006 par 519]

354. The bank should have a documented process for collecting receivable payments in distressed situations. The requisite facilities for collection should be in place, even when the bank normally looks to the borrower for collections. [BCBS June 2006 par 520]

Requirements for recognition of other collateral

355. Supervisors may allow for recognition of the credit risk mitigating effect of certain other physical collateral. Each supervisor will determine which, if any, collateral types in its jurisdiction meet the following two standards:

- Existence of liquid markets for disposal of collateral in an expeditious and economically efficient manner.
- Existence of well established, publicly available market prices for the collateral. Supervisors will seek to ensure that the amount a bank receives when collateral is realised does not deviate significantly from these market prices.

[BCBS June 2006 par 521]

356. In order for a given bank to receive recognition for additional physical collateral, it must meet all the standards in paragraphs 342 and 344, subject to the following modifications.

- First Claim: With the sole exception of permissible prior claims specified in footnote 41, only first liens on, or charges over, collateral are permissible. As such, the bank must have priority over all other lenders to the realised proceeds of the collateral.
- The loan agreement must include detailed descriptions of the collateral plus detailed specifications of the manner and frequency of revaluation.
- The types of physical collateral accepted by the bank 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.
- Bank 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.
- 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.

[BCBS June 2006 par 522]

6.8.10 Requirements for recognition of leasing

357. Leases other than those that expose the bank to residual value risk (see paragraph 358) will be accorded the same treatment as exposures collateralised by the same type of collateral. The minimum requirements for the collateral type must be met (CRE/RRE or other collateral). In addition, the bank must also meet the following standards:

- 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;
- 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
- The difference between the rate of depreciation of the physical asset and the rate of amortisation of the lease payments must not be so large as to overstate the CRM attributed to the leased assets.

[BCBS June 2006 par 523]

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

- 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.

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

[BCBS June 2006 par 524]

6.8.11 Calculation of capital charges for equity exposures

(i) The internal models market-based approach

359. To be eligible for the internal models market-based approach a bank must demonstrate to its supervisor that it meets certain quantitative and qualitative minimum requirements at the outset and on an ongoing basis. A bank that fails to demonstrate continued compliance with the minimum requirements must develop a plan for rapid return to compliance, obtain its supervisor's approval of the plan, and implement that plan in a timely fashion. In the interim, banks would be expected to compute capital charges using a simple risk weight approach.

[BCBS June 2006 par 525]

360. The Committee recognises that differences in markets, measurement methodologies, equity investments and management practices require banks and supervisors to customise their operational procedures. It is not the Committee's intention to dictate the form or operational detail of banks' risk management policies and measurement practices for their banking book equity holdings. However, some of the minimum requirements are specific. Each supervisor will develop detailed examination procedures to ensure that banks' risk measurement systems and management controls are adequate to serve as the basis for the internal models approach. [BCBS June 2006 par 526]

(ii) Capital charge and risk quantification

361. The following minimum quantitative standards apply for the purpose of calculating minimum capital charges under the internal models approach.

(a) The capital charge is equivalent to the potential loss on the institution's equity portfolio arising from an assumed instantaneous shock equivalent to the 99th percentile, one-tailed confidence interval of the difference between quarterly returns and an appropriate risk-free rate computed over a long-term sample period.

(b) The estimated losses should be robust to adverse market movements relevant to the long-term risk profile of the institution's specific holdings. The data used to represent return distributions should reflect the longest sample period for which data are available and meaningful in representing the risk profile of the bank's specific equity holdings. The data used should be sufficient to provide conservative, statistically reliable and robust loss estimates that are not based purely on subjective or judgmental considerations. Institutions must demonstrate to supervisors that the shock employed provides a conservative estimate of potential losses over a relevant long-term market or business cycle. Models estimated using data not reflecting realistic ranges of long-run experience, including a period of reasonably severe declines in equity market values relevant to a bank's holdings, are presumed to produce optimistic results unless there is credible evidence of appropriate adjustments built into the model. In the absence of built-in adjustments, the bank must combine empirical analysis of available data with adjustments based on a variety of factors in order to attain model outputs that achieve appropriate

realism and conservatism. In constructing Value at Risk (VaR) models estimating potential quarterly losses, institutions may use quarterly data or convert shorter horizon period data to a quarterly equivalent using an analytically appropriate method supported by empirical evidence. Such adjustments must be applied through a well-developed and well-documented thought process and analysis. In general, adjustments must be applied conservatively and consistently over time. Furthermore, where only limited data are available, or where technical limitations are such that estimates from any single method will be of uncertain quality, banks must add appropriate margins of conservatism in order to avoid over-optimism.

(c) No particular type of VaR model (e.g. variance-covariance, historical simulation, or Monte Carlo) is prescribed. However, the model used must be able to capture adequately all of the material risks embodied in equity returns including both the general market risk and specific risk exposure of the institution's equity portfolio. Internal models must adequately explain historical price variation, capture both the magnitude and changes in the composition of potential concentrations, and be robust to adverse market environments. The population of risk exposures represented in the data used for estimation must be closely matched to or at least comparable with those of the bank's equity exposures.

(d) Banks may also use modelling techniques such as historical scenario analysis to determine minimum capital requirements for banking book equity holdings. The use of such models is conditioned upon the institution demonstrating to its supervisor that the methodology and its output can be quantified in the form of the loss percentile specified under (a).

(e) Institutions must use an internal model that is appropriate for the risk profile and complexity of their equity portfolio. Institutions with material holdings with values that are highly non-linear in nature (e.g. equity derivatives, convertibles) must employ an internal model designed to capture appropriately the risks associated with such instruments.

(f) Subject to supervisory review, equity portfolio correlations can be integrated into a bank's internal risk measures. The use of explicit correlations (e.g. utilisation of a variance/covariance VaR model) must be fully documented and supported using empirical analysis. The appropriateness of implicit correlation assumptions will be evaluated by supervisors in their review of model documentation and estimation techniques.

(g) Mapping of individual positions to proxies, market indices, and risk factors should be plausible, intuitive, and conceptually sound. Mapping techniques and processes should be fully documented, and demonstrated with both theoretical and empirical evidence to be appropriate for the specific holdings. Where professional judgement is combined with quantitative techniques in estimating a holding's return volatility, the judgement must take into account the relevant and material information not considered by the other techniques utilised.

(h) Where factor models are used, either single or multi-factor models are acceptable depending upon the nature of an institution's holdings. Banks are expected to ensure that the factors are sufficient to capture the risks inherent in the equity portfolio. Risk factors

should correspond to the appropriate equity market characteristics (for example, public, private, market capitalisation industry sectors and sub-sectors, operational characteristics) in which the bank holds significant positions. While banks will have discretion in choosing the factors, they must demonstrate through empirical analyses the appropriateness of those factors, including their ability to cover both general and specific risk.

(i) Estimates of the return volatility of equity investments must incorporate relevant and material available data, information, and methods. A bank may utilise independently reviewed internal data or data from external sources (including pooled data). The number of risk exposures in the sample, and the data period used for quantification must be sufficient to provide the bank with confidence in the accuracy and robustness of its estimates. Institutions should take appropriate measures to limit the potential of both sampling bias and survivorship bias in estimating return volatilities.

(j) A rigorous and comprehensive stress-testing programme must be in place. Banks are expected to subject their internal model and estimation procedures, including volatility computations, to either hypothetical or historical scenarios that reflect worst-case losses given underlying positions in both public and private equities. At a minimum, stress tests should be employed to provide information about the effect of tail events beyond the level of confidence assumed in the internal models approach.

[BCBS June 2006 par 527]

(iii) Risk management process and controls

362. Banks' overall risk management practices used to manage their banking book equity investments are expected to be consistent with the evolving sound practice guidelines issued by the Committee and national supervisors. With regard to the development and use of internal models for capital purposes, institutions must have established policies, procedures, and controls to ensure the integrity of the model and modelling process used to derive regulatory capital standards. These policies, procedures, and controls should include the following:

(a) Full integration of the internal model into the overall management information systems of the institution and in the management of the banking book equity portfolio. Internal models should be fully integrated into the institution's risk management infrastructure including use in: (i) establishing investment hurdle rates and evaluating alternative investments; (ii) measuring and assessing equity portfolio performance (including the risk-adjusted performance); and (iii) allocating economic capital to equity holdings and evaluating overall capital adequacy as required under Pillar 2. The institution should be able to demonstrate, through for example, investment committee minutes, that internal model output plays an essential role in the investment management process.

(b) Established management systems, procedures, and control functions for ensuring the periodic and independent review of all elements of the internal modelling process, including approval of model revisions, vetting of model inputs, and review of model results, such as direct verification of risk computations. Proxy and mapping techniques and other critical model components should receive special attention. These reviews should assess the accuracy, completeness, and appropriateness of model inputs and results and focus on both finding and limiting potential errors associated with known weaknesses

and identifying unknown model weaknesses. Such reviews may be conducted as part of internal or external audit programmes, by an independent risk control unit, or by an external third party.

(c) Adequate systems and procedures for monitoring investment limits and the risk exposures of equity investments.

(d) The units responsible for the design and application of the model must be functionally independent from the units responsible for managing individual investments.

(e) Parties responsible for any aspect of the modelling process must be adequately qualified. Management must allocate sufficient skilled and competent resources to the modelling function.

[BCBS June 2006 par 528]

(iv) Validation and documentation

363. Institutions employing internal models for regulatory capital purposes are expected to have in place a robust system to validate the accuracy and consistency of the model and its inputs. They must also fully document all material elements of their internal models and modelling process. The modelling process itself as well as the systems used to validate internal models including all supporting documentation, validation results, and the findings of internal and external reviews are subject to oversight and review by the bank's supervisor. [BCBS June 2006 par 529]

Validation

364. Banks must have a robust system in place to validate the accuracy and consistency of their internal models and modelling processes. A bank must demonstrate to its supervisor that the internal validation process enables it to assess the performance of its internal model and processes consistently and meaningfully. [BCBS June 2006 par 530]

365. Banks must regularly compare actual return performance (computed using realised and unrealised gains and losses) with modelled estimates and be able to demonstrate that such returns are within the expected range for the portfolio and individual holdings. 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 must be clearly documented by the bank. This analysis and documentation should be updated at least annually. [BCBS June 2006 par 531]

366. Banks should make use of other quantitative validation tools and comparisons with 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. Banks' internal assessments of the performance of their own model must be based on long data histories, covering a range of economic conditions, and ideally one or more complete business cycles. [BCBS June 2006 par 532]

367. Banks must demonstrate that quantitative validation methods and data are consistent through time. Changes in estimation methods and data (both data sources and periods covered) must be clearly and thoroughly documented. [BCBS June 2006 par 533]

368. Since the evaluation of actual performance to expected performance over time provides a basis for banks to refine and adjust internal models on an ongoing basis, it is expected that banks using internal models will have established well-articulated model review standards. These standards are especially important for situations where actual results significantly deviate from expectations and where the validity of the internal model is called into question. These standards must take account of business cycles and similar systematic variability in equity returns. All adjustments made to internal models in response to model reviews must be well documented and consistent with the bank's model review standards. [BCBS June 2006 par 534]

369. To facilitate model validation through backtesting on an ongoing basis, institutions using the internal model approach must construct and maintain appropriate databases on the actual quarterly performance of their equity investments as well on the estimates derived using their internal models. Institutions should also backtest the volatility estimates used within their internal models and the appropriateness of the proxies used in the model. Supervisors may ask banks to scale their quarterly forecasts to a different, in particular shorter, time horizon, store performance data for this time horizon and perform backtests on this basis. [BCBS June 2006 par 535]

Documentation

370. The burden is on the bank to satisfy its supervisor that a model has good predictive power and that regulatory capital requirements will not be distorted as a result of its use. Accordingly, all critical elements of an internal model and the modelling process should be fully and adequately documented. Banks must document in writing their internal model's design and operational details. The documentation should demonstrate banks' compliance with the minimum quantitative and qualitative standards, and should address topics such as the application of the model to different segments of the portfolio, estimation methodologies, responsibilities of parties involved in the modelling, and the model approval and model review processes. In particular, the documentation should address the following points:

(a) A bank must document the rationale for its choice of internal modelling methodology and must be able to provide analyses demonstrating that the model and modelling procedures are likely to result in estimates that meaningfully identify the risk of the bank's equity holdings. Internal models and procedures must be periodically reviewed to determine whether they remain fully applicable to the current portfolio and to external conditions. In addition, a bank must document a history of major changes in the model over time and changes made to the modelling process subsequent to the last supervisory review. If changes have been made in response to the bank's internal review standards, the bank must document that these changes are consistent with its internal model review standards.

(b) In documenting their internal models banks should:

- provide a detailed outline of the theory, assumptions and/or mathematical and empirical basis of the parameters, variables, and data source(s) used to estimate the model;
- establish a rigorous statistical process (including out-of-time and out-of-sample performance tests) for validating the selection of explanatory variables; and

- indicate circumstances under which the model does not work effectively.

(c) Where proxies and mapping are employed, institutions must have performed and documented rigorous analysis demonstrating that all chosen proxies and mappings are sufficiently representative of the risk of the equity holdings to which they correspond. The documentation should show, for instance, the relevant and material factors (e.g. business lines, balance sheet characteristics, geographic location, company age, industry sector and subsector, operating characteristics) used in mapping individual investments into proxies. In summary, institutions must demonstrate that the proxies and mappings employed:

- are adequately comparable to the underlying holding or portfolio;
- are derived using historical economic and market conditions that are relevant and material to the underlying holdings or, where not, that an appropriate adjustment has been made; and,
- are robust estimates of the potential risk of the underlying holding.

[BCBS June 2006 par 536]

6.8.12 Disclosure requirements

371. In order to be eligible for the IRB approach, banks must meet the disclosure requirements set out in Pillar 3. These are minimum requirements for use of IRB: failure to meet these will render banks ineligible to use the relevant IRB approach. [BCBS June 2006 par 537]

Appendix 6-1 - Illustrative IRB Risk Weights

[BCBS June 2006 Annex 5]

1. The following tables provide illustrative risk weights calculated for four asset classes types under the internal ratings-based (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.

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 €50 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 €5 million.

OSFI Notes

3. Thresholds in the Basel II framework have been converted into Canadian dollar amounts at an exchange rate of 1.25. The rate for this one-time conversion was chosen to ensure competitive equity with US banks.

Illustrative IRB Risk Weights for UL

Asset Class:	Corporate Exposures		Residential Mortgages		Other Retail Exposures		Qualifying Revolving Retail Exposures	
LGD:	45%	45%	45%	25%	45%	85%	45%	85%
Maturity: 2.5 years								
Turnover (millions of €)	50	5						
PD:								
0.03%	14.44%	11.30%	4.15%	2.30%	4.45%	8.41%	0.98%	1.85%
0.05%	19.65%	15.39%	6.23%	3.46%	6.63%	12.52%	1.51%	2.86%
0.10%	29.65%	23.30%	10.69%	5.94%	11.16%	21.08%	2.71%	5.12%
0.25%	49.47%	39.01%	21.30%	11.83%	21.15%	39.96%	5.76%	10.88%
0.40%	62.72%	49.49%	29.94%	16.64%	28.42%	53.69%	8.41%	15.88%
0.50%	69.61%	54.91%	35.08%	19.49%	32.36%	61.13%	10.04%	18.97%
0.75%	82.78%	65.14%	46.46%	25.81%	40.10%	75.74%	13.80%	26.06%
1.00%	92.32%	72.40%	56.40%	31.33%	45.77%	86.46%	17.22%	32.53%
1.30%	100.95%	78.77%	67.00%	37.22%	50.80%	95.95%	21.02%	39.70%
1.50%	105.59%	82.11%	73.45%	40.80%	53.37%	100.81%	23.40%	44.19%
2.00%	114.86%	88.55%	87.94%	48.85%	57.99%	109.53%	28.92%	54.63%
2.50%	122.16%	93.43%	100.64%	55.91%	60.90%	115.03%	33.98%	64.18%
3.00%	128.44%	97.58%	111.99%	62.22%	62.79%	118.61%	38.66%	73.03%
4.00%	139.58%	105.04%	131.63%	73.13%	65.01%	122.80%	47.16%	89.08%
5.00%	149.86%	112.27%	148.22%	82.35%	66.42%	125.45%	54.75%	103.41%
6.00%	159.61%	119.48%	162.52%	90.29%	67.73%	127.94%	61.61%	116.37%
10.00%	193.09%	146.51%	204.41%	113.56%	75.54%	142.69%	83.89%	158.47%
15.00%	221.54%	171.91%	235.72%	130.96%	88.60%	167.36%	103.89%	196.23%
20.00%	238.23%	188.42%	253.12%	140.62%	100.28%	189.41%	117.99%	222.86%

Appendix 6-2 - Supervisory Slotting Criteria for Specialised Lending

[BCBS June 2006 Annex 6]

Table 1 ─ Supervisory Rating Grades for Project Finance Exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
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
Financial structure				
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
Amortisation schedule	Amortising debt	Amortising debt	Amortising debt repayments with limited bullet payment	Bullet repayment or amortising debt repayments with high bullet repayment

	Strong	Good	Satisfactory	Weak
Political and legal environment				
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
Transaction characteristics				
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

	Strong	Good	Satisfactory	Weak
Construction risk				
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
Operating risk				
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
Off-take risk				
(a) If there is a take-or-pay	Excellent creditworthiness of off-taker; strong	Good creditworthiness of off-taker; strong termination	Acceptable financial standing of off-taker; normal termination	Weak off-taker; weak termination clauses; tenor of

	Strong	Good	Satisfactory	Weak
or fixed-price off-take contract:	termination clauses; tenor of contract comfortably exceeds the maturity of the debt	clauses; tenor of contract exceeds the maturity of the debt	clauses; tenor of contract generally matches the maturity of the debt	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 organised market
Supply risk				
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
Strength of Sponsor				
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

	Strong	Good	Satisfactory	Weak
Security Package				
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 2 – Supervisory Rating Grades for Income-Producing Real Estate Exposures and High-Volatility Commercial Real Estate Exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
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

	Strong	Good	Satisfactory	Weak
Cash-flow predictability				
(a) For complete and stabilised property.	The property's leases are long-term with creditworthy tenants and their maturity dates are scattered. The property has a track record of tenant retention upon lease expiration. Its vacancy rate is low. Expenses (maintenance, insurance, security, and property taxes) are predictable	Most of the property's leases are long-term, with tenants that range in creditworthiness. The property experiences a normal level of tenant turnover upon lease expiration. Its vacancy rate is low. Expenses are predictable	Most of the property's leases are medium rather than long-term with tenants that range in creditworthiness. The property experiences a moderate level of tenant turnover upon lease expiration. Its vacancy rate is moderate. Expenses are relatively predictable but vary in relation to revenue	The property's leases are of various terms with tenants that range in creditworthiness. The property experiences a very high level of tenant turnover upon lease expiration. Its vacancy rate is high. Significant expenses are incurred preparing space for new tenants
(b) For complete but not stabilised property	Leasing activity meets or exceeds projections. The project should achieve stabilisation in the near future	Leasing activity meets or exceeds projections. The project should achieve stabilisation in the near future	Most leasing activity is within projections; however, stabilisation 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 bank 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 bank 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 bank 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
Asset characteristics				
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

	Strong	Good	Satisfactory	Weak
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
Strength of Sponsor/ Developer				
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

	Strong	Good	Satisfactory	Weak
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
Security Package				
Nature of lien	Perfected first lien[42]	Perfected first lien[42]	Perfected first lien[42]	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

[42] 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 3 – Supervisory Rating Grades for Object Finance Exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
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
Political and legal environment				
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

	Strong	Good	Satisfactory	Weak
Transaction characteristics				
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
Operating risk				
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
Asset characteristics				
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

	Strong	Good	Satisfactory	Weak
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
Strength of sponsor				
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
Security Package				
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 4 – Supervisory Rating Grades for Commodities Finance Exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
Degree of over-collateralisation of trade	Strong	Good	Satisfactory	Weak
Political and legal environment				
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
Asset characteristics				
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

	Strong	Good	Satisfactory	Weak
Strength of sponsor				
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
Security package				
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 jeopardised
Insurance against damages	Strong insurance coverage including collateral damages with top quality insurance companies	Satisfactory insurance coverage (not including collateral damages) with good quality insurance companies	Fair insurance coverage (not including collateral damages) with acceptable quality insurance companies	Weak insurance coverage (not including collateral damages) or with weak quality insurance companies

Appendix 6-3 - Determining the application of a minimum house price correction in the calculation of the DLGD floor

1. This appendix describes how banks that have received the supervisory approval to use the advanced IRB approach for exposures secured by residential real estate are to calculate the Supplementary Capital Requirement indicators (SCRIs) for the purpose of determining whether the minimum price correction (ΔP) of 25% is applied in the calculation of the add-on used to calculate the DLGD floor required by paragraph 300.

2. The data sources necessary to calculate the SCRIs are outlined in Section A of this Appendix. The Teranet – National Bank National Composite House Price Index ("Teranet index")[43] is used to measure house prices and Statistics Canada household disposable income and population data is used to measure the per capita income.

3. An SCRI is to be determined for the 11 metropolitan areas in the Teranet index. For each metropolitan area, an SCRI is calculated on a quarterly basis and is determined as follows:

$$\frac{H}{I} \times s$$

where,

- H is the smoothed value of the Teranet index for a metropolitan area as determined in Section B;
- I is the per capita income value as determined in Section C; and
- s is the scaling factor for the particular metropolitan area as indicated in Section D.

4. OSFI will review the use of the 11 metropolitan areas and may decide to expand the calculation of SCRIs outside of these 11 metropolitan areas in the future.

5. The SCRI for a metropolitan area is compared to a threshold value for that particular area as defined in Section E. If the SCRI exceeds the threshold value for that metropolitan area, then the minimum price correction of 25% is applied at the beginning of a bank's next quarterly fiscal reporting period for exposures in that metropolitan area[44], according to the schedule presented in Section F.

6. An example illustrating how to calculate SCRIs is provided in Section G.

A. Data sources

7. Banks need to access the following data sources to calculate the SCRIs.

[43] In the future, OSFI may consider using equivalent house price indices with the same geographic coverage.
[44] The metropolitan areas geographical limits are determined using Statistics Canada definition of Census Metropolitan Areas.

a. Teranet index data source: Teranet index, monthly (June 2005 = 100, Monthly to present)

b. Per capita income data sources:

   i. Statistics Canada Current and Capital Accounts – Households, quarterly – CANSIM table 380-0072

   ii. Statistics Canada Labour force survey estimates (LFS) by sex and age group, monthly, seasonally adjusted – CANSIM table 282-0087

B. Metropolitan area house price indices

8. The Teranet index values are available on a monthly basis for the following 11 metropolitan areas:

Calgary	Edmonton	Halifax
Hamilton	Montréal	Ottawa-Gatineau
Québec	Toronto	Vancouver
Victoria	Winnipeg	

9. The Teranet indices for the metropolitan areas as published are not seasonally adjusted. Given the seasonal nature of the housing market, the indices need to be smoothed to ensure the stability of the SCRIs. Without smoothing, there is a risk that an index could exhibit short-term fluctuations above and below its threshold, which would not be a desirable outcome. Therefore, a simplified approach is used to determine the smoothed Teranet indices for use in the SCRIs; an average of the last 12 months of each Teranet index's monthly metropolitan area values must be calculated.

C. Calculation of the per capita income

10. The per capita income for use in the SCRI is determined as:

$$\text{Per capita income} = \frac{1{,}000 \times \text{Household disposable income}}{\text{Population}}$$

where,

i. The "Household disposable income" is a quarterly data series from the CANSIM table 380-0072. The data characteristics for this table necessary to calculate the per capita income are:

- Estimates = Household disposable income (× 1,000,000)
- Geography = Canada
- Seasonal adjustment = Seasonally adjusted at annual rates

ii. The "Population" is a monthly data series and is part of the CANSIM table 282-0087. The data characteristics for this table necessary to calculate the per capita income are:

- Labour force characteristics = Population (× 1,000)
- Geography = Canada
- Sex = Both sexes
- Age group = 15 years and over
- Data type = Seasonally adjusted

11. To determine the "Per capita income" on a quarterly basis, the "Population" data series must be converted from a monthly basis to a quarterly basis by calculating a three month average of the data series.

D. Calculation of metropolitan area SCRIs

12. The quarterly SCRI before scaling for each metropolitan area is determined as:

$$\text{SCRI before scaling} = \frac{\text{Smoothed calendar quarter-end Teranet house price index for a metropolitan area}}{\text{Per capita income}}$$

13. The SCRI for a metropolitan area needs to be scaled before being compared to the threshold value to determine whether the minimum price correction is applicable for exposures in that area. The SCRIs are determined by multiplying the ratio of the smoothed Teranet index for a metropolitan area over the per capita income by the scaling factors in the following table.

Metropolitan area	Scaling factor
Calgary	2,500
Edmonton	2,100
Halifax	1,900
Hamilton	2,000
Montréal	2,500
Ottawa-Gatineau	2,400
Québec	1,700
Toronto	3,300
Vancouver	4,200
Victoria	3,300
Winnipeg	1,400

E. Threshold values

14. Each metropolitan area has its own threshold value that has been determined by OSFI using an algorithm that ensured consistency across metropolitan areas[45]. Threshold values will remain stable over time but are subject to periodic review.

15. The following table shows the threshold values for each metropolitan area used to determine whether exposures in a given area are subject to the minimum price correction. For each metropolitan area, if the calculated SCRI has breached its threshold value then a minimum price correction of 25% will apply to exposures in that area in the calculation of the DLGD floor for the next quarterly fiscal reporting period.

Metropolitan area	Threshold values
Calgary	10.0
Edmonton	9.0
Halifax	8.5
Hamilton	9.5
Montréal	11.0
Ottawa-Gatineau	11.0
Québec	9.0
Toronto	14.0
Vancouver	18.5
Victoria	12.5
Winnipeg	7.5

16. Exposures in those areas remain subject to the minimum price correction until the SCRI for a metropolitan area falls below the threshold value. In this case, the minimum price correction would be removed in the next quarterly fiscal reporting period.

F. Timing of calculation

17. The following table provides a summary of the timing for performing the SCRI calculation and determining when the minimum price correction applies.

[45] In particular, the threshold value for a particular metropolitan area is given by the formula:

$$Threshold = Average\ SCRI + K, \text{ where}$$

$$K = \alpha \times Average\ SCRI + \beta \times Standard\ Deviation,$$

and where the quantities α and β are the same for all metropolitan areas and are assumed to be non-negative. The average and standard deviation are specific to each metropolitan area and are determined based on the experience over historical periods that are not considered to be outside the tail of the distribution.

	Reporting quarter for which the SCRI applies	SCRI calculations performed	Month used for housing price index	Data used for per capita income
Financial Institutions with an October Y/E	Q1	October 1	August	June
	Q2	January 1	November	September
	Q3	April 1	February	December
	Q4	July 1	May	March
Financial Institutions with a December Y/E	Q1	December 1	October	September
	Q2	March 1	January	December
	Q3	June 1	April	March
	Q4	September 1	July	June

G. Example

This example illustrates how to calculate the SCRIs for Q3 2016 for October year-end banks and Q2 2016 for December year-end banks for the 11 metropolitan areas in the Teranet index.

Step 1: Calculation of metropolitan area smoothed Teranet indices

The following table provides the monthly Teranet values for the 11 metropolitan areas for the last 11 months of 2015 and two first months of 2016 as well as the January 2016 and February 2016 smoothed values (determined as the average of the previous 12 months) rounded to the second decimal.

	Calgary	Edmonton	Halifax	Hamilton	Montréal
February 2015	184.10	181.24	136.72	157.60	146.42
March 2015	184.45	181.93	138.36	157.07	147.49
April 2015	184.85	183.11	139.39	156.99	148.92
May 2015	178.84	184.28	142.62	157.97	151.34
June 2015	183.23	184.27	142.05	161.85	152.61
July 2015	179.75	182.93	140.56	166.27	153.10
August 2015	186.70	182.02	140.05	170.33	152.35
September 2015	187.98	182.04	142.71	172.53	151.72
October 2015	186.51	182.33	140.30	172.08	151.32
November 2015	184.20	180.77	138.32	172.52	151.65
December 2015	181.10	180.21	140.45	171.51	149.74
January 2016	179.79	179.24	140.31	173.30	147.92
February 2016	178.09	179.40	136.25	172.64	146.19
January 2016 smoothed	183.46	182.03	140.15	165.84	150.38
February 2016 smoothed	182.96	181.88	140.11	167.09	150.36

	Ottawa-Gatineau	Québec	Toronto	Vancouver	Victoria	Winnipeg
February 2015	137.65	173.46	165.99	188.66	140.04	192.88
March 2015	137.20	176.09	166.42	189.14	139.70	193.33
April 2015	136.30	179.12	166.44	189.20	139.47	197.00
May 2015	138.30	180.71	169.10	191.58	140.19	197.39
June 2015	140.58	179.74	171.86	193.90	143.87	196.80
July 2015	143.75	178.61	175.91	196.94	146.36	195.89
August 2015	144.64	176.59	178.75	198.08	145.89	197.08
September 2015	143.88	173.15	179.79	201.20	147.08	194.32
October 2015	143.00	172.84	180.35	202.42	147.55	198.09
November 2015	141.22	173.58	180.53	205.15	150.15	197.48
December 2015	139.19	174.52	180.82	207.40	150.17	194.55
January 2016	137.77	173.82	180.51	209.17	151.25	195.16
February 2016	137.28	174.98	180.93	215.95	152.62	195.45
January 2016 smoothed	140.29	176.02	174.71	197.74	145.14	195.83
February 2016 smoothed	140.26	176.15	175.95	200.01	146.19	196.05

Step 2: Calculation of the per capita income

Given the following values for the data series "Household disposable income" (CANSIM table 380-0072) and "Population" data series (CANSIM table 282-0087), the per capita income for Q4 2015 is determined as follows. The average population is rounded to the first decimal.

	2015	Statistics Canada data estimates
Household disposable income	Q4	1,131,400
Population	October	29,377.5
	November	29,401.2
	December	29,419.0
	Q4 (Average of October – December)	29,399.2

Then the per capita income for Q4 2015 is:

$$\frac{1{,}000 \times 1{,}131{,}400}{29{,}399.2} = 38{,}484.0$$

The per capita income value is rounded to the first decimal.

Step 3: Calculation of metropolitan area SCRIs

Using the February 2016 smoothed Teranet values for the 11 metropolitan areas and the per capita income for Q4 2015, the SCRIs before and after scaling for Q3 2016 for October year-end institutions are presented in the table below. For institutions with their fiscal year ending in December, January 2016 smoothed Teranet values along with the per capita income for Q4 2015 would be used to determine the SCRIs applicable for their Q2 2016. The SCRI before scaling is rounded to the fifth decimal, while the final SCRI is rounded to the second decimal.

Metropolitan area	**February 2016 Teranet index smoothed (*H*)**	**Q3 2016 SCRI before scaling $\left(\frac{H}{I}\right)$**	**Scaling Factor(*s*)**	**Q3 2016 SCRIs $\left(\frac{H}{I} \times s\right)$**
Calgary	183.46	0.00477	2,500	11.92
Edmonton	182.03	0.00473	2,100	9.93
Halifax	140.15	0.00364	1,900	6.92
Hamilton	165.84	0.00431	2,000	8.62
Montréal	150.38	0.00391	2,500	9.77
Ottawa-Gatineau	140.29	0.00365	2,400	8.75
Québec	176.02	0.00457	1,700	7.78
Toronto	174.71	0.00454	3,300	14.98
Vancouver	197.74	0.00514	4,200	21.58
Victoria	145.14	0.00377	3,300	12.45
Winnipeg	196.05	0.00509	1,400	7.13

Where for example the Calgary SCRI before scaling $\left(\frac{H}{I}\right)$ is determined as:

$$\frac{183.46}{38{,}484.0} = 0.00477$$

The SCRI would be calculated as:

$$0.00477 \times 2{,}500 = 11.92$$

As the threshold value is set at 10.0 for Calgary, the minimum price correction of 25% would therefore apply for the Q3-2016 reporting quarter for banks with an October year-end and Q2-2016 for banks with a December year-end.

ΔP in the add-on formula of paragraph 300 would then be equal to 25% and the add-on itself would be equal to the following:

$$Add - on = \frac{Max(CLTV - 80\% \times (100\% - 25\%), 0) - Max(CLTV - 80\%, 0)}{CLTV}$$

$$= \frac{Max(CLTV - 60\%, 0) - Max(CLTV - 80\%, 0)}{CLTV}$$