



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.1 Application

CA-A.1.1 Regulations in this module are applicable to locally incorporated banks (hereinafter referred to as “the banks”) on both a stand-alone and consolidated group basis.

CA-A.1.2 If the banks have investments in banking, securities, financial, insurance and/or commercial entities, the banks will also need to apply rules set out in the Prudential Consolidation and Deduction Requirements Module for the calculation of their solo and consolidated Capital Adequacy Ratio (CAR).



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.2 Purpose

CA-A.2.1 The purpose of this module is to set out the CBB's capital adequacy regulations and provide guidance on the risk measurements for the calculation of capital requirements by locally incorporated banks.

CA-A.2.3 The CBB requires in particular that the banks maintain adequate capital, in accordance with the Regulations in this module, against their risks, as capital provides banks with a cushion to absorb losses without endangering customer deposits. As such, the CBB also requires the relevant banks to maintain adequate liquidity and identify and control their large exposures which might otherwise be a source of loss to a licensee on a scale that might threaten its solvency.

CA-A.2.4 This module provides support for certain other parts of the Rulebook, mainly:

- (a) Prudential Consolidation and Deduction Requirements;
- (b) Licensing and Authorisation Requirements;
- (c) CBB Reporting Requirements;
- (d) Credit Risk Management;
- (e) Market Risk Management;
- (f) Operational Risk Management;
- (g) Liquidity Risk Management;
- (h) High Level Controls;
- (i) Relationship with Audit Firms; and
- (j) Penalties and Fines.



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.3 Capital Adequacy Ratio

CA-A.3.1 Historically, on a consolidated basis, the CBB has set a minimum Capital Adequacy Ratio ("CAR") of 12.0% for all locally incorporated banks. Furthermore, on a solo basis, the parent bank has been required to maintain a minimum CAR of 8.0% (i.e. unconsolidated). The arrangements outlined below will apply once banks have been subject to a Pillar 2 risk profile assessment by the CBB or an acceptable audit firm. Until such an assessment has been completed, the existing 12% and 8% minimum capital ratio requirements (as outlined in Module CA-2.5 October 2006 edition) will remain in place.

CA-A.3.2 **CAR is calculated by applying the regulatory capital to the numerator and risk-weighted assets to the denominator.**

CA-A.3.3 **All locally incorporated banks are required to maintain a capital ratio both on a solo (and a consolidated basis where applicable) above the minimum "trigger" CAR of 8%. Failure to remain above the trigger ratio will result in Enforcement and other measures as outlined in Section CA-1.4.**

CA-A.3.4 **All locally incorporated banks will be required to maintain capital ratios above individually set "target" CARs on a solo and on a consolidated basis. These target CARs will be set at an initial minimum of 8.5% and may in the case of high risk banks be set at levels above the 12.5% target ratio set prior to January 2008. Failure to remain above the target ratio will result in Enforcement and other measures as outlined in Section CA-1.4.**

Eligible capital

CA-A.3.5 **Banks are allowed three classes of capital (see section CA- 2.1) to meet their capital requirements for credit, operational and market risk, as set out below:**

- Tier 1: **Core capital – May be used to support credit, operational and market risk**
- Tier 2: **Supplementary capital – May be used to support credit, operational and market risk; and**
- Tier 3: **Ancillary capital – May be used solely to support market risk.**



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.3 Capital Adequacy Ratio (continued)

Risk-weighted assets

- CA-A.3.6 Total risk-weighted assets are determined by
- (i) multiplying the capital requirements for market risk and operational risk by 12.5; and
 - (ii) adding the resulting figures to the sum of risk-weighted assets for credit risk.
- CA-A.3.7 For the measurement of their credit risks, banks have a choice, subject to the written approval of the CBB, between two broad methodologies.
- (a) One alternative is to measure the risks in a standardised approach, applying the measurement framework described in chapters CA-3 of these regulations.
 - (b) The second methodology (i.e. internal ratings-based approach) is set out in detail in chapter CA-5 including the procedure for obtaining the CBB's approval. This methodology is subject to the fulfilment of certain conditions. The use of this methodology is, therefore, conditional upon the explicit approval of the CBB.
- CA-A.3.8 Credit risk – Securitization framework is set out in chapter CA-6. Banks must apply the securitisation framework for determining regulatory capital requirements on exposures arising from traditional and synthetic securitisations or similar structures that contain features common to both.
- CA-A.3.9 For the measurement of their operational risks, banks have a choice, subject to the written approval of the CBB, between two broad methodologies.
- (a) One alternative is to measure the risks in a basic indicator approach, applying the measurement framework described in chapter CA-7 of these regulations.
 - (b) The second alternative methodology (i.e. the standardised approach) is set out in detail in chapter CA-7 including the procedure for obtaining the CBB's approval. This methodology is subject to the fulfilment of certain conditions (as outlined in module OM). The use of this methodology is, therefore, conditional upon the explicit approval of the CBB.



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.3 Capital Adequacy Ratio (continued)

CA-A.3.10 For the measurement of their market risk, banks have a choice, subject to the written approval of the CBB, between two broad methodologies.

- (a) One alternative is to measure the risks in a standardised approach, applying the measurement frameworks described in chapters CA-9 to CA-13 of this module.
- (b) The second alternative methodology (i.e. the internal models approach) is set out in detail in chapter CA-14 including the procedure for obtaining the CBB's approval. This methodology is subject to the fulfilment of certain conditions. The use of this methodology is, therefore, conditional upon the explicit approval of the CBB.



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.4 Transitional arrangements

CA-A.4.1 For banks applying the IRB approach for credit risk, there will be a capital floor following implementation of this Module. Banks must calculate the difference between (i) the floor as defined in paragraph CA-A.4.2 and (ii) the amount as calculated according to paragraph CA-A.4.3. If the floor amount is larger, banks are required to add 12.5 times the difference to the risk-weighted assets.

CA-A.4.2 The capital floor is based on previous capital adequacy regulation issued by CBB dated July 2004. It is derived by applying an adjustment factor to the following amount: (i) 8% of the risk-weighted assets, (ii) plus Tier 1 and Tier 2 deductions. The adjustment factor for banks applying the foundation IRB approach for the year 2008 is 95%. The adjustment factor for the year 2009 is 90%, and for the year 2010 is 80%. The following table illustrates the application of the adjustment factors. Additional transitional arrangements including parallel calculation are set out in paragraphs CA-5.2.45 to CA-5.2.51.

	2008	2009	2010
Foundation IRB approach	95%	90%	80%

CA-A.4.3 **In the years in which the floor applies, banks must also calculate (i) 8% of total risk-weighted assets as calculated under this Module, (ii) less the difference between total provisions and expected loss amount as described in section CA-5.7, and (iii) plus other Tier 1 and Tier 2 deductions.**

CA-A.4.4 These prudential floors are also applicable to banks that do not complete the transition to IRB approach in the years specified in paragraph CA-2.4.2 to provide time to ensure that individual bank implementations of the IRB approach are sound. However, CBB may develop appropriate bank-by-bank floors periodically.

CA-A.4.5 **Banks which start to use internal models for market risk for one or more risk categories should, over a reasonable period of time, extend the models to all of their operations, subject to the exceptions mentioned in paragraph CA-A.4.6 below, and move towards a comprehensive model (i.e., one which captures all market risk categories).**



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.4 Transitional arrangements (continued)

CA-A.4.6 On a transitional basis, banks will be allowed to use a combination of the standardised approach and the internal models approach to measure their market risks provided they should cover a complete risk category (e.g., interest rate risk or foreign exchange risk), i.e., a combination of the two methods will not be allowed within the same risk category¹. However, banks presently implementing or further improving their internal models will be allowed some flexibility (including within risk categories) in including all their operations on a worldwide basis. This flexibility shall be subject to the specific prior written approval of the CBB, and such approval will be given on a case-by-case basis and reviewed by the CBB from time to time

CA-A.4.7 The CBB will closely monitor banks to ensure that there will be no "cherry-picking" between the standardised approach and the models approach for market risk within a risk category. Banks which adopt a model will not be permitted, save in exceptional circumstances, to revert to the standardised approach.

CA-A.4.8 The CBB recognises that even a bank which uses a comprehensive model for market risk may still incur risks in positions which are not captured by their internal models², for example, in remote locations, in minor currencies or in negligible business areas³. Any such risks that are not included in a model should be separately measured and reported using the standardised approach described in chapters CA-9 to CA-13.

CA-A.4.9 Transitioning banks are required to move towards a comprehensive internal model approach for market risk.

CA-A.4.10 The CBB will closely monitor the risk management practices of banks moving towards the models approach for market risk, to ensure that they are in a position to meet all standards once they apply a full-fledged model for any risk category.

¹ This does not, however, apply to pre-processing techniques which are used to simplify the calculation and whose results become subject to the standardised methodology.

² Banks may also incur interest rate and equity risks outside of their trading activities. However, there are no explicit capital charges for the price risk in such positions.

³ For example, if a bank is hardly at all engaged in commodities it will not necessarily be expected to model its commodities risk.



MODULE	CA: Capital Adequacy
CHAPTER	CA-A: Introduction

CA-A.5 Regulation history

CA-A.5.1 This module was first issued in July 2004 as part of the conventional principles volume. All regulations in this volume have been effective since this date. All subsequent changes are dated with the month and year at the base of the relevant page and in the Table of Contents.

CA-A.5.2 Prior to the development of this Module, the CBB had issued various circulars representing regulations relating to capital adequacy requirements. These circulars have now been consolidated into this module covering the capital adequacy regulations. These circulars and their incorporation into this module are listed below:

Circular Ref.	Date of Issue	Module Ref.	Circular Subject
ODG/50/98	11 Sep 1998	CA 1 – CA 9	Market Risk Capital Regulations
BC/07/02	26 Jun 2002	CA 1.4	Review of PIR by External Auditors
OG/78/01	20 Feb 2001	CA 2.5	Monitoring of Capital Adequacy
BC/01/98	10 Jan 1998	CA 2.5	Capital Adequacy Ratio

CA-A.5.3 **Content from CBB’s original circulars, which have been effective from the date of the circulars, has been incorporated into this module (see paragraph CA-A.5.2). This module will be effective from January 01, 2008.**



MODULE	CA: Capital Adequacy
CHAPTER	CA-1: Scope and Coverage of Capital Charges

CA-1.1 Application

CA-1.1.1 All locally incorporated banks are required to measure and apply capital charges with respect to their credit, operational and market risks capital requirements.

CA-1.1.2 Credit risk is defined as the potential that a bank's borrower or counterparty will fail to meet its obligations in accordance with agreed terms. Credit risk exists throughout the activities of a bank in the banking book and in the trading book and includes both on- and off-balance-sheet exposures.

CA-1.1.3 Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk,² but excludes strategic and reputational risk.

CA-1.1.4 Market risk is defined as the risk of loss in on- or off-balance-sheet positions arising from movements in market prices. The risks subject to the capital requirement of this module are:

- (a) the risks pertaining to interest rate related instruments and equities in the trading book; and
- (b) foreign exchange and commodities risks throughout the bank.

² Legal risk includes, but is not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements.



MODULE	CA: Capital Adequacy
CHAPTER	CA-1: Scope and Coverage of Capital Charges

CA-1.2 Monitoring of risks

CA-1.2.1 Banks are required to manage their risks, especially market risk, in such a way that the capital requirements are being met on a continuous basis, i.e. at the close of each business day and not merely at the end of each calendar quarter. Banks are also required to maintain strict risk management systems to ensure that their intra-day exposures are not excessive.

CA-1.2.2 Banks' daily compliance with the capital requirements for credit and market risk must be verified by the independent risk management department and the internal auditor. It is expected that the external auditors will perform appropriate tests of the banks' daily compliance with the capital requirements for credit and market risk. Where a bank fails to meet the minimum capital requirements for credit and market risk on any business day, the CBB must be informed in writing by no later than the following business day. The CBB will then seek to ensure that the bank takes immediate measures to rectify the situation.



MODULE	CA: Capital Adequacy
CHAPTER	CA-1: Scope and Coverage of Capital Charges

CA-1.3 Investments in other entities and consolidation

CA-1.3.1 The banks must also apply rules set in the Prudential Consolidation and Deduction Requirements Module where the bank has significant investments (as defined in the aforementioned Module) in other entities.

CA-1.3.2 These capital adequacy regulations must be applied on a worldwide consolidated basis as well as on a solo basis. Guidance on consolidation and related matters is provided in the Prudential Consolidation and Deduction Requirements Module.



MODULE	CA: Capital Adequacy
CHAPTER	CA-1: Scope and Coverage of Capital Charges

CA-1.4 Reporting

CA-1.4.1 Formal reporting, to the CBB, of capital adequacy must be made in accordance with the requirements set out under section BR 3.1.

CA-1.4.2 Where a bank's CAR falls below its **individual target ratio** either on a solo basis (or on a consolidated basis), the General Manager of the bank must notify the CBB by the following business day, however no formal action plan will be necessary. The General Manager must explain what measures are being implemented to ensure that the bank will remain above its minimum target CAR(s).

CA-1.4.3 The bank will be required to submit form PIR (and PIRC where applicable) to the CBB on a monthly basis, until the **concerned CAR** exceeds its target ratio.

CA-1.4.4 The CBB will notify banks in writing of any action required of them with regard to the corrective and preventive action (as appropriate) proposed by the bank pursuant to the above, as well as of any other requirement of the CBB in any particular case.

CA-1.4.5 All locally incorporated banks must provide the CBB, with immediate written notification (i.e. by no later than the following business day) of any actual breach of the minimum trigger CAR of 8%. Where such notification is given, the bank must also provide the CBB:

- (a) no later than one calendar week after the notification, with a written action plan setting out how the bank proposes to restore the relevant CAR(s) to the required minimum level(s) set out above and, further, describing how the bank will ensure that a breach of such CAR(s) will not occur again in the future; and
- (b) report on a weekly basis thereafter on the bank's relevant CAR(s) until such CAR(s) have reached the required target level(s) described above.

CA-1.4.6 Banks must note that the CBB considers the breach of CARs to be a very serious matter. Consequently, the CBB may (at its discretion) subject a bank which breaches its CAR(s) to a formal licensing reappraisal. Such reappraisal may be effected either through the CBB's own inspection function or through the use of Reporting Accountants, as appropriate. Following such appraisal, the CBB will notify the bank concerned in writing of its conclusions with regard to the continued licensing of the bank.

CA-1.4.7 The CBB recommends that the bank's compliance officer support and cooperate with the CBB in the monitoring and reporting of the CARs and other regulatory reporting matters. Compliance officers should ensure that their banks have adequate internal systems and controls to comply with these regulations.



MODULE	CA: Capital Adequacy
CHAPTER	CA-1: Scope and Coverage of Capital Charges

CA-1.5 Review of Prudential Information Returns by External Auditors

CA-1.5.1 The CBB requires all relevant banks to request their external auditors to conduct a review of the prudential returns on a quarterly basis in accordance with the requirements set out under section BR 3.1. However, if a bank provides prudential returns without any reservation from auditors for two consecutive quarters, it can apply for exemption from such review for a period to be decided by CBB.



MODULE	CA: Capital Adequacy
CHAPTER	CA-2: Regulatory Capital

CA-2.1 Regulatory capital

Tier 1: Core capital

CA-2.1.1 Tier 1 capital shall consist of the sum of items (a) to (f) below, less the sum of items (g) to (k) below:

- (a) Issued and fully paid ordinary shares and perpetual non-cumulative preference shares, but excluding cumulative preference shares;
- (b) Certain innovative capital instruments such as instruments with step-ups, subject to the fulfilment of criteria given in paragraph CA-2.1.2 to CA-2.1.4 and the limit given in paragraph CA-2.2.2.
- (c) Disclosed reserves, including:
 - General reserves
 - Legal / statutory reserves
 - Share premium
 - Capital redemption reserve
 - Excluding fair value reserves³
- (d) Retained profit brought forward;
- (e) Unrealized net gains arising from fair valuing equities⁴; and
- (f) Minority interest in subsidiaries Tier 1 equity, arising on consolidation, in the equity of subsidiaries which are less than wholly owned. Further guidance on minority interests is provided in paragraphs PCD-A.2.11, PCD-1.1.3 and PCD-1.1.4 of the Prudential Consolidation and Deduction Requirements Module.

LESS:

- (g) Goodwill;
- (h) Current interim cumulative net losses;
- (i) Unrealized gross losses arising from fair valuing equity securities⁵;
- (j) Other deductions made on a pro-rata basis between Tier 1 and Tier 2;
- (k) Reciprocal cross holdings of other banks' capital.

³ This refers to unrealised fair value gains reported directly in equity (such gross gains are included in Tier 2).

⁴ This refers to unrealised net fair value gains taken through P&L (which have been audited). Please note that the unrealised net gains related to unlisted equities taken through P&L arising on or after January 1, 2008 will be subject to 55% discount as stated in CA-2.1.5(c)ii.

⁵ This refers to both 'net losses taken through P&L' and 'gross losses reported directly in equity'.



MODULE	CA: Capital Adequacy
CHAPTER	CA-2: Regulatory Capital

CA-2.1 Regulatory capital (continued)

CA-2.1.2 Certain innovative capital instruments agreed to on a case by case basis by CBB, where the underlying instrument meets the following requirements which must, at a minimum, be fulfilled by all instruments in Tier 1:

- (a) Issued and fully paid;
- (b) Non-cumulative;
- (c) Able to absorb losses within the bank on a going-concern basis;
- (d) Junior to depositors, general creditors, and subordinated debt of the bank;
- (e) Permanent;
- (f) Neither be secured nor covered by a guarantee of the issuer or related entity or other arrangement that legally or economically enhances the seniority of the claim vis-à-vis bank creditors;
- (g) Callable at the initiative of the issuer only after a minimum of five years, with CBB approval and under the condition that it will be replaced with capital of same or better quality, unless the CBB determines that the bank has capital that is more than adequate to cover its risks.
- (h) The main features of such instruments must be easily understood and publicly disclosed;
- (i) Proceeds must be immediately available without limitation to the issuing bank;
- (j) The bank must have discretion over the amount and timing of distributions, subject only to prior waiver of distributions on the bank's common stock, and banks must have full access to waived payments; and
- (k) Distributions can only be paid out of distributable items; where distributions are pre-set they may not be reset based on the credit standing of the issuer.

CA-2.1.3 Moderate step-ups in such instruments meeting the requirements set forth above, are permitted, in conjunction with a call option, only if the moderate step-up occurs at a minimum of ten years after the issue date and if it results in an increase over the initial rate that is no greater than either;

- (a) 100 basis points, less the swap spread between the initial index basis and the stepped-up index basis; or
- (b) 50% of the initial credit spread, less the swap spread between the initial index basis and the stepped-up index basis.

CA-2.1.4 The terms of the instrument should provide for no more than one rate step-up over the life of the instrument. The swap spread should be fixed as of the pricing date and reflect the differential in pricing on that date between the initial reference security or rate and the stepped-up reference security or rate.



MODULE	CA: Capital Adequacy
CHAPTER	CA-2: Regulatory Capital

CA-2.1 Regulatory capital (continued)

Tier 2: Supplementary capital

CA-2.1.5 Tier 2 capital shall consist of the following items:

- (a) Current interim profits which have been reviewed as per the ISA by the external auditors;
- (b) Asset revaluation reserves which arise from the revaluation of fixed assets from time to time in line with the change in market values, and are reflected on the face of the balance sheet as a revaluation reserve. Similarly, gains may also arise from revaluation of Investment Properties (real estate). These reserves (including the net gains on investment properties) may be included in Tier 2 capital, with the concurrence of the external auditors, provided that the assets are prudently valued, fully reflecting the possibility of price fluctuation and forced sale. A discount of 55% must be applied to the difference between the historical cost book value and the market value to reflect the potential volatility of this form of unrealised capital.
- (c) **Unrealized gains arising from fair valuing equities:**
 - i. For unrealized gross gains reported directly in equity, a discount factor of 55% will be applied before inclusion in Tier 2 capital. Note for gross losses, the whole amount of such loss should be deducted from the Tier 1 capital.
 - ii. For unrealized net gains reported in income, a discount factor of 55% will apply on any such unrealized net gains from unlisted equity instruments before inclusion in Tier 1 capital (for audited gains) or Tier 2 capital (for reviewed gains) as appropriate. This discount factor will be applied to the incremental net gains related to unlisted equities arising on or after January 1, 2008.
- (d) Banks should note that the Central Bank will discuss the applicability of the discount factor under paragraph (c) above with individual banks. This discount factor relating to CA-2.1.5(c)ii may be reassessed by the CBB if the bank arranges an independent review (which has been performed for the bank's systems and controls relating to FV gains on financial instruments) and meets all the requirements of the paper '*Supervisory guidance on the use of the fair value option for financial instruments by banks*' issued by Basel Committee on Banking Supervision in June 2006.



MODULE	CA: Capital Adequacy
CHAPTER	CA-2: Regulatory Capital

CA-2.1 Regulatory capital (continued)

- (e) Banks applying the IRB approach for securitisation exposures or the PD/LGD approach for equity exposures must first deduct the expected loss (EL) amounts subject to the corresponding conditions in paragraphs CA-6.4.4 and CA-5.7.13, respectively. Banks applying the IRB approach for other asset classes must compare (i) the amount of total eligible provisions, as defined in paragraph CA-5.7.7, with (ii) the total expected losses amount as calculated within the IRB approach and defined in paragraph CA-5.7.2. Where the total expected loss amount exceeds total eligible provisions, banks must deduct the difference. Deduction must be on the basis of 50% from Tier 1 and 50% from Tier 2. Where the total expected loss amount is less than total eligible provisions, as explained in paragraphs CA-5.7.7 to CA-5.7.10, banks may recognise the difference in Tier 2 capital up to a maximum of 0.6% of credit risk-weighted assets. The provisions in excess of 0.6% of credit risk-weighted assets will be deducted from the risk-weighted assets of the related portfolio to which these provisions relate.
- (f) Hybrid instruments, which include a range of instruments that combine characteristics of equity capital and debt, and which meet the following requirements:
- They are unsecured, subordinated and fully paid-up;
 - They are not redeemable at the initiative of the holder or without the prior consent of the CBB;
 - They are available to participate in losses without the bank being obliged to cease trading (unlike conventional subordinated debt); and
 - Although the capital instrument may carry an obligation to pay interest that cannot permanently be reduced or waived (unlike dividends on ordinary shareholders' equity), it should allow service obligations to be deferred (as with cumulative preference shares) where the profitability of the bank would not support payment. Cumulative preference shares, having the above characteristics, would be eligible for inclusion in Tier 2 capital. Debt capital instruments which do not meet the above criteria may be eligible for inclusion in item (g).



MODULE	CA: Capital Adequacy
CHAPTER	CA-2: Regulatory Capital

CA-2.1 Regulatory capital (continued)

- (g) Subordinated term debt, which comprises all conventional unsecured borrowing subordinated (with respect to both interest and principal) to all other liabilities of the bank except the share capital and limited life redeemable preference shares. To be eligible for inclusion in Tier 2 capital, subordinated debt capital instruments should have a minimum original fixed term to maturity of over five years. During the last five years to maturity, a cumulative discount (or amortisation) factor of 20% per year will be applied to reflect the diminishing value of these instruments as a continuing source of strength. Unlike instruments included in item (f) above, these instruments are not normally available to participate in the losses of a bank which continues trading. For this reason, these instruments will be limited to a maximum of 50% of Tier 1 capital. Subordinated debt instruments must also satisfy the conditions outlined in paragraphs CA-2.1.2 (a), (f), (h), (i), (j), CA-2.1.3 and CA-2.1.4. Further, the subordinated debt is only callable before maturity by the issuer with CBB approval, and there must be a clear statement to this effect in the documentation.

Tier 3: Market risk ancillary capital

CA-2.1.6 Tier 3 capital will consist of short-term subordinated debt which, if circumstances demand, must be capable of becoming part of the bank's permanent capital and thus be available to absorb losses in the event of insolvency. It must therefore, at a minimum, meet the following conditions:

- (a) Be unsecured, subordinated and fully paid up;
- (b) Have an original maturity of at least two years;
- (c) Not be repayable before the agreed repayment date; and
- (d) Be subject to a lock-in clause which stipulates that neither interest nor principal may be paid (even at maturity) if such payment means that the bank falls below or remains below its minimum capital requirement.



MODULE	CA: Capital Adequacy
CHAPTER	CA-2: Regulatory Capital

CA-2.2 Limits on the use of different forms of capital

Tier 1: Core capital

CA-2.2.1 Tier 1 capital must represent at least half of the total eligible capital after all adjustments to all elements of capital, have been made. i.e., the sum total of Tier 2 plus Tier 3 eligible capital must not exceed total Tier 1 eligible capital.

CA-2.2.2 The CBB expects banks to meet the minimum CARs without undue reliance on innovative instruments, including instruments that have a step-up. Accordingly, the aggregate of issuances of non-common equity Tier 1 instruments with any explicit feature, (other than a pure call option), which might lead to the instrument being redeemed is limited (at issuance) to 15% of the consolidated bank's Tier 1 capital.

CA-2.2.3 The limits on innovative Tier 1 instruments and Tier 2 subordinated debt are based on the amount of Tier 1 capital after deduction of goodwill pursuant to the Prudential Consolidation and Deduction Requirements Module (see Appendix CA-1 for an example how to calculate the 15% limit for innovative Tier 1 instruments and Appendix PCD-2 of PCD module for an example of the deduction effects and the caps).

Tier 2: Supplementary capital

CA-2.2.4 Tier 2 elements may be substituted for Tier 3 up to the Tier 3 limit of 250% of Tier 1 capital (as below) in so far as eligible Tier 2 capital does not exceed total Tier 1 capital, and long-term subordinated debt does not exceed 50% of Tier 1 capital after deduction of goodwill.

Tier 3: Ancillary capital

CA-2.2.5 Tier 3 capital is limited to 250% of a bank's Tier 1 capital that is required to support market risks. This means that a minimum of about 28.57% of market risks needs to be supported by Tier 1 capital that is not required to support risks in the remainder of the book.

CA-2.2.6 Banks are entitled to use Tier 3 capital solely to support market risks as defined in chapters CA-9 to CA-14. This means that any capital requirement arising in respect of credit and counterparty risk, including the credit counterparty risk in respect of derivatives in both trading and banking books, needs to be met by Tier 1 and Tier 2 capital.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.1 Overview

- CA-3.1.1 Basel II identifies two methodologies for calculating capital requirements for credit risk. This module sets out the rules relating to the standardized approach. The internal rating-based approach (IRB) and securitization framework are presented in a separate module. The standardized approach makes use of external credit assessments⁶ as a means of calculating the risk weight for an exposure to a counterparty.
- CA-3.1.2 The credit equivalent amount of Securities Financing Transactions (SFT)⁷ and OTC derivatives that expose a bank to counterparty credit risk⁸ is to be calculated under the rules set forth in **Appendix CA-2**.
- CA-3.1.3 In determining the risk weights in the standardised approach, banks must use assessments by only those external credit assessment institutions which are recognised as eligible for capital purposes by CBB in accordance with the criteria defined in section CA-3.4.
- CA-3.1.4 Exposures must be risk-weighted net of specific provisions and taking eligible financial collateral. Where a discount is applied on fair value of an asset (as explained in CA-2.1.5), the value of the asset will be adjusted to exclude that discount part. Refer to appendix CA-17.

⁶ The notations follow the methodology used by one institution, Standard & Poor's. The use of Standard & Poor's credit ratings is an example only; those of some other external credit assessment institutions could equally well be used. The ratings used throughout this document, therefore, do not express any preferences or determinations on external assessment institutions by CBB.

⁷ Securities Financing Transactions (SFT) are transactions such as repurchase agreements, reverse repurchase agreements, security lending and borrowing, and margin lending transactions, where the value of the transactions depends on the market valuations and the transactions are often subject to margin agreements.

⁸ The counterparty credit risk is defined as the risk that the counterparty to a transaction could default before the final settlement of the transaction's cash flows. An economic loss would occur if the transactions or portfolio of transactions with the counterparty has a positive economic value at the time of default. Unlike a firm's exposure to credit risk through a loan, where the exposure to credit risk is unilateral and only the lending bank faces the risk of loss, the counterparty credit risk creates a bilateral risk of loss: the market value of the transaction can be positive or negative to either counterparty to the transaction. The market value is uncertain and can vary over time with the movement of underlying market factors.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims

Claims on sovereigns

CA-3.2.1 Claims on governments of GCC member states (hereinafter referred to as GCC) and their central banks can be risk weighted at 0%. Claims on other sovereigns and their central banks are given a preferential risk weighting of 0% where such claims are denominated and funded in the relevant domestic currency of that sovereign/central bank (e.g. if a Bahraini bank has a claim on government of Australia and the loan is denominated and funded in Australian dollar, it will be risk weighted at 0%). Such preferential risk weight for claims on GCC/other sovereigns and their central banks will be allowed only if the relevant supervisor also allows 0% risk weighting to claims on its sovereign and central bank.

CA-3.2.2 Claims on sovereigns other than those referred to in the previous paragraph must be assigned risk weights as follows:

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk Weight	0%	20%	50%	100%	150%	100%

Claims on international organizations

CA-3.2.3 Claims on the Bank for International Settlements, the International Monetary Fund and the European Central Bank must receive a 0% risk weight.

Claims on non-central government public sectors entities (PSEs)

CA-3.2.4 Claims on the **Bahraini PSEs listed in Appendix CA-18** will be treated as claims on the government of Bahrain.

CA-3.2.5 Where other supervisors also treat claims on named PSEs as claims on their sovereigns, claims to those PSEs are treated as claims on the respective sovereigns as outlined in paragraphs CA-3.2.1 and CA-3.2.2 above. These PSE's must be shown on a list maintained by the concerned central bank or financial regulator. Where PSE's are not on such a list, they must be subject to the treatment outlined in paragraph CA-3.2.6 below.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims (continued)

CA-3.2.6 Claims on all other (foreign) PSEs (i.e. not having sovereign treatment) denominated and funded in the home currency of the sovereign must be risk weighted as allowed by their home country supervisors, provided the sovereign carries rating BBB- or above. Claims on PSEs with no explicit home country weighting or to PSEs in countries of BB+ sovereign rating and below are subject to ECAI ratings as per the following table:

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk Weight	20%	50%	100%	100%	150%	100%

CA-3.2.7 Claims on commercial companies owned by governments must be risk weighted as normal commercial entities unless they are covered by a government guarantee that satisfies the conditions in CA-4.2 and CA-4.5 in which case they may take the risk weight of the concerned government.

Claims on multilateral development banks (MDB's)

CA-3.2.8 MDB's currently eligible for a 0% risk weight are: the World Bank Group comprised of the International Bank for Reconstruction and Development (IBRD) and the International Finance Corporation (IFC), the Asian Development Bank (ADB), the African Development Bank (AfDB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), the European Investment Bank (EIB), the European Investment Fund (EIF), the Nordic Investment Bank (NIB), the Caribbean Development Bank (CDB), the Islamic Development Bank (IDB), Arab Monetary Fund (AMF), the Council of Europe Development Bank (CEDB), the Arab Bank for Economic Development in Africa (ABEDA), Council of European Resettlement Fund (CERF) and the Kuwait Fund for Arab Economic Development (KFAED).

CA-3.2.9 The claims on MDB's, which do not qualify for the 0% risk weighting, should be assigned risk weights as follows:

Banks Credit Quality Grades	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Un-rated
Risk weights	20%	50%	50%	100%	150%	50%



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims (continued)

Claims on banks

CA-3.2.10 Claims on banks must be risk weighted as given in the following table. No claim on an unrated bank may receive a risk weight lower than that applied to claims on its sovereign of incorporation.

Banks Credit Quality Grades	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Un-rated
Standard risk weights	20%	50%	50%	100%	150%	50%
Preferential risk weight	20%	20%	20%	50%	150%	20%

CA-3.2.11 Short-term claims on locally incorporated banks may be assigned a risk weighting of 20% where such claims on the banks are of an original maturity of 3 months or less denominated and funded in either BD or US\$. A preferential risk weight that is one category more favourable than the standard risk weighting may be assigned to claims on foreign banks licensed in Bahrain of an original maturity of 3 months or less denominated and funded in the relevant domestic currency (other than claims on banks that are rated below B-). Such preferential risk weight for short-term claims on banks licensed in other jurisdictions will be allowed only if the relevant supervisor also allows this preferential risk weighting to short-term claims on its banks.

CA-3.2.12 Claims with an (contractual) original maturity under 3 months that are expected to be rolled over (i.e. where the effective maturity is longer than 3 months) will not qualify for a preferential treatment for capital adequacy purposes.

Claims on investment firms

CA-3.2.13 Claims on category one and category two investment firms which are subject to direct supervisory and regulatory provisions from the CBB may be treated as claims on banks for risk weighting purposes but without the use of preferential risk weight for short-term claims. Claims on category three investment firms must be treated as claims on corporates for risk weighting purposes. Claims on investment firms in other jurisdictions will be treated as claims on corporates for risk weighting purposes. However, if the bank can demonstrate that the concerned investment firm is subject to a Basel II equivalent capital adequacy regime and is treated as a bank for risk weighting purposes by its home regulator, then claims on such investment firms may be treated as claims on banks.

Claims on corporates, including insurance companies

CA-3.2.14 Risk weighting for corporates including insurance companies is as follows:



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims (continued)

Credit assessment	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Unrated
Risk weight	20%	50%	100%	150%	100%

CA-3.2.15 Risk weighting for unrated (corporate) claims will be reviewed and where appropriate, may be increased by the CBB.

Claims included in the regulatory retail portfolios

CA-3.2.16 No claim on any unrated corporate, where said corporate originates from a foreign jurisdiction, may be given a risk weight lower than that assigned to a corporate within its own jurisdiction, and in no case will it be below 100%.

CA-3.2.17 **Retail claims that are included in the regulatory retail portfolio must be risk weighted at 75%, except as provided in CA-3.2.23 for the past due loans.**

CA-3.2.18 **To be included in the regulatory retail portfolio, claims must meet the following criteria:**

- (a) **Orientation** – the exposure is to an individual person or persons or to a small business.
- (b) **Product** – The exposure takes the form of any of the following: revolving credits and lines of credit (including credit cards and overdrafts), personal term loans and leases (e.g. instalment loans, auto loans and leases, student and educational loans, personal finance) and small business facilities and commitments. Securities (such as bonds and equities), whether listed or not, are specifically excluded from this category. Mortgage loans are excluded to the extent that they qualify for treatment as claims secured by residential property. Loans for purchase of shares are also excluded from the regulatory retail portfolios.
- (c) **Granularity** – The regulatory retail portfolio is sufficiently diversified to a degree that reduces the risks in the portfolio, warranting a 75% risk weight. No aggregate exposure to one counterpart⁹ can exceed 0.2% of the overall regulatory retail portfolio.

⁹ Aggregated exposure means gross amount (i.e. not taking any credit risk mitigation into account) of all forms of debt exposures (e.g. loans or commitments) that individually satisfy the three other criteria. In addition, “to one counterpart” means one or several entities that may be considered as a single beneficiary (e.g. in the case of a small business that is affiliated to another small business, the limit would apply to the bank’s aggregated exposure on both businesses).



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims (continued)

- (d) The maximum aggregated retail exposure to one counterpart must not exceed an absolute limit of BD 250,000.

Claims secured by residential property

CA-3.2.19 Lending fully secured by first mortgages on residential property that is or will be occupied by the borrower, or that is leased, must carry a risk weighting of 75%. However, if the bank can justify foreclosure or repossession for a claim, the risk weight allowed will be 35%. To get this lower risk weight the bank must obtain a satisfactory legal opinion that foreclosure or repossession is possible without any impediment.

Claims secured by commercial real estate

CA-3.2.20 Claims secured by mortgages on commercial real estate are subject to a minimum of 100% risk weight. If the borrower is rated below BB-, the risk-weight corresponding to the rating of the borrower must be applied.

Past due loans

CA-3.2.21 The unsecured portion of any loan (other than a qualifying residential mortgage loan) that is past due for more than 90 days, net of specific provisions (including partial write-offs), must be risk-weighted as follows:

- (a) 150% risk weight when specific provisions are less than 20% of the outstanding amount of the loan.
(b) 100% risk weight when specific provisions are greater than 20% of the outstanding amount of the loan.

CA-3.2.22 For the purposes of defining the secured portion of a past due loan, eligible collateral and guarantees will be the same as for credit risk mitigation purposes.

CA-3.2.23 Past due retail loans are to be excluded from the overall regulatory retail portfolio when assessing the granularity criterion, for risk-weighting purposes.

CA-3.2.24 In the case of qualifying residential mortgage loans, when such loans are past due for more than 90 days, they must be risk weighted at 100% net of specific provisions.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims (continued)

Higher-risk categories

CA-3.2.25 Holdings of securitization tranches that are rated between BB+ and BB- are risk weighted at 350%.

Investments in equities and funds

CA-3.2.26 Investments in listed equities must be risk weighted at 100% while equities other than listed must be risk weighted at 150%.

CA-3.2.27 Investments in funds (e.g. mutual funds, Collective Investment Undertakings etc.) must be risk weighted as follows:

- If the instrument (e.g. units) is rated, it should be risk-weighted according to its external rating (for risk-weighting, it must be treated as a “claim on corporate”);
- If not rated, such investment should be treated as an equity investment and risk weighted accordingly (i.e. 100% for listed and 150% for others);
- The bank can apply to CBB for using the look-through approach for such investments if it can demonstrate that the look-through approach is more appropriate to the circumstances of the bank;
- If there are no voting rights attached to investment in funds, the investment will not be subjected to consolidation and deduction requirements (except large exposure limits);
- For the purpose of determining “large exposure limit” for investment in funds, the look-through approach should be used (even if the look-through approach is not used to risk weight the investment).

CA-3.2.28 CBB may enforce a bank to adopt one of the IRB treatments for equities if the CBB considers that bank’s equity portfolio is significant.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.2 Segregation of claims (continued)

Holdings of Real Estate

CA-3.2.29 All holdings of real estate by banks (i.e. owned directly or by way of investments in Real Estate Companies, subsidiaries or associate companies or other arrangements such as trusts, funds or REITs) must be risk-weighted at 200%. Premises occupied by the bank may be weighted at 100%. Investments in Real Estate Companies will be subject to the materiality thresholds for commercial companies described in Module PCD and therefore any holdings which amount to 15% or more of regulatory capital will be subject to deduction. The holdings below the 15% threshold will be weighted at 200%.

Other assets

CA-3.2.30 Gold bullion held in own vaults or on an allocated basis to the extent backed by bullion liabilities may be treated as cash and therefore risk-weighted at 0%. In addition, cash items in the process of collection must be risk-weighted at 20%. The standard risk weight for all other assets will be 100%. Investments in regulatory capital instruments issued by banks or investment firms must be risk weighted at a minimum of 100%, unless they are deducted from the capital base according to the Prudential Consolidation and Deduction Requirements Module.

Underwriting of non-trading book items

CA-3.2.31 Where a bank has acquired assets on its balance sheet in the banking book which it is intending to place with third parties under a formal arrangement and is underwriting the placement, the following risk weightings apply during the underwriting period (which may not last for more than 90 days). Once the underwriting period has expired, the usual risk weights should apply.

(a) For holdings of private equity, a risk weighting of 100% will apply instead of the usual 150% (see CA-3.2.26).

(b) For holdings of Real Estate, a risk weight of 100% will apply instead of the usual 200% risk weight (see CA-3.2.29).



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.3 Off-balance sheet items

CA-3.3.1 Off-balance-sheet items must be converted into credit exposure equivalents applying credit conversion factors (CCFs). Counterparty risk weightings for OTC derivative transactions will not be subject to any specific ceiling.

CA-3.3.2 Commitments with an original maturity of up to one year and commitments with an original maturity of over one year will receive a CCF of 20% and 50%, respectively.

CA-3.3.3 Any commitments that are unconditionally cancellable at any time by the bank without prior notice, or that are subject to automatic cancellation due to deterioration in a borrowers' creditworthiness, will receive a 0% CCF.

CA-3.3.4 Direct credit substitutes, e.g. general guarantees of indebtedness (including standby letters of credit serving as financial guarantees for loans and securities) and acceptances (including endorsements with the character of acceptances) must receive a CCF of 100%.

CA-3.3.5 Sale and repurchase agreements and asset sales with recourse, where the credit risk remains with the bank, must receive a CCF of 100%.

CA-3.3.6 A CCF of 100% must be applied to the lending of banks' securities or the posting of securities as collateral by banks, including instances where these arise out of repo-style transactions (i.e. repurchase/reverse repurchase and securities lending/securities borrowing transactions). See Section CA-4.3 for the calculation of risk-weighted assets where the credit converted exposure is secured by eligible collateral.

CA-3.3.7 Forward asset purchases, forward deposits and partly-paid shares and securities, which represent commitments with certain drawdown must receive a CCF of 100%.

CA-3.3.8 Certain transaction-related contingent items (e.g. performance bonds, bid bonds, warranties and standby letters of credit related to particular transactions) must receive CCF of 50%.

CA-3.3.9 Note issuance facilities and revolving underwriting facilities must receive a CCF of 50%.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.3 Off-balance sheet items (continued)

- CA-3.3.10 For short-term self-liquidating trade letters of credit arising from the movement of goods, a 20% CCF must be applied to both issuing and confirming banks.
- CA-3.3.11 Where there is an undertaking to provide a commitment on an off-balance sheet item, banks are to apply the lower of the two applicable CCF's.
- CA-3.3.12 Credit equivalent amount of OTC derivatives and SFTs that expose a bank to counterparty credit risk must be calculated as per Appendix CA-2.
- CA-3.3.13 Banks must closely monitor securities, commodities, and foreign exchange transactions that have failed, starting the first day they fail. A capital charge to failed transactions must be calculated in accordance with CBB guidelines set forth in Appendix CA-4.
- CA-3.3.14 With regard to unsettled securities, commodities, and foreign exchange transactions, banks are encouraged to develop, implement and improve systems for tracking and monitoring the credit risk exposure arising from unsettled transactions as appropriate for producing management information that facilitates action on a timely basis.
- CA-3.3.15 Furthermore, when such transactions are not processed through a delivery-versus-payment (DvP) or payment-versus-payment (PvP) mechanism, banks must calculate a capital charge as set forth in **Appendix CA-4**.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.4 External credit assessments

The recognition process and eligibility criteria

CA-3.4.1 CBB will assess all External Credit Assessment Institutions (ECAI) according to the six criteria below. Any failings, in whole or in part, to satisfy these to the fullest extent will result in the respective ECAI's methodology and associated resultant rating not being accepted by the CBB.

- (a) **Objectivity:** The methodology for assigning credit assessments must be rigorous, systematic, and subject to some form of validation based on historical experience. Moreover, assessments must be subject to ongoing review and responsive to changes in financial condition. Before being recognized by the CBB, an assessment methodology for each market segment, including rigorous back testing, must have been established for an absolute minimum of one year and with a preference of three years.
- (b) **Independence:** An ECAI must show independence and should not be subject to political or economic pressures that may influence the rating. The assessment process should be as free as possible from any constraints that could arise in situations where the composition of the board of directors, political pressure, the shareholder structure of the assessment institution or any other aspect could be seen as creating a conflict of interest.
- (c) **International access/Transparency:** The individual assessments should be available to both domestic and foreign institutions with legitimate interests and at equivalent terms. The general methodology used by the ECAI has to be publicly available.
- (d) **Disclosure:** An ECAI is required to disclose the following information: its assessment methodologies, including the definition of default, the time horizon, and the meaning of each rating; the actual default rates experienced in each assessment category; and the transitions of the assessments, e.g. the likelihood of a slide in the ratings of an exposure from one class to another over time.
- (e) **Resources:** An ECAI must have sufficient resources to carry out high quality credit assessments. These resources should allow for substantial ongoing contact with senior and operational levels within the entities assessed in order to add value to the credit assessments. Such assessments will be based on methodologies combining qualitative and quantitative approaches.
- (f) **Credibility:** Credibility, to a certain extent, can derive from the criteria above. In addition, the reliance on an ECAI's external credit assessments by independent parties (investors, insurers, trading partners) may be evidence of the credibility of the assessments of an ECAI. The credibility of an ECAI will also be based on the existence of internal procedures to prevent the misuse of confidential information. In order to be eligible for recognition, an ECAI does not have to assess firms in more than one country.

CA-3.4.2 The CBB recognizes Standard and Poor's, Moody's, Fitch IBCA and Capital Intelligence as eligible ECAIs. With respect to the possible recognition of other rating agencies as eligible ECAIs, CBB will update this paragraph subject to the rating agencies satisfying the eligibility requirements. (See Appendix 16 for mapping of eligible ECAIs).



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.4 External credit assessments (continued)

CA-3.4.3 Banks must use the chosen ECAIs and their ratings consistently for each type of claim, for both risk weighting and risk management purposes. Banks will not be allowed to “cherry-pick” the assessments provided by different eligible ECAIs.

CA-3.4.4 Banks must disclose ECAIs that they use for the risk weighting of their assets by type of claims, the risk weights associated with the particular rating grades as determined by CBB through the mapping process as well as the aggregated risk-weighted assets for each risk weight based on the assessments of each eligible ECAI.

Multiple assessments

CA-3.4.5 If there are two assessments by eligible ECAIs chosen by a bank which map into different risk weights, the higher risk weight must be applied.

CA-3.4.6 If there are three or more assessments by eligible ECAIs chosen by a bank which map into different risk weights, the assessments corresponding to the two lowest risk weights should be referred to and the higher of those two risk weights must be applied.

Issuer versus issues assessment

CA-3.4.7 Where a bank invests in a particular issue that has an issue-specific assessment, the risk weight of the claim will be based on this assessment. Where the bank’s claim is not an investment in a specific assessed issue, the following general principles apply.

- (a) In circumstances where the borrower has a specific assessment for an issued debt — but the bank’s claim is not an investment in this particular debt — a high quality credit assessment (one which maps into a risk weight lower than that which applies to an unrated claim) on that specific debt may only be applied to the bank’s un-assessed claim if this claim ranks *pari passu* or senior to the claim with an assessment in all respects. If not, the credit assessment cannot be used and the un-assessed claim will receive the risk weight for unrated claims.
- (b) In circumstances where the borrower has an issuer assessment, this assessment typically applies to senior unsecured claims on that issuer. Consequently, only senior claims on that issuer will benefit from a high quality issuer assessment. Other un-assessed claims of a highly assessed issuer will be treated as unrated. If either the issuer or a single issue has a low quality assessment (mapping into a risk weight equal to or higher than that which applies to unrated claims), an un-assessed claim on the same counterparty will be assigned the same risk weight as is applicable to the low quality assessment.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.4 External credit assessments (continued)

CA-3.4.8 Whether the bank intends to rely on an issuer- or an issue-specific assessment, the assessment must take into account and reflect the entire amount of credit risk exposure the bank has with regard to all payments owed to it.¹⁰

CA-3.4.9 In order to avoid any double counting of credit enhancement factors, no recognition of credit risk mitigation techniques will be taken into account if the credit enhancement is already reflected in the issue specific rating (see paragraph CA-4.1.5).

Domestic currency and foreign currency assessments

CA-3.4.10 Where unrated exposures are risk weighted based on the rating of an equivalent exposure to that borrower, the general rule is that foreign currency ratings would be used for exposures in foreign currency. Domestic currency ratings, if separate, would only be used to risk weight claims denominated in the domestic currency.

CA-3.4.11 However, when an exposure arises through a bank's participation in a loan that has been extended, or has been guaranteed against convertibility and transfer risk, by certain MDBs, its convertibility and transfer risk can be considered by CBB, on a case by case basis, to be effectively mitigated. To qualify, MDBs must have preferred creditor status recognised in the market and be included in MDB's qualifying for 0% risk rate under CA-3.2.8. In such cases, for risk weighting purposes, the borrower's domestic currency rating may be used instead of its foreign currency rating. In the case of a guarantee against convertibility and transfer risk, the local currency rating can be used only for the portion that has been guaranteed. The portion of the loan not benefiting from such a guarantee will be risk-weighted based on the foreign currency rating.

Short-term/long-term assessments

CA-3.4.12 For risk-weighting purposes, short-term assessments are deemed to be issue-specific. They can only be used to derive risk weights for claims arising from the rated facility. They cannot be generalised to other short-term claims, except under the conditions of paragraph CA-3.4.14. In no event can a short-term rating be used to support a risk weight for an unrated long-term claim. Short-term assessments may only be used for short-term claims against banks and corporates. The table below provides a framework for banks' exposures to specific short-term facilities, such as a particular issuance of commercial paper:

¹⁰ For example, if a bank is owed both principal and interest, the assessment must fully take into account and reflect the credit risk associated with repayment of both principal and interest.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.4 External credit assessments (continued)

Credit assessment	A-1/P-1 ¹¹	A-2/P-2	A-3/P-3	Others ¹²
Risk weight	20%	50%	100%	150%

CA-3.4.13 If a short-term rated facility attracts a 50% risk-weight, unrated short-term claims cannot attract a risk weight lower than 100%. If an issuer has a short-term facility with an assessment that warrants a risk weight of 150%, all unrated claims, whether long-term or short-term, should also receive a 150% risk weight, unless the bank uses recognised credit risk mitigation techniques for such claims.

CA-3.4.14 For short-term claims on banks, the interaction with specific short-term assessments is expected to be the following:

- (a) The general preferential treatment for short-term claims, as defined under paragraphs CA-3.2.11 and CA-3.2.12, applies to all claims on banks of up to three months original maturity when there is no specific short-term claim assessment.
- (b) When there is a short-term assessment and such an assessment maps into a risk weight that is more favourable (i.e. lower) or identical to that derived from the general preferential treatment, the short-term assessment should be used for the specific claim only. Other short-term claims would benefit from the general preferential treatment.
- (c) When a specific short-term assessment for a short term claim on a bank maps into a less favourable (higher) risk weight, the general short-term preferential treatment for inter-bank claims cannot be used. All unrated short-term claims should receive the same risk weighting as that implied by the specific short-term assessment.

CA-3.4.15 When a short-term assessment is to be used, the institution making the assessment needs to meet all of the eligibility criteria for recognising ECAIs as presented in paragraph CA-3.4.1 in terms of its short-term assessment.

Level of application of the assessment

CA-3.4.16 External assessments for one entity within a corporate group must not be used to risk weight other entities within the same group.

¹¹ The notations follow the methodology used by Standard & Poor's and by Moody's Investors Service. The A-1 rating of Standard & Poor's includes both A-1+ and A-1-.

¹² This category includes all non-prime and B or C ratings.



MODULE	CA: Capital Adequacy
CHAPTER	CA-3: Credit Risk – The Standardized Approach

CA-3.4 External credit assessments (continued)

Unsolicited ratings

CA-3.4.17 As a general rule, banks should use solicited ratings from eligible ECAs but they are also allowed to use unsolicited ratings in the same way as solicited ratings. However, there may be the potential for ECAs to use unsolicited ratings to put pressure on entities to obtain solicited ratings. If such behaviour is identified, CBB may disallow the use of unsolicited ratings.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.1 Overarching Issues

Introduction

CA-4.1.1 Banks use a number of techniques to mitigate the credit risks to which they are exposed. For example, exposures may be collateralised by first priority claims, in whole or in part with cash or securities, a loan exposure may be guaranteed by a third party, or a bank may buy a credit derivative to offset various forms of credit risk. Additionally banks may agree to net loans owed to them against deposits from the same counterparty. Off-balance sheet items will first be converted into on-balance sheet equivalents prior to the CRM being applied.

General remarks

CA-4.1.2 The framework set out in this sub-section of “General remarks” is applicable to all banking book exposures. Certain additional types of collateral are also eligible under the IRB approach (see paragraph CA-5.3.20 and others).

CA-4.1.3 The comprehensive approach for the treatment of collateral (see paragraphs CA-4.2.12 to CA-4.2.20 and CA-4.3.1 to CA-4.3.32) will also be applied to calculate the counterparty risk charges for OTC derivatives and repo-style transactions booked in the trading book.

CA-4.1.4 No transaction in which CRM techniques are used should receive a higher capital requirement than an otherwise identical transaction where such techniques are not used.

CA-4.1.5 The effects of CRM will not be double counted. Therefore, no additional recognition of CRM for regulatory capital purposes will be applicable on claims for which an issue-specific rating is used that already reflects that CRM. As stated in paragraph CA-3.4.8 of the section on the standardised approach, principal-only ratings will also not be allowed within the framework of CRM.

CA-4.1.6 While the use of CRM techniques reduces or transfers credit risk, it simultaneously may increase other risks (residual risks). Residual risks include legal, operational, liquidity and market risks. Therefore, it is imperative that banks employ robust procedures and processes to control these risks, including strategy; consideration of the underlying credit; valuation; policies and procedures; systems; control of roll-off risks; and management of concentration risk arising from the bank’s use of CRM techniques and its interaction with the bank’s overall credit risk profile. Where these risks are not adequately controlled, the CBB may impose additional capital charges or take supervisory actions.

CA-4.1.7 Market Discipline requirements must also be observed for banks to obtain capital relief in respect of any CRM techniques.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-4:	Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.1 Overarching Issues (continued)

Legal certainty

CA-4.1.8 In order for banks to obtain capital relief for any use of CRM techniques, the following minimum standards for legal documentation must be met.

CA-4.1.9 All documentation used in collateralised transactions and for documenting on- balance sheet netting, guarantees and credit derivatives 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.2 Overview of Credit Risk Mitigation Techniques¹³

Collateralised transactions

CA-4.2.1 A collateralised transaction is one in which:

- (a) Banks have a credit exposure or potential credit exposure; and
- (b) That credit exposure or potential credit exposure is hedged in whole or in part by collateral posted by a counterparty¹⁴ or by a third party on behalf of the counterparty.

CA-4.2.2 Where banks take eligible financial collateral (e.g. cash or securities, more specifically defined in paragraphs CA.4.3.1 and CA4.3.2, they are allowed to reduce their credit exposure to a counterparty when calculating their capital requirements to take account of the risk mitigating effect of the collateral.

Overall framework and minimum conditions

CA-4.2.3 Banks may opt for either the simple approach, which substitutes the risk weighting of the collateral for the risk weighting of the counterparty for the collateralised portion of the exposure (generally subject to a 20% floor), or for the comprehensive approach, which allows fuller offset of collateral against exposures, by effectively reducing the exposure amount by the value ascribed to the collateral. Banks may operate under either, but not both, approaches in the banking book, but only under the comprehensive approach in the trading book. Partial collateralisation is recognised in both approaches. Mismatches in the maturity of the underlying exposure and the collateral will only be allowed under the comprehensive approach.

CA-4.2.4 However, before capital relief will be granted in respect of any form of collateral, the standards set out below in paragraphs CA-4.2.5 to CA-4.2.8 must be met under either approach.

¹³ See **Appendix CA-5** for an overview of methodologies for the capital treatment of transactions secured by financial collateral under the standardised and IRB approaches.

¹⁴ In this section “counterparty” is used to denote a party to whom a bank has an on- or off-balance sheet credit exposure or a potential credit exposure. That exposure may, for example, take the form of a loan of cash or securities (where the counterparty would traditionally be called the borrower), of securities posted as collateral, of a commitment or of exposure under an OTC derivatives contract.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.2 Overview of Credit Risk Mitigation Techniques (continued)

CA-4.2.5 In addition to the general requirements for legal certainty set out in paragraphs CA4.1.8 and CA-4.1.9, the legal mechanism by which collateral is pledged or transferred must ensure that the bank has the right to liquidate or take legal possession of it, in a timely manner, in the event of the default, insolvency or bankruptcy (or one or more otherwise-defined credit events set out in the transaction documentation) of the counterparty (and, where applicable, of the custodian holding the collateral). Furthermore banks must take all steps necessary to fulfil those requirements under the law applicable to the bank's interest in the collateral for obtaining and maintaining an enforceable security interest, e.g. by registering it with a registrar, or for exercising a right to net or set off in relation to title transfer collateral.

CA-4.2.6 In order for collateral to provide protection, the credit quality of the counterparty and the value of the collateral must not have a material positive correlation. For example, securities issued by the counterparty – or by any related group entity – would provide little protection and so would be ineligible.

CA-4.2.7 Banks must have clear and robust procedures for the timely liquidation of collateral to ensure that any legal conditions required for declaring the default of the counterparty and liquidating the collateral are observed, and that collateral can be liquidated promptly.

CA-4.2.8 Where the collateral is held by a custodian, banks must take reasonable steps to ensure that the custodian segregates the collateral from its own assets.

CA-4.2.9 A capital requirement will be applied to a bank on either side of the collateralised transaction: for example, both repos and reverse repos will be subject to capital requirements. Likewise, both sides of a securities lending and borrowing transaction will be subject to explicit capital charges, as will the posting of securities in connection with a derivative exposure or other borrowing.

CA-4.2.10 Where a bank, acting as agent, arranges a repo-style transaction (i.e. repurchase/reverse repurchase and securities lending/borrowing transactions) between a customer and a third party and provides a guarantee to the customer that the third party will perform on its obligations, then the risk to the bank is the same as if the bank had entered into the transaction as a principal. In such circumstances, a bank will be required to calculate capital requirements as if it were itself the principal.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.2 Overview of Credit Risk Mitigation Techniques (continued)

The simple approach

CA-4.2.11 In the simple approach the risk weighting of the collateral instrument collateralising or partially collateralising the exposure is substituted for the risk weighting of the counterparty. Details of this framework are provided in paragraphs CA-4.3.26 to CA-4.3.29.

The comprehensive approach

CA-4.2.12 In the comprehensive approach, when taking collateral, banks must calculate their adjusted exposure to a counterparty for capital adequacy purposes in order to take account of the effects of that collateral. Using haircuts, banks are required to adjust both the amount of the exposure to the counterparty and the value of any collateral received in support of that counterparty to take account of possible future fluctuations in the value of either¹⁵, occasioned by market movements. This will produce volatility adjusted amounts for both exposure and collateral. Unless either side of the transaction is cash, the volatility adjusted amount for the exposure will be higher than the exposure and for the collateral it will be lower.

CA-4.2.13 Additionally where the exposure and collateral are held in different currencies an additional downwards adjustment must be made to the volatility adjusted collateral amount to take account of possible future fluctuations in exchange rates.

CA-4.2.14 Where the volatility-adjusted exposure amount is greater than the volatility-adjusted collateral amount (including any further adjustment for foreign exchange risk), banks shall calculate their risk-weighted assets as the difference between the two multiplied by the risk weight of the counterparty. The framework for performing these calculations is set out in paragraphs CA-4.3.3 to CA-4.3.6.

CA-4.2.15 Banks must use standard haircuts given in paragraph CA-4.3.7 unless allowed to use models under CA-4.3.22.

CA-4.2.16 The size of the individual haircuts will depend on the type of instrument, type of transaction and the frequency of marking-to-market and re-margining. For example, repo- style transactions subject to daily marking-to-market and to daily re-margining will receive a haircut based on a 5-business day holding period and secured lending transactions with daily mark-to-market and no re-margining clauses will receive a haircut based on a 20-business day holding period. These haircut numbers will be scaled up using the square root of time formula depending on the frequency of re-margining or marking-to-market.

¹⁵ Exposure amounts may vary where, for example, securities are being lent.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.2 Overview of Credit Risk Mitigation Techniques (continued)

CA-4.2.17 For certain types of repo-style transactions (broadly speaking government bond repos as defined in paragraphs CA-4.3.14 and CA-4.3.15, the CBB may allow banks using standard haircuts not to apply these haircuts in calculating the exposure amount after risk mitigation.

CA-4.2.18 The effect of master netting agreements covering repo-style transactions can be recognised for the calculation of capital requirements subject to the conditions in paragraph CA-4.3.17.

CA-4.2.19 As an alternative to standard haircuts banks may, subject to approval from CBB, use VaR models for calculating potential price volatility for repo-style transactions and other similar SFTs, as set out in paragraphs CA-4.3.22 to CA-4.3.25 below. Alternatively, subject to approval from the CBB's, they may also calculate, for these transactions, an expected positive exposure, as set forth in **Appendix CA-2** of this Module.

On-balance sheet netting

CA-4.2.20 Where banks have legally enforceable netting arrangements for loans and deposits they may calculate capital requirements on the basis of net credit exposures subject to the conditions in paragraph CA-4.4.1.

Guarantees and credit derivatives

CA-4.2.21 Where guarantees or credit derivatives are direct, explicit, irrevocable and unconditional, and the CBB is satisfied that banks fulfil certain minimum operational conditions relating to risk management processes they may allow banks to take account of such credit protection in calculating capital requirements.

CA-4.2.22 A range of guarantors and protection providers are recognised, as shown in paragraph CA-4.5.7. A substitution approach will be applied. Thus only guarantees issued by or protection provided by entities with a lower risk weight than the counterparty will lead to reduced capital charges since the protected portion of the counterparty exposure is assigned the risk weight of the guarantor or protection provider, whereas the uncovered portion retains the risk weight of the underlying counterparty.

CA-4.2.23 Detailed operational requirements are given below in paragraphs CA-4.5.1 to CA-4.5.5.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.2 Overview of Credit Risk Mitigation Techniques (continued)

Maturity mismatch

CA-4.2.24 Where the residual maturity of the CRM is less than that of the underlying credit exposure a maturity mismatch occurs. Where there is a maturity mismatch and the CRM has an original maturity of less than one year, the CRM is not recognised for capital purposes. In other cases where there is a maturity mismatch, partial recognition is given to the CRM for regulatory capital purposes as detailed below in paragraphs CA-4.6.1 to CA-4.6.4. Under the simple approach for collateral maturity mismatches will not be allowed.

Miscellaneous

CA-4.2.25 Treatments for pools of credit risk mitigants and first- and second-to-default credit derivatives are given in paragraphs CA-4.7.1 to CA-4.7.5.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral

Eligible financial collateral

CA-4.3.1 The following collateral instruments are eligible for recognition in the simple approach:

- (a) Cash (as well as certificates of deposit or comparable instruments issued by the lending bank) on deposit with the bank which is incurring the counterparty exposure.^{16,17}
- (b) Gold.
- (c) Debt securities rated by a recognised external credit assessment institution where these are either:
 - i. at least BB- when issued by sovereigns or PSEs that are treated as sovereigns by the CBB; or
 - ii. at least BBB- when issued by other entities (including banks and securities firms); or
 - iii. at least A-3/P-3 for short-term debt instruments.
- (d) Debt securities not rated by a recognised external credit assessment institution where these are:
 - i. issued by a bank; and
 - ii. listed on a recognised exchange; and
 - iii. classified as senior debt; and
 - iv. all rated issues of the same seniority by the issuing bank must be rated at least BBB- or A-3/P-3 by a recognised external credit assessment institution; and
 - v. the bank holding the securities as collateral has no information to suggest that the issue justifies a rating below BBB- or A-3/P-3 (as applicable); and
 - vi. the CBB is sufficiently confident about the market liquidity of the security.

¹⁶ Cash funded credit linked notes issued by the bank against exposures in the banking book which fulfil the criteria for credit derivatives will be treated as cash collateralised transactions.

¹⁷ When cash on deposit, certificates of deposit or comparable instruments issued by the lending bank are held as collateral at a third-party bank in a non-custodial arrangement, if they are openly pledged/assigned to the lending bank and if the pledge /assignment is unconditional and irrevocable, the exposure amount covered by the collateral (after any necessary haircuts for currency risk) will receive the risk weight of the third-party bank.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

- (e) Equities (including convertible bonds) that are included in a main index.
- (f) Undertakings for Collective Investments in Transferable Securities (UCITS) and mutual funds where:
 - i. a price for the units is publicly quoted daily; and
 - ii. the UCITS/mutual fund is limited to investing in the instruments listed in this paragraph¹⁸.

CA-4.3.2 The following collateral instruments are eligible for recognition in the comprehensive approach:

- (a) All of the instruments in paragraph CA-4.3.1;
- (b) Equities (including convertible bonds) which are not included in a main index but which are listed on a recognised exchange;
- (c) UCITS/mutual funds which include such equities.

The comprehensive approach

Calculation of capital requirement

CA-4.3.3 For a collateralised transaction, the exposure amount after risk mitigation is calculated as follows:

$$E^* = \max \{0, [E \times (1 + H_e) - C \times (1 - H_c - H_{fx})]\}$$

where:

E^* = the exposure value after risk mitigation

E = current value of the exposure

H_e = haircut appropriate to the exposure

C = the current value of the collateral received

H_c = haircut appropriate to the collateral

H_{fx} = haircut appropriate for currency mismatch between the collateral and exposure

¹⁸ However, the use or potential use by a UCITS/mutual fund of derivative instruments solely to hedge investments listed in this paragraph and paragraph CA-4.3.2 shall not prevent units in that UCITS /mutual fund from being eligible financial collateral.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

CA-4.3.4 The exposure amount after risk mitigation will be multiplied by the risk weight of the counterparty to obtain the risk-weighted asset amount for the collateralised transaction.

CA-4.3.5 The treatment for transactions where there is a mismatch between the maturity of the counterparty exposure and the collateral is given in paragraphs CA-4.6.1 to CA-4.6.4.

CA-4.3.6 Where the collateral is a basket of assets, the haircut on the basket will be $H = \sum_i a_i H_i$, where a_i is the weight of the asset (as measured by units of currency) in the i basket and H_i the haircut applicable to that asset.

Standard haircuts

CA-4.3.7 These are the standard haircuts (assuming daily mark-to-market, daily re-margining and a 10-business day holding period), expressed as percentages:

Issue rating for debt securities	Residual Maturity	Sovereigns ^{19,20}	Other issuers ²¹
AAA to AA-/A-1	≤1 year	0.5	1
	>1 year, ≤5 years	2	4
	> 5 years	4	8
A+ to BBB-/A-2/A-3/P-3 and unrated bank securities per para. CA-4.3.1(d)	≤1 year	1	2
	>1 year, ≤5 years	3	6
	> 5 years	6	12
BB+ to BB-	All	15	
Main index equities (including convertible bonds) and Gold		15	
Other equities (including convertible bonds) listed on a recognised exchange		25	
UCITS/Mutual funds		Highest haircut applicable to any security in which the fund can invest	
Cash in the same currency ²²		0	

¹⁹ Includes PSEs which are treated as sovereigns by the CBB.

²⁰ Multilateral development banks receiving a 0% risk weight will be treated as sovereigns.

²¹ Includes PSEs which are not treated as sovereigns by CBB.

²² Eligible cash collateral specified in paragraph CA-4.3.1 (a).



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

CA-4.3.8 The standard haircut for currency risk where exposure and collateral are denominated in different currencies is 8% (also based on a 10-business day holding period and daily mark-to-market)

CA-4.3.9 For transactions in which the bank lends non-eligible instruments (e.g. non-investment grade corporate debt securities), the haircut to be applied on the exposure should be the same as the one for equity traded on a recognised exchange that is not part of a main index.

Adjustment for different holding periods and non daily mark-to-market or re-margining

CA-4.3.10 For some transactions, depending on the nature and frequency of the revaluation and re-margining provisions, different holding periods are appropriate. The framework for collateral haircuts distinguishes between repo-style transactions (i.e. repo/reverse repos and securities lending/borrowing), “other capital-market-driven transactions” (i.e. OTC derivatives transactions and margin lending) and secured lending. In capital-market-driven transactions and repo-style transactions, the documentation contains remargining clauses; in secured lending transactions, it generally does not.

CA-4.3.11 The minimum holding period for various products is summarised in the following table.

Transaction type	Minimum holding period	Condition
Repo-style transaction	five business days	daily re-margining
Other capital market transactions	ten business days	daily re-margining
Secured lending	twenty business days	daily revaluation



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

CA-4.3.12 When the frequency of remargining or revaluation is longer than the minimum, the minimum haircut numbers will be scaled up depending on the actual number of business days between remargining or revaluation using the square root of time formula below:

$$H = H_M \sqrt{\frac{N_R + (T_M - 1)}{T_M}}$$

where:

H = haircut

H_M = haircut under the minimum holding period

T_M = minimum holding period for the type of transaction

N_R = actual number of business days between remargining for capital market transactions or revaluation for secured transactions.

When a bank calculates the volatility on a T_N day holding period which is different from the specified minimum holding period T_M, the H_M will be calculated using the square root of time formula:

$$H_M = H_N \sqrt{\frac{T_M}{T_N}}$$

T_N = holding period used by the bank for deriving H_N

H_N = haircut based on the holding period T_N



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

CA-4.3.13 For example, for banks using the standard CBB haircuts, the 10-business day haircuts provided in paragraph CA-4.3.7 will be the basis and this haircut will be scaled up or down depending on the type of transaction and the frequency of re-margining or revaluation using the formula below:

$$H = H_{10} \sqrt{\frac{N_R + (T_M - 1)}{10}}$$

where:

H = haircut

H₁₀ = 10-business day standard CBB haircut for instrument

N_R = actual number of business days between re-margining for capital market transactions or revaluation for secured transactions.

T_M = minimum holding period for the type of transaction

Conditions for zero H

CA-4.3.14 For repo-style transactions where the following conditions are satisfied, and the counterparty is a core market participant, banks are not required to apply the haircuts specified in the comprehensive approach and may instead apply a haircut of zero. This carve-out will not be available for banks using the modelling approaches as described in paragraphs CA-4.3.22 to CA-4.3.25.

- (a) Both the exposure and the collateral are cash or a sovereign security or PSE security qualifying for a 0% risk weight in the standardised approach;
- (b) Both the exposure and the collateral are denominated in the same currency;
- (c) Either the transaction is overnight or both the exposure and the collateral are marked-to-market daily and are subject to daily re-margining;
- (d) Following a counterparty's failure to re-margin, the time that is required between the last mark-to-market before the failure to re-margin and the liquidation²³ of the collateral is considered to be no more than four business days;
- (e) The transaction is settled across a settlement system proven for that type of transaction;

²³ This does not require the bank to always liquidate the collateral but rather to have the capability to do so within the given time frame.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

- (f) The documentation covering the agreement is standard market documentation for repo-style transactions in the securities concerned;
- (g) The transaction is governed by documentation specifying that if the counterparty fails to satisfy an obligation to deliver cash or securities or to deliver margin or otherwise defaults, then the transaction is immediately terminable; and
- (h) Upon any default event, regardless of whether the counterparty is insolvent or bankrupt, the bank has the unfettered, legally enforceable right to immediately seize and liquidate the collateral for its benefit.

CA-4.3.15 Core market participants include the following entities:

- (a) Sovereigns, central banks and PSEs;
- (b) Banks and securities firms;
- (c) Other financial companies (including insurance companies) eligible for a 20% risk weight in the standardised approach;
- (d) Regulated mutual funds that are subject to capital or leverage requirements;
- (e) Regulated pension funds; and
- (f) Recognised clearing organisations.

CA-4.3.16 Where a supervisor has applied a specific carve-out to repo-style transactions in securities issued by its domestic government, then banks incorporated in Bahrain are allowed to adopt the same approach to the same transactions.

Treatment of repo-style transactions covered under master netting agreements

CA-4.3.17 The effects of bilateral netting agreements covering repo-style transactions will be recognised on a counterparty-by-counterparty basis if the agreements are legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of whether the counterparty is insolvent or bankrupt. In addition, netting agreements must:

- (a) provide the non-defaulting party the right to terminate and close-out in a timely manner all transactions under the agreement upon an event of default, including in the event of insolvency or bankruptcy of the counterparty;
- (b) provide for the netting of gains and losses on transactions (including the value of any collateral) terminated and closed out under it so that a single net amount is owed by one party to the other;
- (c) allow for the prompt liquidation or setoff of collateral upon the event of default; and
- (d) be, together with the rights arising from the provisions required in (a) to (c) above, legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of the counterparty's insolvency or bankruptcy.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

CA-4.3.18 Netting across positions in the banking and trading book will only be recognised when the netted transactions fulfil the following conditions:

- (a) All transactions are marked to market daily²⁴; and
- (b) The collateral instruments used in the transactions are recognised as eligible financial collateral in the banking book.

CA-4.3.19 The formula in paragraph CA-4.3.3 will be adapted to calculate the capital requirements for transactions with netting agreements.

CA-4.3.20 For banks using the standard haircuts, the framework below will apply to take into account the impact of master netting agreements.

$$E^* = \max \{0, [(\sum(E) - \sum(C)) + \sum (E_S \times H_S) + \sum (E_{FX} \times H_{FX})]\}^{25}$$

where:

E^* = the exposure value after risk mitigation

E = current value of the exposure

C = the value of the collateral received

E_S = absolute value of the net position in a given security

H_S = haircut appropriate to E_S

E_{FX} = absolute value of the net position in a currency different from the settlement currency

H_{FX} = haircut appropriate for currency mismatch

CA-4.3.21 The intention here is to obtain a net exposure amount after netting of the exposures and collateral and have an add-on amount reflecting possible price changes for the securities involved in the transactions and for foreign exchange risk if any. The net long or short position of each security included in the netting agreement will be multiplied by the appropriate haircut. All other rules regarding the calculation of haircuts stated in paragraphs CA4.3.3 to CA-4.3.16 equivalently apply for banks using bilateral netting agreements for repo-style transactions.

²⁴ The holding period for the haircuts will depend as in other repo-style transactions on the frequency of margining.

²⁵ The starting point for this formula is the formula in paragraph CA-4.3.3 which can also be presented as the following: $E^* = \max \{0, [(E - C) + (E \times H_e) + (C \times H_c) + (C \times H_{fx})]\}$



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

Use of models

CA-4.3.22 As an alternative to the use of standard haircuts, CBB may allow banks to use a VaR models approach to reflect the price volatility of the exposure and collateral for repo-style transactions, taking into account correlation effects between security positions. This approach would apply to repo-style transactions covered by bilateral netting agreements on a counterparty-by-counterparty basis. At the discretion of CBB, firms are also eligible to use the VaR model approach for margin lending transactions, if the transactions are covered under a bilateral master netting agreement that meets the requirements of paragraphs CA-4.3.17 and CA-4.3.18. The VaR models approach is available to banks that have received CBB's recognition for an internal market risk model under the chapter CA-14. Banks which have not received CBB's recognition for use of models under the chapter CA-14 can separately apply for CBB's recognition to use their internal VaR models for calculation of potential price volatility for repo-style transactions. Internal models will only be accepted when a bank can prove the quality of its model to CBB through the backtesting of its output using one year of historical data. Banks must meet the model validation requirement of paragraph 43 of **Appendix CA-2** to use VaR for repo-style and other SFTs. In addition, other transactions similar to repo-style transactions (like prime brokerage) and that meet the requirements for repo-style transactions, are also eligible to use the VaR models approach provided the model used meets the operational requirements set forth in Section I.F of **Appendix CA-2**.

CA-4.3.23 The quantitative and qualitative criteria for recognition of internal market risk models for repo-style transactions and other similar transactions are in principle the same as under Chapter CA-14. With regard to the holding period, the minimum will be 5- business days for repo-style transactions, rather than the 10-business days under the Market Risk Amendment. For other transactions eligible for the VaR models approach, the 10- business day holding period will be retained. The minimum holding period should be adjusted upwards for market instruments where such a holding period would be inappropriate given the liquidity of the instrument concerned.

CA-4.3.24 The calculation of the exposure E* for banks using their internal model will be the following:

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

In calculating capital requirements banks will use the previous business day's VaR number.

CA-4.3.25 Subject to CBB's approval, instead of using the VaR approach, banks may also calculate an expected positive exposure for repo-style and other similar SFTs, in accordance with the Internal Model Method set out in **Appendix CA-2** of this Module.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

The simple approach

Minimum conditions

CA-4.3.26 For collateral to be recognised in the simple approach, the collateral must be pledged for at least the life of the exposure and it must be marked to market and revalued with a minimum frequency of six months. Those portions of claims collateralised by the market value of recognised collateral receive the risk weight applicable to the collateral instrument. The risk weight on the collateralised portion will be subject to a floor of 20% except under the conditions specified in paragraphs CA-4.3.27 to CA-4.3.29. The remainder of the claim should be assigned to the risk weight appropriate to the counterparty. A capital requirement will be applied to banks on either side of the collateralised transaction: for example, both repos and reverse repos will be subject to capital requirements.

Exceptions to the risk weight floor

CA-4.3.27 Transactions which fulfil the criteria outlined in paragraph CA-4.3.14 and are with a core market participant, as defined in paragraph CA-4.3.15, receive a risk weight of 0%. If the counterparty to the transactions is not a core market participant the transaction should receive a risk weight of 10%.

CA-4.3.28 OTC derivative transactions subject to daily mark-to-market, collateralised by cash and where there is no currency mismatch receive a 0% risk weight. Such transactions collateralised by sovereign or PSE securities qualifying for a 0% risk weight in the standardised approach will receive a 10% risk weight.

CA-4.3.29 The 20% floor for the risk weight on a collateralised transaction will not be applied and a 0% risk weight can be applied where the exposure and the collateral are denominated in the same currency, and either:

- (a) the collateral is cash on deposit as defined in paragraph CA-4.3.1(a); or
- (b) the collateral is in the form of sovereign/PSE securities eligible for a 0% risk weight, and its market value has been discounted by 20%.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.3 Collateral (continued)

Collateralised OTC derivatives transactions

CA-4.3.30 Under the Current Exposure Method, the calculation of the counterparty credit risk charge for an individual contract will be as follows:

$$\text{Counterparty charge} = [(\text{RC} + \text{add-on}) - C_A] \times r \times 8\%$$

Where:

RC = the replacement cost,

Add-on = the amount for potential future exposure calculated in CBB's 2004 Rule Book.

C_A = the volatility adjusted collateral amount under the comprehensive approach prescribed in paragraphs CA-4.3.3 to CA-4.3.16, or zero if no eligible collateral is applied to the transaction, and

r = the risk weight of the counterparty.

CA-4.3.31 When effective bilateral netting contracts are in place, RC will be the net replacement cost and the add-on will be A_{Net} as calculated according to paragraph 96 (i) to 96 (vi) of **Appendix 2**. The haircut for currency risk (H_{fx}) should be applied when there is a mismatch between the collateral currency and the settlement currency. Even in the case where there are more than two currencies involved in the exposure, collateral and settlement currency, a single haircut assuming a 10-business day holding period scaled up as necessary depending on the frequency of mark-to-market will be applied.

CA-4.3.32 As an alternative to the Current Exposure Method for the calculation of the counterparty credit risk charge, banks may also use the Standardised Method and, subject to CBB's approval, the Internal Model Method as set out in **Appendix CA-2** of this Module.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.4 On-balance sheet netting

CA-4.4.1 Where a bank,

- (a) has a well-founded legal basis for concluding that the netting or offsetting agreement is enforceable in each relevant jurisdiction regardless of whether the counterparty is insolvent or bankrupt;
- (b) is able at any time to determine those assets and liabilities with the same counterparty that are subject to the netting agreement;
- (c) monitors and controls its roll-off risks; and
- (d) monitors and controls the relevant exposures on a net basis,

it may use the net exposure of loans and deposits as the basis for its capital adequacy calculation in accordance with the formula in paragraph CA-4.3.3. Assets (loans) are treated as exposure and liabilities (deposits) as collateral. The haircuts will be zero except when a currency mismatch exists. A 10-business day holding period will apply when daily mark-to-market is conducted and all the requirements contained in paragraphs CA-4.3.7, CA-4.3.13, and CA-4.6.1 to CA-4.6.4 will apply.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.5 Guarantees and credit derivatives

Operational requirements

Operational requirements common to guarantees and credit derivatives

CA-4.5.1 A guarantee (counter-guarantee) or credit derivative must represent a direct claim on the protection provider and must be explicitly referenced to specific exposures or a pool of exposures, so that the extent of the cover is clearly defined and incontrovertible. Other than non-payment by a protection purchaser of money due in respect of the credit protection contract it must be irrevocable; there must be no clause in the contract that would allow the protection provider unilaterally to cancel the credit cover or that would increase the effective cost of cover as a result of deteriorating credit quality in the hedged exposure²⁶. It must also be unconditional; there should be no clause in the protection contract outside the direct control of the bank that could prevent the protection provider from being obliged to pay out in a timely manner in the event that the original counterparty fails to make the payment(s) due.

Additional operational requirements for guarantees

CA-4.5.2 In addition to the legal certainty requirements in paragraphs CA-4.1.8 and CA-4.1.9 above, in order for a guarantee to be recognised, the following conditions must be satisfied:

- (a) On the qualifying default/non-payment of the counterparty, the bank may in a timely manner pursue the guarantor for any monies outstanding under the documentation governing the transaction. The guarantor may make one lump sum payment of all monies under such documentation to the bank, or the guarantor may assume the future payment obligations of the counterparty covered by the guarantee. The bank must have the right to receive any such payments from the guarantor without first having to take legal actions in order to pursue the counterparty for payment.
- (b) The guarantee is an explicitly documented obligation assumed by the guarantor.

²⁶ Note that the irrevocability condition does not require that the credit protection and the exposure be maturity matched; rather that the maturity agreed *ex ante* may not be reduced *ex post* by the protection provider. Paragraph CA-4.6.2 sets forth the treatment of call options in determining remaining maturity for credit protection.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.5 Guarantees and credit derivatives (continued)

- (c) Except as noted in the following sentence, the guarantee covers all types of payments the underlying obligor is expected to make under the documentation governing the transaction, for example notional amount, margin payments etc. Where a guarantee covers payment of principal only, interests and other uncovered payments should be treated as an unsecured amount in accordance with paragraph CA-4.5.10.

Additional operational requirements for credit derivatives

CA-4.5.3 In order for a credit derivative contract to be recognised, the following conditions must be satisfied:

- (a) The credit events specified by the contracting parties must at a minimum cover:
- failure to pay the amounts due under terms of the underlying obligation that are in effect at the time of such failure (with a grace period that is closely in line with the grace period in the underlying obligation);
 - bankruptcy, insolvency or inability of the obligor to pay its debts, or its failure or admission in writing of its inability generally to pay its debts as they become due, and analogous events; and
 - restructuring of the underlying obligation involving forgiveness or postponement of principal, interest or fees that results in a credit loss event (i.e. charge-off, specific provision or other similar debit to the profit and loss account). When restructuring is not specified as a credit event, refer to paragraph CA-4.5.4.
- (b) If the credit derivative covers obligations that do not include the underlying obligation, section (g) below governs whether the asset mismatch is permissible.
- (c) The credit derivative shall not terminate prior to expiration of any grace period required for a default on the underlying obligation to occur as a result of a failure to pay, subject to the provisions of paragraph CA-4.6.2.
- (d) Credit derivatives allowing for cash settlement are recognised for capital purposes insofar as a robust valuation process is in place in order to estimate loss reliably. There must be a clearly specified period for obtaining post-credit- event valuations of the underlying obligation. If the reference obligation specified in the credit derivative for purposes of cash settlement is different than the underlying obligation, section (g) below governs whether the asset mismatch is permissible.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.5 Guarantees and credit derivatives (continued)

- (e) If the protection purchaser's right/ability to transfer the underlying obligation to the protection provider is required for settlement, the terms of the underlying obligation must provide that any required consent to such transfer may not be unreasonably withheld.
- (f) The identity of the parties responsible for determining whether a credit event has occurred must be clearly defined. This determination must not be the sole responsibility of the protection seller. The protection buyer must have the right/ability to inform the protection provider of the occurrence of a credit event.
- (g) A mismatch between the underlying obligation and the reference obligation under the credit derivative (i.e. the obligation used for purposes of determining cash settlement value or the deliverable obligation) is permissible if (1) the reference obligation ranks *pari passu* with or is junior to the underlying obligation, and (2) the underlying obligation and reference obligation share the same obligor (i.e. the same legal entity) and legally enforceable cross-default or cross-acceleration clauses are in place.
- (h) A mismatch between the underlying obligation and the obligation used for purposes of determining whether a credit event has occurred is permissible if (1) the latter obligation ranks *pari passu* with or is junior to the underlying obligation, and (2) the underlying obligation and reference obligation share the same obligor (i.e. the same legal entity) and legally enforceable cross-default or cross-acceleration clauses are in place.

CA-4.5.4 When the restructuring of the underlying obligation is not covered by the credit derivative, but the other requirements in paragraph CA-4.5.3 are met, partial recognition of the credit derivative will be allowed. If the amount of the credit derivative is less than or equal to the amount of the underlying obligation, 60% of the amount of the hedge can be recognised as covered. If the amount of the credit derivative is larger than that of the underlying obligation, then the amount of eligible hedge is capped at 60% of the amount of the underlying obligation²⁷.

CA-4.5.5 Only credit default swaps and total return swaps that provide credit protection equivalent to guarantees will be eligible for recognition. The following exception applies. Where a bank buys credit protection through a total return swap and records the net payments received on the swap as net income, but does not record offsetting deterioration in the value of the asset that is protected (either through reductions in fair value or by an addition to reserves), the credit protection will not be recognised. The treatment of first-to-default and second-to-default products is covered separately in paragraphs CA-4.7.2 to CA-4.7.5.

²⁷ The 60% recognition factor is provided as an interim treatment, which the CBB may refine in the future.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-4:	Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.5 Guarantees and credit derivatives (continued)

CA-4.5.6 Other types of credit derivatives will not be eligible for recognition at this time²⁸.

Range of eligible guarantors (counter-guarantors)/protection providers

CA-4.5.7 Credit protection given by the following entities will be recognised:

- (a) sovereign entities²⁹, PSEs, banks³⁰ and securities firms with a lower risk weight than the counterparty;
- (b) other entities rated A- or better. This would include credit protection provided by parent, subsidiary and affiliate companies when they have a lower risk weight than the obligor.

Risk weights

CA-4.5.8 The protected portion is assigned the risk weight of the protection provider. The uncovered portion of the exposure is assigned the risk weight of the underlying counterparty.

CA-4.5.9 Materiality thresholds on payments below which no payment is made in the event of loss are equivalent to retained first loss positions and must be deducted in full from the capital of the bank purchasing the credit protection.

Proportional cover

CA-4.5.10 Where the amount guaranteed, or against which credit protection is held, is less than the amount of the exposure, and the secured and unsecured portions are of equal seniority, i.e. the bank and the guarantor share losses on a pro-rata basis capital relief will be afforded on a proportional basis: i.e. the protected portion of the exposure will receive the treatment applicable to eligible guarantees/credit derivatives, with the remainder treated as unsecured.

²⁸ Cash funded credit linked notes issued by the bank against exposures in the banking book which fulfil the criteria for credit derivatives will be treated as cash collateralised transactions.

²⁹ This includes the Bank for International Settlements, the International Monetary Fund, the European Central Bank and the European Community, as well as those MDBs referred to in footnote 24.

³⁰ This includes other MDBs.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.5 Guarantees and credit derivatives (continued)

Tranched cover

CA-4.5.11 Where the bank transfers a portion of the risk of an exposure in one or more tranches to a protection seller or sellers and retains some level of risk of the loan and the risk transferred and the risk retained are of different seniority, banks may obtain credit protection for either the senior tranches (e.g. second loss portion) or the junior tranche (e.g. first loss portion). In this case the rules as set out in CA-6 (Credit risk – securitisation framework) will apply.

Currency mismatches

CA-4.5.12 Where the credit protection is denominated in a currency different from that in which the exposure is denominated — i.e. there is a currency mismatch — the amount of the exposure deemed to be protected will be reduced by the application of a haircut H_{FX} , i.e.

$$G_A = G \times (1 - H_{FX})$$

where:

G = nominal amount of the credit protection
 H_{FX} = haircut appropriate for currency mismatch between the credit protection and underlying obligation.

The appropriate haircut based on a 10-business day holding period (assuming daily marking-to-market) will be applied. If a bank uses the standard haircuts it will be 8%. The haircuts must be scaled up using the square root of time formula, depending on the frequency of revaluation of the credit protection as described in paragraph CA-4.3.12.

Sovereign guarantees and counter-guarantees

CA-4.5.13 Portions of claims guaranteed by the entities detailed in paragraph CA-3.2.1 above, where the guarantee is denominated in the domestic currency (and US\$ in case of a guarantee provided by the Government of Bahrain and CBB) may get a 0% risk-weighting. A claim may be covered by a guarantee that is indirectly counter-guaranteed by such entities. Such a claim may be treated as covered by a sovereign guarantee provided that:

- (a) the sovereign counter-guarantee covers all credit risk elements of the claim;
- (b) both the original guarantee and the counter-guarantee meet all operational requirements for guarantees, except that the counter-guarantee need not be direct and explicit to the original claim; and
- (c) CBB is satisfied that the cover is robust and that no historical evidence suggests that the coverage of the counter-guarantee is less than effectively equivalent to that of a direct sovereign guarantee.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.6 Maturity mismatches

CA-4.6.1 For the purposes of calculating risk-weighted assets, a maturity mismatch occurs when the residual maturity of a hedge is less than that of the underlying exposure.

Definition of maturity

CA-4.6.2 The maturity of the underlying exposure and the maturity of the hedge should both be defined conservatively. The effective maturity of the underlying should be gauged as the longest possible remaining time before the counterparty is scheduled to fulfil its obligation, taking into account any applicable grace period. For the hedge, embedded options which may reduce the term of the hedge should be taken into account so that the shortest possible effective maturity is used. Where a call is at the discretion of the protection seller, the maturity will always be at the first call date. If the call is at the discretion of the protection buying bank but the terms of the arrangement at origination of the hedge contain a positive incentive for the bank to call the transaction before contractual maturity, the remaining time to the first call date will be deemed to be the effective maturity. For example, where there is a step-up in cost in conjunction with a call feature or where the effective cost of cover increases over time even if credit quality remains the same or increases, the effective maturity will be the remaining time to the first call.

Risk weights for maturity mismatches

CA-4.6.3 As outlined in paragraph CA-4.2.24, hedges with maturity mismatches are only recognised when their original maturities are greater than or equal to one year. As a result, the maturity of hedges for exposures with original maturities of less than one year must be matched to be recognised. In all cases, hedges with maturity mismatches will no longer be recognised when they have a residual maturity of three months or less.

CA-4.6.4 When there is a maturity mismatch with recognised credit risk mitigants (collateral, on-balance sheet netting, guarantees and credit derivatives) the following adjustment will be applied.

$$P_a = P \times (t - 0.25) / (T - 0.25)$$

where:

- P_a = value of the credit protection adjusted for maturity mismatch.
- P = credit protection (e.g. collateral amount, guarantee amount) adjusted for any haircuts.
- t = min (T, residual maturity of the credit protection arrangement) expressed in years.
- T = min (5, residual maturity of the exposure) expressed in years.



MODULE	CA: Capital Adequacy
CHAPTER	CA-4: Credit Risk – The Standardized Approach – Credit Risk Mitigation

CA-4.7 Other items related to the treatment of CRM techniques

Treatment of pools of CRM techniques

CA-4.7.1 In the case where a bank has multiple CRM techniques covering a single exposure (e.g. a bank has both collateral and guarantee partially covering an exposure), the bank will be required to subdivide the exposure into portions covered by each type of CRM technique (e.g. portion covered by collateral, portion covered by guarantee) and the risk-weighted assets of each portion must be calculated separately. When credit protection provided by a single protection provider has differing maturities, they must be subdivided into separate protection as well.

First-to-default credit derivatives

CA-4.7.2 There are cases where a bank obtains credit protection for a basket of reference names and where the first default among the reference names triggers the credit protection and the credit event also terminates the contract. In this case, the bank may recognise regulatory capital relief for the asset within the basket with the lowest risk-weighted amount, but only if the notional amount is less than or equal to the notional amount of the credit derivative.

CA-4.7.3 With regard to the bank providing credit protection through such an instrument, if the product has an external credit assessment from an eligible credit assessment institution, the risk weight in paragraph CA-6.4.8 applied to securitisation tranches will be applied. If the product is not rated by an eligible external credit assessment institution, the risk weights of the assets included in the basket will be aggregated up to a maximum of 1250% and multiplied by the nominal amount of the protection provided by the credit derivative to obtain the risk-weighted asset amount.

Second-to-default credit derivatives

CA-4.7.4 In the case where the second default among the assets within the basket triggers the credit protection, the bank obtaining credit protection through such a product will only be able to recognise any capital relief if first-default-protection has also been obtained or when one of the assets within the basket has already defaulted.

CA-4.7.5 For banks providing credit protection through such a product, the capital treatment is the same as in paragraph CA-4.7.3 above with one exception. The exception is that, in aggregating the risk weights, the asset with the lowest risk weighted amount can be excluded from the calculation.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.1 Overview

CA-5.1.1 This chapter of the Capital Adequacy Module describes the IRB approach to credit risk. Subject to certain minimum conditions and disclosure requirements, banks that have received CBB's 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 most cases, banks are required to use a value given by the CBB as opposed to an internal estimate for one or more of the risk components.

CA-5.1.2 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 paragraph CA-2.1.5 and section CA-5.7.

CA-5.1.3 In this chapter, 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 Section CA-4.1 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 CA-5.8, paragraph CA-5.8.1.

CA-5.1.4 A scaling factor of 1.06 must be applied to the risk-weighted assets for credit risk assessed under the IRB approach.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach

CA-5.2.1 In sub-section 1, the risk components (e.g. PD and LGD) and asset classes (e.g. corporate exposures and retail exposures) of the IRB approach are defined. Sub-section 2 provides a description of the risk components to be used by banks by asset class. Sub-sections 3 and 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 when a 0% risk weight applies under the standardised approach, and the resulting risk-weighted assets are assumed to represent UL only.

1. Categorisation of exposures

CA-5.2.2 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.

CA-5.2.3 Some banks may use different classifications to those listed above in their internal risk management and measurement systems. While it is not the intention of the CBB 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 CBB that their methodology for assigning exposures to different classes is appropriate and consistent over time.

CA-5.2.4 For a discussion of the IRB treatment of securitisation exposures, see chapter CA-6.

(i) Definition of corporate exposures

CA-5.2.5 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 CA-5.3.4.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

CA-5.2.6 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:

- (a) The exposure is typically to an entity (often a special purpose entity (SPE)) which was created specifically to finance and/or operate physical assets;
- (b) The borrowing entity has little or no other material assets or activities, and therefore little or no independent capacity to repay the obligation, apart from the income that it receives from the asset(s) being financed;
- (c) The terms of the obligation give the lender a substantial degree of control over the asset(s) and the income that it generates; and
- (d) As a result of the preceding factors, the primary source of repayment of the obligation is the income generated by the asset(s), rather than the independent capacity of a broader commercial enterprise.

CA-5.2.7 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.

Project finance

CA-5.2.8 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.

CA-5.2.9 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

Object finance

CA-5.2.10 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.

Commodities finance

CA-5.2.11 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.

CA-5.2.12 The CBB 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

Income-producing real estate

CA-5.2.13 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.

High-volatility commercial real estate

CA-5.2.14 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:

- (a) Commercial real estate exposures secured by properties of types that are categorised by the CBB periodically as sharing higher volatilities in portfolio default rates;
- (b) Loans financing any of the land acquisition, development and construction (ADC) phases for properties of those types in such jurisdictions; and
- (c) 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

CA-5.2.15 Where other supervisors categorise certain types of commercial real estate exposures as HVCRE in their jurisdictions, Bahraini banks are also required to classify such exposures in those jurisdictions as HVCRE.

(ii) Definition of sovereign exposures

CA-5.2.16 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 are given a 0% risk weight under the standardised approach, and the entities referred to in paragraph CA-3.2.3.

(iii) Definition of bank exposures

CA-5.2.17 This asset class covers exposures to banks and those investment firms outlined in paragraph CA-3.2.13. Bank exposures also include claims on domestic PSEs that are treated like claims on banks under the standardised approach, and MDBs that are not assigned a 0% risk weight under the standardised approach.

(iv) Definition of retail exposures

CA-5.2.18 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

- (a) Exposures to individuals — such as revolving credits and lines of credit (e.g. credit cards, overdrafts, and retail facilities secured by financial instruments) as well as personal term loans and leases (e.g. instalment loans, auto loans and leases, student and educational loans, personal finance, and other exposures with similar characteristics). There will be an exposure threshold of BD250,000 to distinguish between retail and corporate exposures.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

- (b) 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 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. CBB may set limits on the maximum number of housing units per exposure, on a case by case basis.
- (c) Loans extended to small businesses and managed as retail exposures are eligible for retail treatment provided the total exposure of the banking group to a small business borrower (on a consolidated basis where applicable) is less than BD 250,000 . Small business loans extended through or guaranteed by an individual are subject to the same exposure threshold.
- (d) CBB will 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. CBB will however, check on regular basis 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.

Large number of exposures

CA-5.2.19 The exposure must be one of a large pool of exposures, which are managed by the bank on a pooled basis. CBB may, on a case by case basis, set a minimum number of exposures within a pool for exposures in that pool to be treated as retail.

- (a) Small business exposures below BD 250,000 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

CA-5.2.20 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.

(v) Definition of qualifying revolving retail exposures

CA-5.2.21 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 BD 25,000 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. CBB will review the relative volatility of loss rates across the QRRE subportfolios, as well as the aggregate QRRE portfolio.
- (e) Data on loss rates for the sub-portfolio must be retained in order to allow analysis of the volatility of loss rates.
- (f) CBB must concur that treatment as a qualifying revolving retail exposure is consistent with the underlying risk characteristics of the sub-portfolio.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

(vi) *Definition of equity exposures*

CA-5.2.22 In general, equity exposures are defined on the basis of the economic substance of the instrument. They include both direct and indirect ownership interests,³¹ 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 Prudential Consolidation and Deduction Requirements Module. An instrument is considered to be an equity exposure if it meets all of the following requirements:

- (a) 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;
- (b) It does not embody an obligation on the part of the issuer; and
- (c) It conveys a residual claim on the assets or income of the issuer.

CA-5.2.23 Additionally any of the following instruments must be categorised as an equity exposure:

- (a) An instrument with the same structure as those permitted as Tier 1 capital for banking organisations.
- (b) An instrument that embodies an obligation on the part of the issuer and meets any of the following conditions:
 - The issuer may defer indefinitely the settlement of the obligation;
 - The obligation requires (or permits at the issuer's discretion) settlement by issuance of a fixed number of the issuer's equity shares;

³¹ 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

- 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;³² or,
- 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 CBB 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 CBB 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 CBB.

CA-5.2.24 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.³³ This includes liabilities from which the return is linked to that of equities.³⁴ 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.

CA-5.2.25 The CBB may, on a case by case basis, re-characterise debt holdings as equities for regulatory purposes or otherwise ensure the proper treatment of holdings.

³² 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 this bullet 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.

³³ 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.

³⁴ Such liabilities are not required to be included where they are directly hedged by an equity holding, such that the net position does not involve material risk.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

(vii) Definition of eligible purchased receivables

CA-5.2.26 Eligible purchased receivables are divided into retail and corporate receivables as defined below.

Retail receivables

CA-5.2.27 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 CA-5.6 and CA-5.8.

Corporate receivables

CA-5.2.28 For purchased corporate receivables, banks are required to assess the default risk of individual obligors as specified in section CA-5.3 (starting with paragraph CA-5.3.2) consistent with the treatment of other corporate exposures.

2. Foundation and advanced approaches

CA-5.2.29 For each of the asset classes covered under the IRB framework, there are three key elements:

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

CA-5.2.30 The CBB has decided to allow only the foundation approach for corporate, sovereign and bank asset classes. However, banks are required to adopt the advanced approach for retail asset class. Under the foundation approach, as a general rule, banks provide their own estimates of PD and rely on CBB's 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 chapter for the purpose of deriving capital requirements. The full suite of approaches is described below.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

(i) *Corporate, sovereign, and bank exposures*

CA-5.2.31 For corporate, sovereign and bank exposures only the foundation approach is allowed under which banks must provide their own estimates of PD associated with each of their borrower grades, but must use CBB's estimates for the other relevant risk components. The other risk components are LGD, EAD and M.³⁵

CA-5.2.32 There is an exception to this general rule for the five sub-classes of assets identified as SL.

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

CA-5.2.33 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'.

CA-5.2.34 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. Subject to CBB's discretion, on a case by case basis, 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 CA-5.3.11.

(ii) *Retail exposures*

CA-5.2.35 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.

(iii) *Equity exposures*

CA-5.2.36 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 CA-5.5.1 to CA-5.5.23.

³⁵ As noted in section CA-5.3.45, CBB may require/allow banks using the foundation approach to calculate M using the definition provided in section CA-5.3.46 to CA-5.3.50.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

(iv) Eligible purchased receivables

CA-5.2.37 The treatment potentially straddles two asset classes. For eligible corporate receivables, only the foundation approach is 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.

3. Adoption of the IRB approach across asset classes

CA-5.2.38 Once a bank adopts an IRB approach for part of its holdings, it is expected to extend it across the entire banking group. The CBB 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 business units at the same time. CBB will expect banks to define their business units in line with asset classes given in this chapter, however banks can apply to CBB for exemption from this rule.

CA-5.2.39 As such, CBB allows 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); and (ii) adoption of IRB across business units in the same banking group. 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.

CA-5.2.40 **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 CBB. It should be driven by the practicality and feasibility of moving to the more advanced approaches, and not motivated by a desire to adopt an approach that minimises its capital charge. During the roll-out period, CBB 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.**



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

- CA-5.2.41 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 CBB's approval. Capital requirements for such operations will be determined according to the standardised approach, with the CBB determining whether a bank should hold more capital for such positions.
- CA-5.2.42 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. 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.
- CA-5.2.43 Banks adopting an IRB approach are expected to continue to employ an IRB approach. A voluntary return to the standardised approach is permitted only in extraordinary circumstances, such as divestiture of a large fraction of the bank's credit-related business, and approval must be obtained from the CBB.
- CA-5.2.44 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 approach for other sub-classes within the corporate asset class.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

4. *Transition arrangements*

(i) *Parallel calculation*

CA-5.2.45 Banks adopting the foundation IRB (advanced IRB for retail class) approach are required to calculate their capital requirement using these approaches, as well as the capital adequacy regulations issued by CBB dated July 2004 for the time period specified in section CA-A.4. The transition period for adoption of IRB will begin from the publication of this Module. Parallel calculation for banks adopting the foundation IRB approach to credit risk will start in the year beginning year-end 2007.

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

CA-5.2.46 The transition period starts on the date of implementation of this Module and will last for 3 years from that date. During the transition period, the following minimum requirements can be relaxed:

- (a) For corporate, sovereign, and bank exposures under the foundation approach, paragraph CA-5.8.74, the requirement that, regardless of the data source, banks must use at least five years of data to estimate the PD; and
- (b) For retail exposures, paragraph CA-5.8.77, the requirement that regardless of the data source banks must use at least five years of data to estimate loss characteristics (EAD, and either expected loss (EL) or PD and LGD).
- (c) For corporate, sovereign, bank, and retail exposures, paragraph CA-5.8.56, the requirement that a bank must demonstrate it has been using a rating system that was broadly in line with the minimum requirements articulated in this document for at least three years prior to qualification.
- (d) The applicable aforementioned transitional arrangements also apply to the PD/LGD approach to equity. There are no transitional arrangements for the market-based approach to equity.

CA-5.2.47 Under these transitional arrangements for IRB, banks must have a minimum of two years of data at the implementation of this Module. This requirement will increase by one year for each of three years of transition.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.2 Mechanics of the IRB Approach (continued)

CA-5.2.48 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 CA-5.4.3 is applied.³⁶ During the transition period the CBB will review the potential need for continuation of this floor.

(iii) Equity exposures

CA-5.2.49 For a maximum of ten years, CBB may, on a case by case basis, exempt from the IRB treatment particular equity investments held at the time of the publication of this Module. This exemption period will begin from the publication of this Module. 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.

CA-5.2.50 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 Module) 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.

CA-5.2.51 Equity holdings covered by these transitional provisions will be subject to the capital requirements of the standardised approach.

³⁶ 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 section CA-5.8.79.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures

CA-5.3.1 This section presents the method of calculating the unexpected loss (UL) capital requirements for corporate, sovereign and bank exposures. As discussed in preceding paragraphs, 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. Then the risk components are discussed. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in section CA-5.7.

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

(i) Formula for derivation of risk-weighted assets

CA-5.3.2 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 CA-5.3.45 to CA-5.3.50 discuss the circumstances in which the maturity adjustment applies.

CA-5.3.3 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:^{37, 38}

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

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

$$\text{Capital requirement}^{39} (\text{K}) = [\text{LGD} \times \text{N}[(1 - \text{R})^{-0.5} \times \text{G}(\text{PD}) + (\text{R} / (1 - \text{R}))^{0.5} \times \text{G}(0.999)] - \text{PD} \times \text{LGD}] \times (1 - 1.5 \times \text{b})^{-1} \times (1 + (\text{M} - 2.5) \times \text{b})$$

$$\text{Risk-weighted assets (RWA)} = \text{K} \times 12.5 \times \text{EAD}$$

³⁷ Ln denotes the natural logarithm.

³⁸ 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.

³⁹ If this calculation results in a negative capital charge for any individual sovereign exposure, banks must apply a zero capital charge for that exposure.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph CA-5.8.79) and the bank's best estimate of expected loss (described in paragraph CA-5.8.82). 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 CA-6**.

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

CA-5.3.4 Under the IRB approach for corporate credits, banks will be permitted to separately distinguish exposures to SME borrowers (defined as corporate exposures, being an unlisted or unincorporated enterprise where the reported annual sales for the consolidated group of which the firm is a part is less than BD 2 million) from those to large firms. A firm-size adjustment (i.e. $0.04 \times (1 - (S - 0.2)/1.8)$) is made to the corporate risk weight formula for exposures to SME borrowers. S is expressed as total annual sales in millions of BD with values of S falling in the range of equal to or less than BD 2 million or greater than or equal to BD 0.2 million. Reported sales of less than 0.2 million BD will be treated as if they were equivalent to 0.2 million BD for the purposes of the firm-size adjustment for SME borrowers.

$$\text{Correlation (R)} = 0.12 \times (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50)) + 0.24 \times [1 - (1 - \text{EXP}(-50 \times \text{PD})) / (1 - \text{EXP}(-50))] - 0.04 \times (1 - (S - 0.2) / 1.8)$$

CA-5.3.5 Banks are allowed, 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. The criteria for definition of SME will be assessed by CBB on a regular basis. The external auditors are required to assess the reasonableness of identification criteria.

(iii) Risk weights for specialised lending

Risk weights for PF, OF, CF, and IPRE

CA-5.3.6 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 CA-7**. The risk weights for unexpected losses associated with each supervisory category are:



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

**CA-5.3 Rules for corporate, sovereign, and bank exposures
(continued)**

Supervisory categories and UL risk weights for other SL exposures

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

CA-5.3.7 Although banks are expected to map their internal ratings to the supervisory categories for specialised lending using the slotting criteria provided in **Appendix CA-7**, 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

CA-5.3.8 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.

Risk weights for HVCRE

CA-5.3.9 Banks that do not meet the requirements for estimation of PD, must map their internal grades to five supervisory categories, each of which is associated with a specific risk weight. The slotting criteria on which this mapping must be based are the same as those for IPRE, as provided in **Appendix CA-7**. The risk weights associated with each category are:



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

**CA-5.3 Rules for corporate, sovereign, and bank exposures
(continued)**

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

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

CA-5.3.10 As indicated in paragraph CA-5.3.7, each supervisory category broadly corresponds to a range of external credit assessments.

CA-5.3.11 Banks that meet the requirements for the estimation of PD 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:

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

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

CA-5.3.12 For hedged exposures to be treated within the scope of the double default framework, capital requirements may be calculated according to paragraphs CA-5.3.13 to CA-5.3.16.

CA-5.3.13 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):

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



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

CA-5.3.14 K_0 is calculated in the same way as a capital requirement for an unhedged corporate exposure (as defined in paragraphs CA-5.3.3 and CA-5.3.4), but using different parameters for LGD and the maturity adjustment.

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

CA-5.3.15 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 CA-5.3.17. The correlation ρ_{os} is calculated according to the formula for correlation (R) in paragraph CA-5.3.3 (or, if applicable, paragraph CA-5.3.4), 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 paragraph CA-5.3.29, 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 paragraphs CA-5.3.31 or CA-5.3.8 and CA-5.8.79 to CA-5.8.83, 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 CA-5.3.3, 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.

CA-5.3.16 The risk-weighted asset amount is calculated in the same way as for unhedged exposures, i.e.

$$RWA_{DD} = K_{DD} \times 12.5 \times EAD_g$$



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

2. Risk components

(i) Probability of default (PD)

CA-5.3.17 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 CA-5.8.72 to CA-5.8.74.

(ii) Loss given default (LGD)

- Treatment of unsecured claims and non-recognised collateral

CA-5.3.18 Under the foundation approach, senior claims on corporates, sovereigns and banks not secured by recognised collateral will be assigned a 45% LGD.

CA-5.3.19 All subordinated claims on corporates, sovereigns and banks must be assigned a 75% LGD. A subordinated loan is a facility that is expressly subordinated to another facility. This also includes economic subordination, such as cases where the facility is unsecured and the bulk of the borrower's assets are used to secure other exposures. CBB will review subordinated claims on a case by case basis. In case the subordinated claim (i) is on a banking, securities or other financial entity and (ii) exceeds (when combined with other investments in regulatory capital instruments of the investee) 20% of the concerned investee's eligible regulatory capital, such holding must be treated as described in Prudential Consolidation and Deduction Requirements Module.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

- Collateral under the foundation approach

CA-5.3.20 In addition to the eligible financial collateral recognised in the standardised approach, under the foundation IRB approach some other forms of collateral, known as eligible IRB collateral, are also recognised. These include receivables, specified commercial and residential real estate (CRE/RRE), and other collateral, where they meet the minimum requirements set out in paragraphs CA-5.8.119 to CA-5.8.134.⁴⁰ For eligible financial collateral, the requirements are identical to the operational standards as set out in chapter CA-4.

- Methodology for recognition of eligible financial collateral under the foundation approach

CA-5.3.21 The methodology for the recognition of eligible financial collateral closely follows that outlined in the comprehensive approach to collateral in the standardised approach in paragraphs CA-4.3.3 to CA-4.3.25. The simple approach to collateral presented in the standardised approach will not be available to banks applying the IRB approach.

CA-5.3.22 Following the comprehensive approach, the effective loss given default (LGD*) applicable to a collateralised transaction can be expressed as follows, where:

- (e) LGD is that of the senior unsecured exposure before recognition of collateral (45%);
- (f) E is the current value of the exposure (i.e. cash lent or securities lent or posted);
- (g) E* is the exposure value after risk mitigation as determined in paragraphs CA-4.3.3 to CA-4.3.6 of the standardised approach. This concept is only used to calculate LGD*. Banks must continue to calculate EAD without taking into account the presence of any collateral, unless otherwise specified.

$$LGD^* = LGD \times (E^* / E)$$

CA-5.3.23 Banks that qualify for the foundation IRB approach may calculate E* using any of the ways specified under the comprehensive approach for collateralised transactions under the standardised approach.

⁴⁰ The LGD applied to the collateralised portion of such exposures, subject to the limitations set out in paragraphs CA-4.2.1 to CA-4.3.25 of the standardised approach, will be set at 35%. The LGD applied to the remaining portion of this exposure will be set at 45%.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

CA-5.3.24 Where repo-style transactions are subject to a master netting agreement, a bank may choose not to recognise the netting effects in calculating capital. Banks that want to recognise the effect of master netting agreements on such transactions for capital purposes must satisfy the criteria provided in paragraph CA-4.3.17 and CA-4.3.18 of the standardised approach. The bank must calculate E* in accordance with paragraphs CA-4.3.20 and 4.3.21 or CA-4.3.22 to 4.3.25 and equate this to EAD. The impact of collateral on these transactions may not be reflected through an adjustment to LGD.

- Carve out from the comprehensive approach

CA-5.3.25 As in the standardised approach, for transactions where the conditions in paragraph CA-4.3.14 are met, and in addition, the counterparty is a core market participant as specified in paragraph CA-4.3.15, banks can apply a zero H.

- Methodology for recognition of eligible IRB collateral

CA-5.3.26 The methodology for determining the effective LGD under the foundation approach for cases where banks have taken eligible IRB collateral to secure a corporate exposure is as follows.

- (a) Exposures where the minimum eligibility requirements are met, but the ratio of the current value of the collateral received (C) to the current value of the exposure (E) is below a threshold level of C* (i.e. the required minimum collateralisation level for the exposure) would receive the appropriate LGD for unsecured exposures or those secured by collateral which is not eligible financial collateral or eligible IRB collateral.
- (b) Exposures where the ratio of C to E exceeds a second, higher threshold level of C** (i.e. the required level of over-collateralisation for full LGD recognition) would be assigned an LGD according to the following table.

The following table displays the applicable LGD and required over-collateralisation levels for the secured parts of senior exposures:



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

**CA-5.3 Rules for corporate, sovereign, and bank exposures
(continued)**

Minimum LGD for secured portion of senior exposures

	Minimum LGD	Required minimum collateralisation level of the exposure (C*)	Required level of over-collateralisation for full LGD recognition (C**)
Eligible Financial collateral	0%	0%	n.a.
Receivables	35%	0%	125%
CRE/RRE	35%	30%	140%
Other collateral ⁴¹	40%	30%	140%

- (a) Senior exposures are to be divided into fully collateralised and un-collateralised portions.
- (b) The part of the exposure considered to be fully collateralised, C/C**, receives the LGD associated with the type of collateral.
- (c) The remaining part of the exposure is regarded as unsecured and receives an LGD of 45%.

- Methodology for the treatment of pools of collateral

CA-5.3.27 The methodology for determining the effective LGD of a transaction under the foundation approach where banks have taken both financial collateral and other eligible IRB collateral is aligned to the treatment in the standardised approach and based on the following guidance.

- (a) In the case where a bank has obtained multiple forms of CRM, it will be required to subdivide the adjusted value of the exposure (after the haircut for eligible financial collateral) into portions each covered by only one CRM type. That is, the bank must divide the exposure into the portion covered by eligible financial collateral, the portion covered by receivables, the portion covered by CRE/RRE collateral, a portion covered by other collateral, and an unsecured portion, where relevant.

⁴¹ Other collateral excludes physical assets acquired by the bank as a result of a loan default.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

- (b) Where the ratio of the sum of the value of CRE/RRE and other collateral to the reduced exposure (after recognising the effect of eligible financial collateral and receivables collateral) is below the associated threshold level (i.e. the minimum degree of collateralisation of the exposure), the exposure would receive the appropriate unsecured LGD value of 45%.
- (c) The risk-weighted assets for each fully secured portion of exposure must be calculated separately.

Treatment of certain repo-style transactions

CA-5.3.28 Banks that want to recognise the effects of master netting agreements on repo-style transactions for capital purposes must apply the methodology outlined in paragraph CA-5.3.24 for determining E* for use as the EAD.

Treatment of guarantees and credit derivatives

CA-5.3.29 CRM in the form of guarantees and credit derivatives must not reflect the effect of double default (see paragraph CA-5.8.93). As such, to the extent that the CRM is recognised by the bank, the adjusted risk weight will 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.

CA-5.3.30 The approach to guarantees and credit derivatives closely follows the treatment under the standardised approach as specified in paragraphs CA-4.5.1 to CA-4.5.13. The range of eligible guarantors is the same as under the standardised approach except that companies that are internally rated and associated with a PD equivalent to A- or better may also be recognised. To receive recognition, the requirements outlined in paragraphs CA-4.5.1 to CA-4.5.6 must be met.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

- CA-5.3.31 Eligible guarantees from eligible guarantors will be recognised as follows:
- (a) For the covered portion of the exposure, a risk weight is derived by taking:
 - the risk-weight function appropriate to the type of guarantor, and
 - the PD appropriate to the guarantor’s borrower grade, or some grade between the underlying obligor and the guarantor’s borrower grade if the bank deems a full substitution treatment not to be warranted.
 - (b) The bank may replace the LGD of the underlying transaction with the LGD applicable to the guarantee taking into account seniority and any collateralisation of a guaranteed commitment.
- CA-5.3.32 The uncovered portion of the exposure is assigned the risk weight associated with the underlying obligor.
- CA-5.3.33 Where partial coverage exists, or where there is a currency mismatch between the underlying obligation and the credit protection, it is necessary to split the exposure into a covered and an uncovered amount. The treatment in this approach follows that outlined in the standardised approach in paragraphs CA-4.5.10 to CA-4.5.12, and depends upon whether the cover is proportional or tranchéd.
- CA-5.3.34 A bank using an IRB approach has the option of using the substitution approach in determining the appropriate capital requirement for an exposure. However, for exposures hedged by one of the following instruments the double default framework according to paragraphs CA-5.3.12 to CA-5.3.16 may be applied subject to the additional operational requirements set out in paragraph CA-5.3.39. A bank may decide separately for each eligible exposure to apply either the double default framework or the substitution approach.
- (a) Single-name, unfunded credit derivatives (e.g. credit default swaps) or single-name guarantees.
 - (b) First-to-default basket products — the double default treatment will be applied to the asset within the basket with the lowest risk-weighted amount.
 - (c) nth-to-default basket products — the protection obtained is only eligible for consideration under the double default framework if eligible (n–1)th default protection has also been obtained or where (n–1) of the assets within the basket have already defaulted.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

**CA-5.3 Rules for corporate, sovereign, and bank exposures
(continued)**

Operational requirements for recognition of double default

CA-5.3.35 The double default framework is only applicable where the following conditions are met.

- (a) The risk weight that is associated with the exposure prior to the application of the framework does not already factor in any aspect of the credit protection.
- (b) The entity selling credit protection is a bank⁴², investment firm or insurance company (but only those that are in the business of providing credit protection, including mono-lines, re-insurers, and non-sovereign credit export agencies⁴³), referred to as a financial firm, that:
- it is regulated in a manner broadly equivalent to that in this Module (where there is appropriate supervisory oversight and transparency/market discipline), or externally rated as at least investment grade by a credit rating agency deemed suitable for this purpose by CBB;
 - had an internal rating with a PD equivalent to or lower than that associated with an external A– rating at the time the credit protection for an exposure was first provided or for any period of time thereafter; and
 - has an internal rating with a PD equivalent to or lower than that associated with an external investment-grade rating.
- (c) The underlying obligation is:
- a corporate exposure as defined in paragraphs CA-5.2.5 to CA-5.2.15 (excluding specialised lending exposures for which the supervisory slotting criteria approach described in paragraphs CA-5.3.6 to CA-5.3.11 is being used); or
 - a claim on a PSE that is not a sovereign exposure as defined in paragraph CA-5.2.16; or
 - a loan extended to a small business and classified as a retail exposure as defined in paragraph CA-5.2.18.

⁴² This does not include PSEs and MDBs, even though claims on these may be treated as claims on banks according to paragraph CA-5.2.17.

⁴³ By non-sovereign it is meant that credit protection in question does not benefit from any explicit sovereign counter-guarantee.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

- (d) The underlying obligor is not:
- a financial firm as defined in (b); or
 - a member of the same group as the protection provider.
- (e) The credit protection meets the minimum operational requirements for such instruments as outlined in paragraphs CA-4.5.1 to CA-4.5.5.
- (f) In keeping with paragraph CA-4.5.2 for guarantees, for any recognition of double default effects for both guarantees and credit derivatives a bank must have the right and expectation to receive payment from the credit protection provider without having to take legal action in order to pursue the counterparty for payment. To the extent possible, a bank must take steps to satisfy itself that the protection provider is willing to pay promptly if a credit event should occur.
- (g) The purchased credit protection absorbs all credit losses incurred on the hedged portion of an exposure that arise due to the credit events outlined in the contract.
- (h) If the payout structure provides for physical settlement, then there must be legal certainty with respect to the deliverability of a loan, bond, or contingent liability. If a bank intends to deliver an obligation other than the underlying exposure, it must ensure that the deliverable obligation is sufficiently liquid so that the bank would have the ability to purchase it for delivery in accordance with the contract.
- (i) The terms and conditions of credit protection arrangements must be legally confirmed in writing by both the credit protection provider and the bank.
- (j) In the case of protection against dilution risk, the seller of purchased receivables must not be a member of the same group as the protection provider.
- (k) There is no excessive correlation between the creditworthiness of a protection provider and the obligor of the underlying exposure due to their performance being dependent on common factors beyond the systematic risk factor. The bank has a process to detect such excessive correlation. An example of a situation in which such excessive correlation would arise is when a protection provider guarantees the debt of a supplier of goods or services and the supplier derives a high proportion of its income or revenue from the protection provider.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

(iii) Exposure at default (EAD)

CA-5.3.36 The following sections apply to both on and off-balance sheet positions. All exposures are measured gross of specific provisions or partial write-offs. 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 provisions and partial write-offs. 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 CA-5.7.7, discounts may be included in the measurement of total eligible provisions for purposes of the EL-provision calculation set out in section CA-5.7.

Exposure measurement for on-balance sheet items

CA-5.3.37 On-balance sheet netting of loans and deposits will be recognised subject to the same conditions as under the standardised approach (see paragraph CA-4.4.1). Where currency or maturity mismatched on-balance sheet netting exists, the treatment follows the standardised approach, as set out in paragraphs CA-4.5.12 and CA-4.6.1 to CA-4.6.4.

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

CA-5.3.38 For off-balance sheet items, exposure is calculated as the committed but undrawn amount multiplied by a CCF.

CA-5.3.39 The types of instruments and the CCFs applied to them are the same as those in the standardised approach, as outlined in paragraphs CA-3.3.1 to CA-3.3.15 with the exception of commitments, Note Issuance Facilities (NIFs) and Revolving Underwriting Facilities (RUFs).

CA-5.3.40 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

CA-5.3.41 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.

CA-5.3.42 **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.**

CA-5.3.43 **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.**

Exposure measurement for transactions that expose banks to counterparty credit risk

CA-5.3.44 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 **Appendix CA-2** of this Module.

(iv) Effective maturity (M)

CA-5.3.45 Effective maturity (M) will be 2.5 years except for repo-style transactions where the effective maturity will be 6 months. However, banks can apply to CBB for approval to measure M for each facility using the definition provided below.

CA-5.3.46 Except as noted in proceeding paragraph, 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.

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

$$\text{Effective Maturity (M)} = \frac{\sum_t t * CF_t}{\sum CF_t}$$

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



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

- (b) 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.
- (c) 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.

CA-5.3.47 The one-year floor does not apply to certain short-term exposures, comprising fully or nearly-fully collateralised⁴⁴ 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 than 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).

CA-5.3.48 In addition to the transactions considered in the preceding paragraph 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 are eligible for exemption from the one-year floor. Such transactions include:

- (a) Some capital market-driven transactions and repo-style transactions that might not fall within the scope of the preceding paragraph;
- (b) 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;
- (c) 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;

⁴⁴ The intention is to include both parties of a transaction meeting these conditions where neither of the parties is systematically under-collateralised.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.3 Rules for corporate, sovereign, and bank exposures (continued)

- (d) Some exposures arising from cash settlements by wire transfer, including overdrafts arising from failed transfers provided that such overdrafts do not continue more than a short, fixed number of business days;
- (e) Some exposures to banks arising from foreign exchange settlements; and
- (f) Some short-term loans and deposits.

CA-5.3.49 For transactions falling within the scope of paragraph CA-5.3.47 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 paragraph CA-4.3.11 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.

CA-5.3.50 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 CA-5.3.45.

Treatment of maturity mismatches

CA-5.3.51 The treatment of maturity mismatches under IRB is identical to that in the standardised approach — see paragraphs CA-4.6.1 to CA-4.6.4.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.4 Rules for retail exposures

CA-5.4.1 This section presents in detail the method of calculating the UL capital requirements for retail exposures. The first sub-section provides three risk-weight functions, one for residential mortgage exposures, a second for qualifying revolving retail exposures, and a third for other retail exposures. Second sub-section 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 CA-5.7.

1. Risk-weighted assets for retail exposures

CA-5.4.2 There are three separate risk-weight functions for retail exposures, as defined in paragraphs CA-5.4.3 to CA-5.4.5. 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.

(i) Residential mortgage exposures

CA-5.4.3 For exposures defined in paragraph CA-5.2.18 that are not in default and are secured or partly secured⁴⁵ by residential mortgages, risk weights will be assigned based on the following formula:

$$\text{Correlation (R)} = 0.15$$

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

$$\text{Risk-weighted assets} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph CA-5.8.79) and the bank's best estimate of expected loss (described in paragraph CA-5.8.82). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

⁴⁵ This means that risk weights for residential mortgages also apply to the unsecured portion of such residential mortgages.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.4 Rules for retail exposures (continued)

(ii) Qualifying revolving retail exposures

CA-5.4.4 For qualifying revolving retail exposures as defined in paragraph CA-5.2.21 that are not in default, risk weights are defined based on the following formula:

$$\text{Correlation (R)} = 0.04$$

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

$$\text{Risk-weighted assets} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph CA-8.79) and the bank's best estimate of expected loss (described in paragraph CA-5.8.82). The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

(iii) Other retail exposures

CA-5.4.5 For all other retail exposures that are not in default, risk weights are assigned based on the following function, which allows correlation to vary with PD:

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

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

$$\text{Risk-weighted assets} = \text{K} \times 12.5 \times \text{EAD}$$

The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD (described in paragraph CA-5.8.79) and the bank's best estimate of expected loss (described in paragraph CA-5.8.82). 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 CA-6**.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.4 Rules for retail exposures (continued)

2. Risk components

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

CA-5.4.6 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 CA-5.8. 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%.

(ii) Recognition of guarantees and credit derivatives

CA-5.4.7 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 CA-5.8.91 to CA-5.8.100. Whether adjustments are done through PD or LGD, they must be done in a consistent manner for a given guarantee or credit derivative type.

CA-5.4.8 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.

(iii) Exposure at default (EAD)

CA-5.4.9 Both on and off-balance sheet retail exposures are measured gross of specific provisions or partial write-offs. 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 provisions and partial write-offs. 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 CA-5.7.7, discounts may be included in the measurement of total eligible provisions for purposes of the EL-provision calculation set out in Section CA-5.7.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.4 Rules for retail exposures (continued)

- CA-5.4.10 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 paragraph CA-4.4.1 of the standardised approach. For retail off-balance sheet items, banks must use their own estimates of CCFs provided the minimum requirements in paragraphs CA-5.8.84 to CA-5.8.87 and CA-5.8.90 are satisfied.
- CA-5.4.11 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.
- CA-5.4.12 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. For determining the EAD associated with the seller's interest in the undrawn lines, the undrawn balances of securitised exposures would be allocated between the seller's and investors' interests on a pro rata basis, based on the proportions of the seller's and investors' shares of the securitised drawn balances. The investors' share of undrawn balances related to the securitised exposures is subject to the treatment in paragraph CA-6.4.32.
- CA-5.4.13 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.5 Rules for equity exposures

CA-5.5.1 This section presents the method of calculating the UL capital requirements for equity exposures. The first sub-section 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 the second sub-section. The method of calculating expected losses, and for determining the difference between that measure and provisions is described in section CA-5.7.

1. Risk-weighted assets for equity exposures

CA-5.5.2 Risk-weighted assets for equity exposures in the trading book are subject to the market risk capital rules detailed in chapter CA-10.

CA-5.5.3 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. Banks are permitted to select the approach subject to approval of CBB. Certain equity holdings are excluded as defined in paragraphs CA-5.5.18 to CA-5.5.20 and are subject to the capital charges required under the standardised approach.

CA-5.5.4 Banks' choices must be made consistently, and in particular not determined by regulatory arbitrage considerations.

(i) Market-based approach

CA-5.5.5 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. CBB may require the use of either method based on the individual circumstances of a bank.

- Simple risk weight method

CA-5.5.6 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.5 Rules for equity exposures (continued)

CA-5.5.7 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.

Internal models method

CA-5.5.8 IRB banks may use, or may be required by CBB 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 CAR through the calculation of risk-weighted equivalent assets.

CA-5.5.9 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.

CA-5.5.10 A bank may be permitted by CBB to employ different market-based approaches to different portfolios based on appropriate considerations and where the bank itself uses different approaches internally.

CA-5.5.11 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.5 Rules for equity exposures (continued)

(ii) *PD/LGD approach*

CA-5.5.12 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:

- (a) 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.⁴⁶ 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.
- (b) An LGD of 90% would be assumed in deriving the risk weight for equity exposures.
- (c) 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.

CA-5.5.13 Under the PD/LGD approach, minimum risk weights as set out in section CA-5.5.14 and CA-5.5.15 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 the preceding paragraph plus the EL associated with the equity exposure multiplied by 12.5 are smaller than the applicable minimum risk weights.

⁴⁶ 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.5 Rules for equity exposures (continued)

CA-5.5.14 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:

- (a) 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).
- (b) 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.

CA-5.5.15 For all other equity positions, including net short positions (as defined in section CA-5.5.7), 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.

CA-5.5.16 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 section CA-5.5.12 plus the EL associated with the equity exposure multiplied by 12.5 exceed the 1250% risk weight. Alternatively, banks may deduct the entire equity exposure amount, assuming it represents the EL amount, 50% from Tier 1 capital and 50% from Tier 2 capital.

CA-5.5.17 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.

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

CA-5.5.18 Banks are allowed to exclude equity holdings in entities whose debt obligations qualify for a zero risk weight under the standardised approach to credit risk from the IRB approaches to equity (including those publicly sponsored entities where a zero risk weight can be applied).



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.5 Rules for equity exposures (continued)

CA-5.5.19 Equity exposures of a bank can be excluded from the IRB treatment based on materiality as defined in the following paragraph.

CA-5.5.20 The equity exposures of a bank are considered material if their aggregate value 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. CBB may use lower materiality thresholds in future.

2. Risk components

CA-5.5.21 In general, the measure of an equity exposure on which capital requirements is based is the value presented in the financial statements, which may include unrealised revaluation gains. Thus, for example, equity exposure measures will be:

- (a) For investments held at fair value with changes in value flowing directly through income and into regulatory capital and where a discount is applied on fair value (as explained in CA-2.1.5), the exposure is equal to the fair value adjusted to exclude that discount part. Refer to appendix CA-17.
- (b) For investments held at fair value with changes in value not flowing through income but into a tax-adjusted separate component of equity and where a discount is applied on fair value (as explained in CA-2.1.5), the exposure is equal to the fair value adjusted to exclude that discount part. Refer to appendix CA-17.
- (c) 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.⁴⁷

CA-5.5.22 Holdings in funds containing both equity investments and other non-equity types of investments can be either treated, in a consistent manner, as a single investment based on the majority of the fund's holdings or, where possible, as separate and distinct investments in the fund's component holdings based on a look-through approach.

CA-5.5.23 Where only the investment mandate of the fund is known, the fund can still be treated as a single investment. For this purpose, it is assumed that the fund first invests, to the maximum extent allowed under its mandate, in the asset classes attracting the highest capital requirement, and then continues making investments in descending order until the maximum total investment level is reached. The same approach can also be used for the look-through approach, but only where the bank has rated all the potential constituents of such a fund.

⁴⁷ If "latent gain" is allowed on such investment (as explained in CA-2.1.5), the cost will be adjusted to include that allowed gain.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.6 Rules for purchased receivables

CA-5.6.1 This section 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. The first sub-section discusses the calculation of risk-weighted assets for default risk. The calculation of risk-weighted assets for dilution risk is provided in the second sub-section. The method of calculating expected losses, and for determining the difference between that measure and provisions, is described in section CA-5.7.

1. Risk-weighted assets for default risk

CA-5.6.2 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 meets 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 CA-5.2.21), 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.

(i) Purchased retail receivables

CA-5.6.3 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.

(ii) Purchased corporate receivables

CA-5.6.4 For purchased corporate receivables, the purchasing bank is required to apply the existing IRB risk quantification standards for the bottom-up approach.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.6 Rules for purchased receivables (continued)

2. *Risk-weighted assets for dilution risk*

CA-5.6.5 Dilution refers to the possibility that the receivable amount is reduced through cash or non-cash credits to the receivable's obligor.⁴⁸ For both corporate and retail receivables, unless the bank demonstrates to the CBB 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.

CA-5.6.6 This treatment will be applied regardless of whether the underlying receivables are corporate or retail exposures.

3. *Treatment of purchase price discounts for receivables*

CA-5.6.7 In many cases, the purchase price of receivables will reflect a discount (not to be confused with the discount concept defined in paragraphs CA-5.3.40 and CA-5.4.9) that provides first loss protection for default losses, dilution losses or both (see paragraph CA-6.4.73). 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 CA-5.7 or the calculation of risk-weighted assets.

⁴⁸ 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).



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.6 Rules for purchased receivables (continued)

CA-5.6.8 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 paragraph CA-6.4.73). 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 paragraph CA-6.4.79.

4. Recognition of credit risk mitigants

CA-5.6.9 Credit risk mitigants will be recognised generally using the same type of framework as set forth in paragraphs CA-5.3.33 to CA-5.3.37. In particular, a guarantee provided by the seller or a third party will be treated using the existing IRB rules for guarantees, regardless of whether the guarantee covers default risk, dilution risk, or both.

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

CA-5.6.10 If protection against dilution risk has been purchased, and the conditions of paragraphs CA-5.3.38 and CA-5.3.39 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 CA-5.3.12 to CA-5.3.16 apply with PDo being equal to the estimated EL, LGDg being equal to 100 percent, and effective maturity being set according to paragraph CA-5.6.6.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.7 Treatment of expected losses and recognition of provisions

CA-5.7.1 This section discusses the method by which the difference between provisions (specific provisions and collective impairment provisions) and expected losses may be included in or must be deducted from regulatory capital, as outlined in paragraph CA-2.1.5 (e). However any excess provision representing impairment loss will not be allowed to be included in regulatory capital.

1. Calculation of expected losses

CA-5.7.2 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 CA-5.7.3 and CA-5.7.13 apply to such exposures. The treatment of EL for securitisation exposures is described in paragraph CA-6.4.4.

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

CA-5.7.3 Banks must calculate an EL as $PD \times LGD$ 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 CA-5.8.82 and banks on the foundation approach must use the CBB's LGD. For SL exposures subject to the supervisory slotting criteria EL is calculated as described in paragraphs CA-5.7.4 and CA-5.7.5. For equity exposures subject to the PD/LGD approach, the EL is calculated as $PD \times LGD$ unless paragraphs CA-5.5.13 to CA-5.5.16 apply. Securitisation exposures do not contribute to the EL amount, as set out in paragraph CA-6.4.4. For all other exposures, including hedged exposures under the double default treatment, the EL is zero.

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

CA-5.7.4 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.7 Treatment of expected losses and recognition of provisions (continued)

Supervisory categories and EL risk weights for other SL exposures

CA-5.7.5 The risk weights for SL, other than HVCRE, are as follows:

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

Supervisory categories and EL risk weights for HVCRE

CA-5.7.6 The risk weights for HVCRE are as follows:

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

2. Calculation of provisions

(i) Exposures subject to IRB approach

CA-5.7.7 Total eligible provisions are defined as the sum of all provisions (specific provisions and collective impairment provisions) that are attributed to exposures treated under the IRB approach. In addition, total eligible provisions may include any discounts on defaulted assets. Specific provisions set aside against equity and securitisation exposures must not be included in total eligible provisions.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.7 Treatment of expected losses and recognition of provisions (continued)

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

CA-5.7.8 Banks using the standardised approach for a portion of their credit risk exposures, either on a transitional basis (as defined in paragraphs CA-5.2.44 and CA-5.2.45), or on a permanent basis if the exposures subject to the standardised approach are immaterial (paragraph CA-5.2.46), must determine the portion of collective impairment provisions attributed to the standardised or IRB treatment of provisions (see section CA-2.1 (d) according to the methods outlined in paragraphs CA-5.7.9 and CA-5.7.10.

CA-5.7.9 Banks should generally attribute total provisions on a pro rata basis according to the proportion of credit risk-weighted assets subject to the standardised and IRB approaches. However, when one approach to determining credit risk-weighted assets (i.e. standardised or IRB approach) is used exclusively within an entity, provisions booked within the entity may be attributed to that approach.

CA-5.7.10 Subject to CBB's discretion, banks using both the standardised and IRB approaches may rely on their internal methods for allocating provisions for recognition in capital under either the standardised or IRB approach, subject to the following conditions. Where the internal allocation method is made available, the CBB will establish the standards surrounding their use. Banks will need to obtain prior approval from CBB to use an internal allocation method for this purpose.

3. Treatment of EL and provisions

CA-5.7.11 As specified in paragraph CA-2.1.5 (e), banks using the IRB approach must compare the total amount of total eligible provisions (as defined in paragraph CA-5.7.7) with the total EL amount as calculated within the IRB approach (as defined in paragraph CA-5.7.2).



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.7 Treatment of expected losses and recognition of provisions (continued)

- CA-5.7.12 Where the calculated EL amount is lower than the provisions of the bank, CBB will 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 provisions 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.
- CA-5.7.13 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 paragraph CA-6.4.4.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach

CA-5.8.1 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) CBB's 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.

1. Composition of minimum requirements

CA-5.8.2 **To be eligible for the IRB approach a bank must demonstrate to CBB 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.**

CA-5.8.3 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. CBB will periodically develop detailed review procedures to ensure that banks' systems and controls are adequate to serve as the basis for the IRB approach.

CA-5.8.4 The minimum requirements set out in this section 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.5 The minimum requirements set out in this section apply to both foundation and advanced approaches unless noted otherwise. Generally, all IRB banks must produce their own estimates of PD⁴⁹ 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 using their own estimates of LGD and EAD for retail exposures must also meet the incremental minimum requirements for these risk factors included in paragraphs CA-5.8.79 to CA-5.8.100.

2. Compliance with minimum requirements

CA-5.8.6 To be eligible for an IRB approach, a bank must demonstrate to CBB that it meets the IRB requirements in this sub-section, 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 Basel Committee (See www.bis.org for guidance) and CBB periodically.

CA-5.8.7 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 CBB, 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 CBB to reconsider the bank's eligibility for the IRB approach. Furthermore, for the duration of any non-compliance, CBB will consider the need for the bank to hold additional capital or take other appropriate supervisory action.

3. Rating system design

CA-5.8.8 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.

⁴⁹ 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.9 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.

(i) Rating dimensions

- Standards for corporate, sovereign, and bank exposures

CA-5.8.10 A qualifying IRB rating system must have two separate and distinct dimensions: (i) the risk of borrower default, and (ii) transaction-specific factors.

CA-5.8.11 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.

CA-5.8.12 The second dimension must reflect transaction-specific factors, such as collateral, seniority, product type, etc. 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 CBB's loss severity (LGD) considerations would qualify.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.13 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 CBB's loss severity (LGD) considerations. This exemption does not apply to banks using the general corporate foundation approach for the SL sub- class.

- Standards for retail exposures

CA-5.8.14 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.

CA-5.8.15 For each pool, banks must estimate PD, LGD, and EAD. Multiple pools may share identical PD, LGD and EAD estimates. At a minimum, banks must consider the following risk drivers when assigning exposures to a pool:

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

(ii) Rating structure

- Standards for corporate, sovereign, and bank exposures

CA-5.8.16 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.17 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; CBB may require banks, which lend to borrowers of diverse credit quality, to have a greater number of borrower grades.

CA-5.8.18 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.

CA-5.8.19 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.

CA-5.8.20 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 approach are the same as those for general corporate exposures.

- Standards for retail exposures

CA-5.8.21 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(iii) Rating criteria

CA-5.8.22 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.

- (a) The grade descriptions and criteria must be sufficiently detailed to allow those charged with assigning ratings to consistently assign the same grade to borrowers or facilities posing similar risk. This consistency should exist across lines of business, departments and geographic locations. If rating criteria and procedures differ for different types of borrowers or facilities, the bank must monitor for possible inconsistency, and must alter rating criteria to improve consistency when appropriate.
- (b) Written rating definitions must be clear and detailed enough to allow third parties 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.
- (c) The criteria must also be consistent with the bank's internal lending standards and its policies for handling troubled borrowers and facilities.

CA-5.8.23 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.

- SL product lines within the corporate asset class

CA-5.8.24 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 Appendix CA-7 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.25 The CBB 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 must take special care to ensure that any overrides of their internal criteria do not render the mapping process ineffective.

(iv) Rating assignment horizon

CA-5.8.26 Although the time horizon used in PD estimation is one year (as described in paragraph CA-5.8.59), banks are expected to use a longer time horizon in assigning ratings.

CA-5.8.27 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.

CA-5.8.28 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(v) *Use of models*

CA-5.8.29 The requirements in this sub-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.

- (a) The burden is on the bank to satisfy CBB 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.
- (b) 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.
- (c) 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.
- (d) 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.
- (e) 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.
- (f) 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(vi) Documentation of rating system design

CA-5.8.30 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 CBB's review. The organisation of rating assignment, including the internal control structure, must also be documented.

CA-5.8.31 Banks must document the specific definitions of default and loss used internally and demonstrate consistency with the reference definitions set out in paragraphs CA-5.8.63 to CA-5.8.71.

CA-5.8.32 If the bank employs statistical models in the rating process, the bank must document their methodologies. This material must:

- (a) Provide a detailed outline of the theory, assumptions and/or mathematical and empirical basis of the assignment of estimates to grades, individual obligors, exposures, or pools, and the data source(s) used to estimate the model;
- (b) Establish a rigorous statistical process (including out-of-time and out-of-sample performance tests) for validating the model; and
- (c) Indicate any circumstances under which the model does not work effectively.

CA-5.8.33 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 CBB.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

4. *Risk rating system operations*

(i) *Coverage of ratings*

CA-5.8.34 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.

CA-5.8.35 Each separate legal entity to which the bank is exposed must be separately rated. A bank must have policies acceptable to CBB 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.

(ii) *Integrity of rating process*

- Standards for corporate, sovereign, and bank exposures

CA-5.8.36 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 by the bank through a range of practices that will be carefully reviewed by CBB. 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.

CA-5.8.37 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.

- Standards for retail exposures

CA-5.8.38 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(iii) Overrides

CA-5.8.39 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.

(iv) Data maintenance

CA-5.8.40 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 section, and to serve as a basis for CBB 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 may be required under disclosure requirements specified by CBB periodically.

- For corporate, sovereign, and bank exposures

CA-5.8.41 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.

CA-5.8.42 Banks under the foundation approach which utilise CBB's 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).



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- For retail exposures

CA-5.8.43 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.

(v) Stress tests used in assessment of capital adequacy

CA-5.8.44 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.

CA-5.8.45 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 CBB's 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.

CA-5.8.46 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.47 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.

CA-5.8.48 CBB may issue guidance to banks on how the tests to be used for this purpose should be designed, bearing in mind conditions in the Kingdom of Bahrain. The results of the stress test may indicate no difference in the capital calculated under the IRB rules described in this section of this chapter 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 must stress portfolios containing the vast majority of its total exposures.

5. Corporate governance and oversight

(i) Corporate governance

CA-5.8.49 All material aspects of the rating and estimation processes must be approved by the bank's board of directors or a designated committee thereof and senior management. These parties must possess a general understanding of the bank's risk rating system and detailed comprehension of its associated management reports. Senior management must provide notice to the board of directors or a designated committee thereof of material changes or exceptions from established policies that will materially impact the operations of the bank's rating system.

CA-5.8.50 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.51 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 retail asset class) against expectations. Reporting frequencies may vary with the significance and type of information and the level of the recipient.

(ii) Credit risk control

CA-5.8.52 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:

- (a) Testing and monitoring internal grades;
- (b) 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;
- (c) Implementing procedures to verify that rating definitions are consistently applied across departments and geographic areas;
- (d) Reviewing and documenting any changes to the rating process, including the reasons for the changes; and
- (e) Reviewing the rating criteria to evaluate if they remain predictive of risk. Changes to the rating process, criteria or individual rating parameters must be documented and retained for CBB to review.

CA-5.8.53 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.

(iii) Internal and external audit

CA-5.8.54 Internal audit or an equally independent function must review at least bi-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. External auditors are also required to conduct above-mentioned review on an annual basis.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

6. *Use of internal ratings*

CA-5.8.55 Internal ratings and default and loss estimates should 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 CBB.

CA-5.8.56 **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 section for at least the three years prior to qualification. For the retail asset class, banks must demonstrate that they have 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.**

7. *Risk quantification*

(i) *Overall requirements for estimation*

- Structure and intent

CA-5.8.57 This section addresses the broad standards for own-estimates of PD, LGD, and EAD. Generally, all banks using the IRB approaches must estimate a PD⁵⁰ for each internal borrower grade for corporate, sovereign and bank exposures or for each pool in the case of retail exposures.

⁵⁰ 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- CA-5.8.58** 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 CA-5.8.72 to CA-5.8.78. For retail asset class banks must estimate an appropriate LGD (as defined in paragraphs CA-5.8.79 to CA-5.8.83) for each of its retail pools and must also estimate an appropriate long-run default-weighted average EAD for each of its facilities as defined in paragraphs CA-5.8.84 and CA-5.8.85. Requirements specific to EAD estimation appear in paragraphs CA-5.8.84 to CA-5.8.89.
- CA-5.8.59** 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.
- CA-5.8.60** 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.
- CA-5.8.61** 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 CA-5.8.79 to CA-5.8.89. 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.62 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. CBB may allow some flexibility in application of the required standards for data that are collected prior to the date of implementation of this Module. However, banks must demonstrate to CBB 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.

(ii) *Definition of default*

CA-5.8.63 A default is considered to have occurred with regard to a particular obligor when either or both of the two following events have taken place.

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

CA-5.8.64 The elements to be taken as indications of unlikelihood to pay include:

- (a) The bank puts the credit obligation on non-accrued status.
- (b) The bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.⁵¹
- (c) The bank sells the credit obligation at a material credit-related economic loss.
- (d) 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.⁵²

⁵¹ Specific provisions on equity exposures set aside for price risk do not signal default.

⁵² Including, in the case of equity holdings assessed under a PD/LGD approach, such distressed restructuring of the equity itself.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

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

CA-5.8.65 CBB will periodically provide appropriate guidance as to how these elements must be implemented and monitored.

CA-5.8.66 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.

CA-5.8.67 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 CA-5.8.75. However, in such cases, banks must demonstrate to CBB 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 Module. Internal data (including that pooled by banks) used in such estimates beyond the date of implementation of this Module must be consistent with the reference definition.

CA-5.8.68 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(iii) Re-ageing

CA-5.8.69 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). The CBB may choose to establish more specific requirements on re-ageing for banks.

(iv) Treatment of overdrafts

CA-5.8.70 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 days, 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, 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.

(v) Definition of loss for all asset classes

CA-5.8.71 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(vi) *Requirements specific to PD estimation*

- Corporate, sovereign, and bank exposures

CA-5.8.72 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.

CA-5.8.73 Banks may have a primary technique and use others as a point of comparison and potential adjustment. CBB 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) 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.
- (b) 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 CA-5.8.63 to CA-5.8.68. The bank must document the basis for the mapping.
- (c) 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 CA-5.8.29.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.74 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.

- Retail exposures

CA-5.8.75 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.

CA-5.8.76 One method for deriving long-run average estimates of PD and default-weighted average loss rates given default (as defined in paragraph CA-5.8.79) 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 CA-5.8.79.

CA-5.8.77 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 CBB that more recent data are a better predictor of loss rates.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.78 The CBB recognises that seasoning can be quite material for some long-term retail exposures characterised by seasoning effects that peak several years after origination. Banks must 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. The CBB may make such adjustments mandatory.

(vii) Requirements specific to own-LGD estimates

CA-5.8.79 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. CBB will continue to monitor and encourage the development of appropriate approaches to this issue.

CA-5.8.80 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.81 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.

CA-5.8.82 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 CA-5.3.3 and CA-5.4.3 to CA-5.4.5. Instances where the best estimate of expected loss on a defaulted asset is less than the sum of specific provisions and partial charge-offs on that asset will attract CBB's scrutiny and must be justified by the bank.

CA-5.8.83 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 CBB that more recent data are a better predictor of loss rates.

(viii) Requirements specific to own-EAD estimates

CA-5.8.84 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 for retail class, 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 **Appendix CA-2**). Banks must have established procedures in place for the estimation of EAD for off-balance sheet items for retail asset class. 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 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- CA-5.8.85 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.
- CA-5.8.86 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.
- CA-5.8.87 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.
- CA-5.8.88 For transactions that expose banks to counterparty credit risk, estimates of EAD must fulfil the requirements set forth in Appendix CA-2 of this Module.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.89 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 CBB that more recent data are a better predictor of drawdowns.

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

- Standards for corporate, sovereign, and bank exposures

CA-5.8.90 The minimum requirements outlined in paragraphs CA-5.8.91 to CA-5.8.100 apply to banks using the foundation LGD estimates with the following exceptions:

- (a) The bank is not able to use an ‘LGD-adjustment’ option; and
- (b) The range of eligible guarantees and guarantors is limited to those outlined in paragraph CA-5.3.34.

- Standards for retail exposures

a. Guarantees

CA-5.8.91 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.

CA-5.8.92 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 section, including the regular monitoring of the guarantor’s condition and ability and willingness to honour its obligations. Consistent with the requirements in section CA-5.8.43, a bank must retain all relevant information on the assignment of an exposure to a pool, and the estimation of PD.

CA-5.8.93 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.”



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

b. Eligible guarantors and guarantees

CA-5.8.94 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.

CA-5.8.95 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.

c. Adjustment criteria

CA-5.8.96 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 CA-5.8.22 and CA-5.8.23, and must follow all minimum requirements for assigning borrower or facility ratings set out in this section.

CA-5.8.97 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.

CA-5.8.98 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

d. Credit derivatives

CA-5.8.99 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.

CA-5.8.100 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.

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

CA-5.8.101 The following minimum requirements for risk quantification must be satisfied for any purchased retail receivables making use of the top-down treatment of default risk and/or the IRB treatments of dilution risk.

CA-5.8.102 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- Minimum operational requirements

CA-5.8.103 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:

- Legal certainty

CA-5.8.104 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.

- Effectiveness of monitoring systems

CA-5.8.105 The bank must be able to monitor both the quality of the receivables and the financial condition of the seller and servicer. In particular:

- (a) The bank must (i) assess the correlation among the quality of the receivables and the financial condition of both the seller and servicer, and (ii) have in place internal policies and procedures that provide adequate safeguards to protect against such contingencies, including the assignment of an internal risk rating for each seller and servicer.
- (b) The 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- (c) The bank must have the ability to assess the characteristics of the receivables pool, including (i) over-advances; (ii) history of the seller's arrears, bad debts, and bad debt allowances; (iii) payment terms, and (iv) potential contra accounts.
- (d) The bank must have effective policies and procedures for monitoring on an aggregate basis single-obligor concentrations both within and across receivables pools.
- (e) The bank must receive timely and sufficiently detailed reports of receivables ageings and dilutions to (i) ensure compliance with the bank's eligibility criteria and advancing policies governing purchased receivables, and (ii) provide an effective means with which to monitor and confirm the seller's terms of sale (e.g. invoice date ageing) and dilution.

- Effectiveness of work-out systems

CA-5.8.106 An effective programme requires systems and procedures not only for detecting deterioration in the seller's financial condition and deterioration in the quality of the receivables at an early stage, but also for addressing emerging problems pro-actively. In particular:

- (a) The bank should have clear and effective policies, procedures, and information systems to monitor compliance with (i) all contractual terms of the facility (including covenants, advancing formulas, concentration limits, early amortisation triggers, etc.) as well as (ii) 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.
- (b) To limit inappropriate draws, the bank should have effective policies and procedures for detecting, approving, monitoring, and correcting over-advances.
- (c) 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.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-5	Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

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

CA-5.8.107 The bank must have clear and effective policies and procedures governing the control of receivables, credit, and cash. In particular,

- (a) Written internal policies must specify all material elements of the receivables purchase programme, including the advancing rates, eligible collateral, necessary documentation, concentration limits, and how cash receipts are to be handled. These elements should take appropriate account of all relevant and material factors, including the seller's/servicer's financial condition, risk concentrations, and trends in the quality of the receivables and the seller's customer base.
- (b) Internal systems must ensure that funds are advanced only against specified supporting collateral and documentation (such as servicer attestations, invoices, shipping documents, etc.).

- Compliance with the bank's internal policies and procedures

CA-5.8.108 Given the reliance on monitoring and control systems to limit credit risk, the bank must have an effective internal process for assessing compliance with all critical policies and procedures, including

- (a) regular internal and/or external audits of all critical phases of the bank's receivables purchase programme.
- (b) verification of the separation of duties (i) between the assessment of the seller/servicer and the assessment of the obligor and (ii) between the assessment of the seller/servicer and the field audit of the seller/servicer.

CA-5.8.109 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

8. *Validation of internal estimates*

- CA-5.8.110 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 CBB that the internal validation process enables it to assess the performance of internal rating and risk estimation systems consistently and meaningfully.
- CA-5.8.111 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.
- CA-5.8.112 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.
- CA-5.8.113 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.
- CA-5.8.114 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.115 Where banks rely on the CBB's, rather than internal estimates of risk parameters, they are encouraged to compare realised LGDs and EADs to those set by the CBB. The information on realised LGDs and EADs should form part of the bank's assessment of economic capital.

9. CBB's LGD and EAD estimates

CA-5.8.116 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 CA-4). They must meet the following additional minimum requirements in order to receive recognition for additional collateral types.

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

CA-5.8.117 Eligible CRE and RRE collateral for corporate, sovereign and bank exposures are defined as:

- (a) Collateral where the risk of the borrower is not materially dependent upon the performance of the underlying property or project, but rather on the underlying capacity of the borrower to repay the debt from other sources. As such, repayment of the facility is not materially dependent on any cash flow generated by the underlying CRE/RRE serving as collateral;⁵³ and
- (b) Additionally, the value of the collateral pledged must not be materially dependent on the performance of the borrower. This requirement is not intended to preclude situations where purely macro-economic factors affect both the value of the collateral and the performance of the borrower.

⁵³ If the CBB ascertains that public housing policy is supportive of certain real estate sectors, considering them to be an important part of housing market in Bahrain, by means of guarantees or other credit support from government agencies, then mortgage on such multifamily residential real estate can be recognised as eligible collateral for corporate exposures.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.118 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.

(ii) Operational requirements for eligible CRE/RRE

CA-5.8.119 Subject to meeting the definition above, CRE and RRE will be eligible for recognition as collateral for corporate claims only if all of the following operational requirements are met.

- (a) **Legal enforceability:** any claim on a collateral taken must be legally enforceable in all relevant jurisdictions, and any claim on collateral must be properly filed on a timely basis. Collateral interests must reflect a perfected lien (i.e. all legal requirements for establishing the claim have been fulfilled). Furthermore, the collateral agreement and the legal process underpinning it must be such that they provide for the bank to realise the value of the collateral within a reasonable timeframe.
- (b) **Objective market value of collateral:** the collateral must be valued at or less than the current fair value under which the property could be sold under private contract between a willing seller and an arm's-length buyer on the date of valuation.
- (c) **Frequent revaluation:** the 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.
- (d) **Junior liens:** 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.120 Additional collateral management requirements are as follows:

- (a) 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.
- (b) The bank must take steps to ensure that the property taken as collateral is adequately insured against damage or deterioration.
- (c) The bank must monitor on an ongoing basis the extent of any permissible prior claims (e.g. tax) on the property.
- (d) 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.

(iii) Requirements for recognition of financial receivables

- Definition of eligible receivables

CA-5.8.121 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 securitisations, sub-participations or credit derivatives.

- Operational requirements

a. Legal certainty

CA-5.8.122 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.

CA-5.8.123 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.124 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.

CA-5.8.125 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 must have legal authority to sell or assign the receivables to other parties without consent of the receivables' obligors.

b. Risk management

CA-5.8.126 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.

CA-5.8.127 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.

CA-5.8.128 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.129 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.

CA-5.8.130 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.

c. Requirements for recognition of other collateral

CA-5.8.131 CBB may, on a case by case basis, allow for recognition of the credit risk mitigating effect of certain other physical collateral if the bank can demonstrate that such collateral meets the following two standards:

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

CA-5.8.132 **In order for a given bank to receive recognition for additional physical collateral, it must meet all the standards in paragraphs CA-5.8.119 and CA-5.8.120, subject to the following modifications.**

- (a) **First Claim: 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.**
- (b) **The loan agreement must include detailed descriptions of the collateral plus detailed specifications of the manner and frequency of revaluation.**
- (c) **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.**



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

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

10. *Requirements for recognition of leasing*

CA-5.8.133 Leases other than those that expose the bank to residual value risk (see paragraph CA-5.8.134) 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:

- (a) Robust risk management on the part of the lessor with respect to the location of the asset, the use to which it is put, its age, and planned obsolescence;
- (b) A robust legal framework establishing the lessor’s legal ownership of the asset and its ability to exercise its rights as owner in a timely fashion; and
- (c) The difference between the rate of depreciation of the physical asset and the rate of amortisation of the lease payments must not be so large as to overstate the CRM attributed to the leased assets.

CA-5.8.134 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.

- (a) The discounted lease payment stream will receive a risk weight appropriate for the lessee’s financial strength (PD) and CBB’s or own-estimate of LGD, whichever is appropriate.
- (b) The residual value will be risk-weighted at 100%.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

11. Calculation of capital charges for equity exposures

(i) The internal models market-based approach

CA-5.8.135 To be eligible for the internal models market-based approach a bank must demonstrate to CBB 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 CBB'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.

CA-5.8.136 CBB will periodically 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.

(ii) Capital charge and risk quantification

CA-5.8.137 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- (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 CBB 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- (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 CBB that the methodology and its output can be quantified in the form of the loss percentile specified under (a).
- (e) Banks must use an internal model that is appropriate for the risk profile and complexity of their equity portfolio. Banks 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 CBB's 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 CBB in its 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- (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.

(iii) Risk management process and controls

CA-5.8.138 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 Basel Committee and CBB. 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. 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- (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.

(iv) Validation and documentation

CA-5.8.139 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 CBB.

Validation

CA-5.8.140 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 CBB that the internal validation process enables it to assess the performance of its internal model and processes consistently and meaningfully.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

- CA-5.8.141** 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.
- CA-5.8.142** 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.
- CA-5.8.143** 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.
- CA-5.8.144** 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

CA-5.8.145 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. CBB 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.

Documentation

CA-5.8.146 The burden is on the bank to satisfy CBB 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.



MODULE	CA: Capital Adequacy
CHAPTER	CA-5 Credit Risk – The Internal Ratings-Based Approach

CA-5.8 Minimum requirements for IRB approach (continued)

(b) In documenting their internal models banks must:

- 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.

12. *Disclosure requirements*

CA-5.8.147 In order to be eligible for the IRB approach, banks must meet the disclosure requirements that the CBB may set periodically. Failure to meet those requirements will render banks ineligible to use the relevant IRB approach.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.1 Scope and definitions of transactions covered under the Securitisation framework

CA-6.1.1 Banks must apply the securitisation framework for determining regulatory capital requirements on exposures arising from traditional and synthetic securitisations or similar structures that contain features common to both.

CA-6.1.2 Since securitisations may be structured in many different ways, the capital treatment of a securitisation exposure must be determined on the basis of its economic substance rather than its legal form. Similarly, CBB will look to the economic substance of a transaction to determine whether it should be subject to the securitisation framework for purposes of determining regulatory capital. Banks are encouraged to consult with the CBB when there is uncertainty about whether a given transaction should be considered a securitisation. For example, transactions involving cash flows from real estate (e.g. rents) may be considered specialised lending exposures, if warranted.

CA-6.1.3 A *traditional securitisation* is a structure where the cash flow from an underlying pool of exposures is used to service at least two different stratified risk positions or tranches reflecting different degrees of credit risk. Payments to the investors depend upon the performance of the specified underlying exposures, as opposed to being derived from an obligation of the entity originating those exposures. The stratified/tranched structures that characterise securitisations differ from ordinary senior/subordinated debt instruments in that junior securitisation tranches can absorb losses without interrupting contractual payments to more senior tranches, whereas subordination in a senior/subordinated debt structure is a matter of priority of rights to the proceeds of liquidation.

CA-6.1.4 A *synthetic securitisation* is a structure with at least two different stratified risk positions or tranches that reflect different degrees of credit risk where credit risk of an underlying pool of exposures is transferred, in whole or in part, through the use of funded (e.g. credit-linked notes) or unfunded (e.g. credit default swaps) credit derivatives or guarantees that serve to hedge the credit risk of the portfolio. Accordingly, the investors' potential risk is dependent upon the performance of the underlying pool.

CA-6.1.5 Banks' exposures to a securitisation are hereafter referred to as "securitisation exposures". Securitisation exposures can include but are not restricted to the following: asset-backed securities, mortgage-backed securities, credit enhancements, liquidity facilities, interest rate or currency swaps, credit derivatives and tranched cover as described in paragraph CA-4.5.11. Reserve accounts, such as cash collateral accounts, recorded as an asset by the originating bank must also be treated as securitisation exposures.

CA-6.1.6 Underlying instruments in the pool being securitised may include but are not restricted to the following: loans, commitments, asset-backed and mortgage-backed securities, corporate bonds, equity securities, and private equity investments. The underlying pool may include one or more exposures.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-6:	Credit Risk - Securitisation Framework

CA-6.2 Definitions and general terminology

Originating Bank

CA-6.2.1 For risk-based capital purposes, a bank is considered to be an originator with regard to a certain securitisation if it meets either of the following conditions:

- (a) The bank originates directly or indirectly underlying exposures included in the securitisation; or
- (b) The bank serves as a sponsor of an asset-backed commercial paper (ABCP) conduit or similar programme that acquires exposures from third-party entities. In the context of such programmes, a bank would generally be considered a sponsor and, in turn, an originator if it, in fact or in substance, manages or advises the programme, places securities into the market, or provides liquidity and/or credit enhancements.

Asset Backed Commercial Paper (ABCP) Programme

CA-6.2.2 An asset-backed commercial paper (ABCP) programme predominately issues commercial paper with an original maturity of one year or less that is backed by assets or other exposures held in a bankruptcy-remote, Special Purpose Securitisation Vehicle (SPSV).

Clean-up Call

CA-6.2.3 A clean-up call is an option that permits the securitisation exposures (e.g. asset-backed securities) to be called before all of the underlying exposures or securitisation exposures have been repaid. In the case of traditional securitisations, this is generally accomplished by repurchasing the remaining securitisation exposures once the pool balance or outstanding securities have fallen below some specified level. In the case of a synthetic transaction, the clean-up call may take the form of a clause that extinguishes the credit protection.

Credit Enhancement

CA-6.2.4 A credit enhancement is a contractual arrangement in which the bank retains or assumes a securitisation exposure and, in substance, provides some degree of added protection to other parties to the transaction.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.2 Definitions and general terminology (continued)

Credit Enhancing Interest-Only strip

CA-6.2.5 A credit-enhancing interest-only strip (I/O) is an on-balance sheet asset that (i) represents a valuation of cash flows related to future margin income, and (ii) is subordinated.

Early Amortization

CA-6.2.6 Early amortisation provisions are mechanisms that, once triggered, allow investors to be paid out prior to the originally stated maturity of the securities issued. For risk-based capital purposes, an early amortisation provision will be considered either controlled or non-controlled. A controlled early amortisation provision must meet all of the following conditions.

- (a) The bank must have an appropriate capital/liquidity plan in place to ensure that it has sufficient capital and liquidity available in the event of an early amortisation.
- (b) Throughout the duration of the transaction, including the amortisation period, there is the same pro-rata sharing of interest, principal, expenses, losses and recoveries based on the bank's and investors' relative shares of the receivables outstanding at the beginning of each month.
- (c) The bank must set a period for amortisation that would be sufficient for at least 90% of the total debt outstanding at the beginning of the early amortisation period to have been repaid or recognised as in default; and
- (d) The pace of repayment should not be any more rapid than would be allowed by straight-line amortisation over the period set out in criterion (c).

CA-6.2.7 An early amortisation provision that does not satisfy the conditions for a controlled early amortisation provision must be treated as a non-controlled early amortisation provision.



MODULE	CA:	Capital Adequacy
CHAPTER	CA-6:	Credit Risk - Securitisation Framework

CA-6.2 Definitions and general terminology (continued)

Excess Spread

CA-6.2.8 Excess spread is generally defined as gross finance charge collections and other income received by the trust or SPSV (specified in paragraph CA-6.2.10) minus certificate interest, servicing fees, charge-offs, and other senior trust or SPSV expenses.

Implicit Support

CA-6.2.9 Implicit support arises when a bank provides support to a securitisation in excess of its predetermined contractual obligation.

SPSV

CA-6.2.10 An SPSV is a corporation, trust, or other entity organised for a specific purpose, the activities of which are limited to those appropriate to accomplish the purpose of the SPSV, and the structure of which is intended to isolate the SPSV from the credit risk of an originator or seller of exposures. SPSVs are commonly used as financing vehicles in which exposures are sold to a trust or similar entity in exchange for cash or other assets funded by debt issued by the trust.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.3 Operational requirements for the recognition of risk transference

CA-6.3.1 The following operational requirements are applicable to both the standardised and IRB approaches of the securitisation framework.

Operational requirements for traditional securitisations

CA-6.3.2 An originating bank may exclude securitised exposures from the calculation of risk weighted assets under paragraph CA-6.4.1, only if all of the following conditions have been met. Banks meeting these conditions must still hold regulatory capital against any securitisation exposures they retain.

- (a) Significant credit risk associated with the securitised exposures has been transferred to third parties.
- (b) The transferor does not maintain effective or indirect control⁵⁴ over the transferred exposures. The assets are legally isolated from the transferor in such a way (e.g. through the sale of assets or through sub-participation) that the exposures are put beyond the reach of the transferor and its creditors, even in bankruptcy or receivership. These conditions must be supported by an opinion provided by a qualified legal counsel.
- (c) The securities issued are not obligations of the transferor. Thus, investors who purchase the securities only have claim to the underlying pool of exposures.
- (d) The transferee is an SPSV and the holders of the beneficial interests in that entity have the right to pledge or exchange them without restriction.
- (e) Clean-up calls must satisfy the conditions set out in paragraph CA-6.3.5.
- (f) The securitisation does not contain clauses that (i) require the originating bank to alter systematically the underlying exposures such that the pool's weighted average credit quality is improved unless this is achieved by selling assets to independent and unaffiliated third parties at market prices; (ii) allow for increases in a retained first loss position or credit enhancement provided by the originating bank after the transaction's inception; or (iii) increase the yield payable to parties other than the originating bank, such as investors and third-party providers of credit enhancements, in response to a deterioration in the credit quality of the underlying pool.

⁵⁴ The transferor is deemed to have maintained effective control over the transferred credit risk exposures if it: (i) is able to repurchase from the transferee the previously transferred exposures in order to realise their benefits; or (ii) is obligated to retain the risk of the transferred exposures. The transferor's retention of servicing rights to the exposures will not necessarily constitute indirect control of the exposures.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.3 Operational requirements for the recognition of risk transference (continued)

Operational requirements for synthetic securitisations

CA-6.3.3 For synthetic securitisations, the use of CRM techniques (i.e. collateral, guarantees and credit derivatives) for hedging the underlying exposure may be recognised for risk-based capital purposes only if the conditions outlined below are satisfied:

- (a) Credit risk mitigants must comply with the requirements as set out in Chapter CA-4 of this Module.
- (b) Eligible collateral is limited to that specified in paragraphs CA-4.3.1 and CA-4.3.2. Eligible collateral pledged by SPSVs may be recognised.
- (c) Eligible guarantors are defined in paragraph CA-4.5.7. Banks may not recognise SPSVs as eligible guarantors in the securitisation framework.
- (d) Banks must transfer significant credit risk associated with the underlying exposure to third parties.
- (e) The instruments used to transfer credit risk may not contain terms or conditions that limit the amount of credit risk transferred, such as those provided below:
 - Clauses that materially limit the credit protection or credit risk transference (e.g. significant materiality thresholds below which credit protection is deemed not to be triggered even if a credit event occurs or those that allow for the termination of the protection due to deterioration in the credit quality of the underlying exposures);
 - Clauses that require the originating bank to alter the underlying exposures to improve the pool's weighted average credit quality;
 - Clauses that increase the banks' cost of credit protection in response to deterioration in the pool's quality;
 - Clauses that increase the yield payable to parties other than the originating bank, such as investors and third-party providers of credit enhancements, in response to a deterioration in the credit quality of the reference pool; and
 - Clauses that provide for increases in a retained first loss position or credit enhancement provided by the originating bank after the transaction's inception.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.3 Operational requirements for the recognition of risk transference (continued)

- (f) An opinion must be obtained from a qualified legal counsel that confirms the enforceability of the contracts in all relevant jurisdictions.
- (g) Clean-up calls must satisfy the conditions set out in paragraph CA-6.3.5.

CA-6.3.4 For synthetic securitisations, the effect of applying CRM techniques for hedging the underlying exposure are treated according to chapter CA-4. In case there is a maturity mismatch, the capital requirement will be determined in accordance with paragraphs CA-4.6.1 to CA-4.6.4. When the exposures in the underlying pool have different maturities, the longest maturity must be taken as the maturity of the pool. Maturity mismatches may arise in the context of synthetic securitisations when, for example, a bank uses credit derivatives to transfer part or all of the credit risk of a specific pool of assets to third parties. When the credit derivatives unwind, the transaction will terminate. This implies that the effective maturity of the tranches of the synthetic securitisation may differ from that of the underlying exposures. Originating banks of synthetic securitisations must treat such maturity mismatches in the following manner. A bank applying the standardised approach for securitisation must deduct all retained positions that are unrated or rated below investment grade. A bank applying the IRB approach must deduct unrated, retained positions if the treatment of the position is deduction specified in paragraphs CA-6.4.51 to CA-6.4.88. Accordingly, when deduction is required, maturity mismatches are not taken into account. For all other securitisation exposures, the bank must apply the maturity mismatch treatment set forth in paragraphs CA-4.6.1 to CA-4.6.4.

Operational requirements and treatment of clean-up calls

CA-6.3.5 For securitisation transactions that include a clean-up call, no capital will be required due to the presence of a clean-up call if the following conditions are met:

- (a) the exercise of the clean-up call must not be mandatory, in form or in substance, but rather must be at the discretion of the originating bank;



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.3 Operational requirements for the recognition of risk transference (continued)

- (b) the clean-up call must not be structured to avoid allocating losses to credit enhancements or positions held by investors or otherwise structured to provide credit enhancement; and
- (c) the clean-up call must only be exercisable when 10% or less of the original underlying portfolio, or securities issued remain, or, for synthetic securitisations, when 10% or less of the original reference portfolio value remains.

CA-6.3.6 Securitisation transactions that include a clean-up call that does not meet all of the criteria stated in paragraph CA-6.3.5 result in a capital requirement for the originating bank. For a traditional securitisation, the underlying exposures must be treated as if they were not securitised. Additionally, banks must not recognise in regulatory capital any gain-on-sale, as defined in paragraph CA-6.4.3. For synthetic securitisations, the bank purchasing protection must hold capital against the entire amount of the securitised exposures as if they did not benefit from any credit protection. If a synthetic securitisation incorporates a call (other than a cleanup call) that effectively terminates the transaction and the purchased credit protection on a specific date, the bank must treat the transaction in accordance with paragraph CA-6.3.4 and paragraphs CA-4.6.1 to CA-4.6.4.

CA-6.3.7 If a clean-up call, when exercised, is found to serve as a credit enhancement, the exercise of the clean-up call must be considered a form of implicit support provided by the bank and must be treated in accordance with the supervisory guidance pertaining to securitisation transactions.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures

Calculation of capital requirements

CA-6.4.1 Except as stated in paragraph CA-6.3.2, banks are required to hold regulatory capital against all of their securitisation exposures, including those arising from the provision of credit risk mitigants to a securitisation transaction, investments in asset-backed securities, retention of a subordinated tranche, and extension of a liquidity facility or credit enhancement, as set forth in the following sections. Repurchased securitisation exposures must be treated as retained securitisation exposures.

(i) Deduction

CA-6.4.2 When a bank is required to deduct a securitisation exposure from regulatory capital, the deduction must be taken 50% from Tier 1 and 50% from Tier 2 with the one exception noted in paragraph CA-6.4.3. Credit enhancing I/Os (net of the amount that must be deducted from Tier 1 as in paragraph CA-6.4.3) are deducted 50% from Tier 1 and 50% from Tier 2. Deductions from capital may be calculated net of any specific provisions taken against the relevant securitisation exposures.

CA-6.4.3 Banks must deduct from Tier 1 any increase in equity capital resulting from a securitisation transaction, such as that associated with expected future margin income (FMI) resulting in a gain-on-sale that is recognised in regulatory capital. Such an increase in capital is referred to as a “gain-on-sale” for the purposes of the securitisation framework.

CA-6.4.4 For the purposes of the EL-provision calculation as set out in Section CA-5.7, securitisation exposures do not contribute to the EL amount. Similarly, any specific provisions against securitisation exposures are not to be included in the measurement of eligible provisions.

(ii) Implicit support

CA-6.4.5 When a bank provides implicit support to a securitisation, it must, at a minimum, hold capital against all of the exposures associated with the securitisation transaction as if they had not been securitised. Additionally, banks would not be permitted to recognise in regulatory capital any gain-on-sale, as defined in paragraph CA-6.4.3. Furthermore, the bank is required to disclose publicly that (a) it has provided non-contractual support and (b) the capital impact of doing so.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Operational requirements for use of external credit assessments

CA-6.4.6 The following operational criteria concerning the use of external credit assessments apply in the standardised and IRB approaches of the securitisation framework:

- (a) To be eligible for risk-weighting purposes, the external credit assessment must take into account and reflect the entire amount of credit risk exposure the bank has with regard to all payments owed to it. For example, if a bank is owed both principal and interest, the assessment must fully take into account and reflect the credit risk associated with timely repayment of both principal and interest.
- (b) The external credit assessments must be from an eligible ECAI as recognised by the CBB in accordance with section CA-3.4 with the following exception. In contrast with (c) of paragraph CA-3.4.1, an eligible credit assessment must be publicly available. In other words, a rating must be published in an accessible form and included in the ECAI's transition matrix. Consequently, ratings that are made available only to the parties to a transaction do not satisfy this requirement.
- (c) Eligible ECAIs must have a demonstrated expertise in assessing securitisations, which may be evidenced by strong market acceptance.
- (d) A bank must apply external credit assessments from eligible ECAIs consistently across a given type of securitisation exposure. Furthermore, a bank cannot use the credit assessments issued by one ECAI for one or more tranches and those of another ECAI for other positions (whether retained or purchased) within the same securitisation structure that may or may not be rated by the first ECAI. Where two or more eligible ECAIs can be used and these assess the credit risk of the same securitisation exposure differently, paragraphs CA-3.4.5 and CA-3.4.6 will apply.
- (e) Where CRM is provided directly to an SPSV by an eligible guarantor defined in paragraph CA-4.5.7 and is reflected in the external credit assessment assigned to a securitisation exposure(s), the risk weight associated with that external credit assessment should be used. In order to avoid any double counting, no additional capital recognition is permitted. If the CRM provider is not recognised as an eligible guarantor in paragraph CA-4.5.7, the covered securitisation exposures should be treated as unrated.
- (f) In the situation where a credit risk mitigant is not obtained by the SPSV but rather applied to a specific securitisation exposure within a given structure (e.g. ABS tranche), the bank must treat the exposure as if it is unrated and then use the CRM treatment outlined in chapter CA-4 or in the foundation IRB approach of chapter CA-5, to recognise the hedge.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Standardised approach for securitisation exposures

(i) Scope

CA-6.4.7 Banks that apply the standardised approach to credit risk for the type of underlying exposure(s) securitised must use the standardised approach under the securitisation framework.

(ii) Risk weights

CA-6.4.8 The risk-weighted asset amount of a securitisation exposure is computed by multiplying the amount of the position by the appropriate risk weight determined in accordance with the following tables. For off-balance sheet exposures, banks must apply a CCF and then risk weight the resultant credit equivalent amount. If such an exposure is rated, a CCF of 100% must be applied. For positions with long-term ratings of B+ and below and short-term ratings other than A-1/P-1, A-2/P-2, A-3/P-3, deduction from capital as defined in paragraph CA-6.4.2 is required. Deduction is also required for unrated positions with the exception of the circumstances described in paragraphs CA-6.4.12 to CA-6.4.16.

Long-term rating category⁵⁵

External Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	B+ and below or unrated
Risk Weight	20%	50%	100%	350%	Deduction

Short-term rating category

External Credit Assessment	A-1/P-1	A-2/P-2	A-3/P-3	All other ratings or unrated
Risk Weight	20%	50%	100%	Deduction

CA-6.4.9 The capital treatment of positions retained by originators, liquidity facilities, credit risk mitigants, and securitisations of revolving exposures are identified separately. The treatment of clean-up calls is provided in paragraphs CA-6.3.5 to CA-6.3.7.

⁵⁵ The rating designations used in the following tables are for illustrative purposes only and do not indicate any preference for, or endorsement of, any particular external assessment system.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Recognition of ratings on below-investment grade exposures

CA-6.4.10 Only third-party investors, as opposed to banks that serve as originators, may recognise external credit assessments that are equivalent to BB+ to BB- for risk weighting purposes of securitisation exposures.

Originators to deduct below-investment grade exposures

CA-6.4.11 Originating banks as defined in paragraph CA-6.2.1 must deduct all retained securitisation exposures rated below investment grade (i.e. BBB-).

(iii) Exceptions to general treatment of unrated securitisation exposures

CA-6.4.12 As noted in the tables above, unrated securitisation exposures must be deducted with the following exceptions: (i) the most senior exposure in a securitisation, (ii) exposures that are in a second loss position or better in ABCP programmes and meet the requirements outlined in paragraph CA-6.4.15, and (iii) eligible liquidity facilities.

Treatment of unrated most senior securitisation exposures

CA-6.4.13 If the most senior exposure in a securitisation of a traditional or synthetic securitisation is unrated, a bank that holds or guarantees such an exposure may determine the risk weight by applying the “look-through” treatment, provided the composition of the underlying pool is known at all times. Banks are not required to consider interest rate or currency swaps when determining whether an exposure is the most senior in a securitisation for the purpose of applying the “look-through” approach.

CA-6.4.14 In the look-through treatment, the unrated most senior position receives the average risk weight of the underlying exposures subject to CBB review. Where the bank is unable to determine the risk weights assigned to the underlying credit risk exposures, the unrated position must be deducted.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Treatment of exposures in a second loss position or better in ABCP programmes

CA-6.4.15 Deduction is not required for those unrated securitisation exposures provided by sponsoring banks to ABCP programmes that satisfy the following requirements:

- (a) The exposure is economically in a second loss position or better and the first loss position provides significant credit protection to the second loss position;
- (b) The associated credit risk is the equivalent of investment grade or better; and
- (c) The bank holding the unrated securitisation exposure does not retain or provide the first loss position.

CA-6.4.16 Where these conditions are satisfied, the risk weight is the greater of (i) 100% or (ii) the highest risk weight assigned to any of the underlying individual exposures covered by the facility.

Risk weights for eligible liquidity facilities

CA-6.4.17 For eligible liquidity facilities as defined in paragraph CA-6.4.19 and where the conditions for use of external credit assessments in paragraph CA-6.4.6 are not met, the risk weight applied to the exposure's credit equivalent amount is equal to the highest risk weight assigned to any of the underlying individual exposures covered by the facility.

(iv) Credit conversion factors for off-balance sheet exposures

CA-6.4.18 For risk-based capital purposes, banks must determine whether, according to the criteria outlined below, an off-balance sheet securitisation exposure qualifies as an 'eligible liquidity facility' or an 'eligible servicer cash advance facility'. All other off-balance sheet securitisation exposures will receive a 100% CCF.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Eligible liquidity facilities

CA-6.4.19 Banks are permitted to treat off-balance sheet securitisation exposures as eligible liquidity facilities if the following minimum requirements are satisfied:

- (a) The facility documentation must clearly identify and limit the circumstances under which it may be drawn. Draws under the facility must be limited to the amount that is likely to be repaid fully from the liquidation of the underlying exposures and any seller-provided credit enhancements. In addition, the facility must not cover any losses incurred in the underlying pool of exposures prior to a draw, or be structured such that draw-down is certain (as indicated by regular or continuous draws);
- (b) The facility must be subject to an asset quality test that precludes it from being drawn to cover credit risk exposures that are in default as defined in paragraphs CA-5.8.63 to CA-5.8.70. In addition, if the exposures that a liquidity facility is required to fund are externally rated securities, the facility can only be used to fund securities that are externally rated investment grade at the time of funding;
- (c) The facility cannot be drawn after all applicable (e.g. transaction-specific and programme-wide) credit enhancements from which the liquidity would benefit have been exhausted; and
- (d) Repayment of draws on the facility (i.e. assets acquired under a purchase agreement or loans made under a lending agreement) must not be subordinated to any interests of any note holder in the programme (e.g. ABCP programme) or subject to deferral or waiver.

CA-6.4.20 Where these conditions are met, the bank may apply a 20% CCF to the amount of eligible liquidity facilities with an original maturity of one year or less, or a 50% CCF if the facility has an original maturity of more than one year. However, if an external rating of the facility itself is used for risk-weighting the facility, a 100% CCF must be applied.

Eligible Liquidity Facilities available only in the event of market disruption

CA-6.4.21 Banks may apply a 0% CCF to eligible liquidity facilities that are only available in the event of a general market disruption (i.e. whereupon more than one SPSV across different transactions are unable to roll over maturing commercial paper, and that inability is not the result of an impairment in the SPSVs' credit quality or in the credit quality of the underlying exposures).



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.22 To qualify for the treatment above, the conditions provided in paragraph CA-6.4.19 must be satisfied. Additionally, the funds advanced by the bank to pay holders of the capital market instruments (e.g. commercial paper) when there is a general market disruption must be secured by the underlying assets, and must rank at least *pari passu* with the claims of holders of the capital market instruments.

Treatment of Overlapping exposures

CA-6.4.23 A bank may provide several types of facilities that can be drawn under various conditions. The same bank may be providing two or more of these facilities. Given the different triggers found in these facilities, it may be the case that a bank provides duplicative coverage to the underlying exposures. In other words, the facilities provided by a bank may overlap since a draw on one facility may preclude (in part) a draw under the other facility. In the case of overlapping facilities provided by the same bank, the bank does not need to hold additional capital for the overlap. Rather, it is only required to hold capital once for the position covered by the overlapping facilities (whether they are liquidity facilities or credit enhancements). Where the overlapping facilities are subject to different conversion factors, the bank must attribute the overlapping part to the facility with the highest conversion factor. However, if overlapping facilities are provided by different banks, each bank must hold capital for the maximum amount of the facility.

Eligible servicer cash advance facilities

CA-6.4.24 If contractually provided for, servicers may advance cash to ensure an uninterrupted flow of payments to investors so long as the servicer is entitled to full reimbursement and this right is senior to other claims on cash flows from the underlying pool of exposures. A 0% CCF must be applied to such un-drawn servicer cash advances or facilities provided that these are unconditionally cancellable without prior notice.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 (v) Treatment of securitisation exposures (continued)

Treatment of credit risk mitigation for securitisation exposures

CA-6.4.25 The treatment below applies to a bank that has obtained a credit risk mitigant on a securitisation exposure. Credit risk mitigants include guarantees, credit derivatives, collateral and on-balance sheet netting. Collateral in this context refers to that used to hedge the credit risk of a securitisation exposure rather than the underlying exposures of the securitisation transaction.

CA-6.4.26 When a bank other than the originator provides credit protection to a securitisation exposure, it must calculate a capital requirement on the covered exposure as if it were an investor in that securitisation. If a bank provides protection to an unrated credit enhancement, it must treat the credit protection provided as if it were directly holding the unrated credit enhancement.

Collateral

CA-6.4.27 Eligible collateral is limited to that recognised under the standardised approach for CRM (paragraphs CA-4.3.1 and CA-4.3.2). Collateral pledged by SPSVs may be recognised.

Guarantees and credit derivatives

CA-6.4.28 Credit protection provided by the entities listed in paragraph CA-4.5.7 may be recognised. SPSVs cannot be recognised as eligible guarantors.

CA-6.4.29 Where guarantees or credit derivatives fulfil the minimum operational conditions as specified in paragraphs CA-4.5.1 to CA-4.5.6, banks can take account of such credit protection in calculating capital requirements for securitisation exposures.

CA-6.4.30 Capital requirements for the guaranteed/protected portion will be calculated according to CRM for the standardised approach as specified in paragraphs CA-4.5.8 to CA-4.5.13.

Maturity mismatches

CA-6.4.31 For the purpose of setting regulatory capital against a maturity mismatch, the capital requirement will be determined in accordance with paragraphs CA-4.6.1 to CA-4.6.4. When the exposures being hedged have different maturities, the longest maturity must be used.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

(vi) Capital requirement for early amortisation provisions

Scope

CA-6.4.32 As described below, an originating bank is required to hold capital against all or a portion of the investors' interest (i.e. against both the drawn and un-drawn balances related to the securitised exposures) when:

- (a) It sells exposures into a structure that contains an early amortisation feature; and
- (b) The exposures sold are of a revolving nature. These involve exposures where the borrower is permitted to vary the drawn amount and repayments within an agreed limit under a line of credit (e.g. credit card receivables and corporate loan commitments).

CA-6.4.33 The capital requirement should reflect the type of mechanism through which an early amortisation is triggered.

CA-6.4.34 For securitisation structures wherein the underlying pool comprises revolving and term exposures, a bank must apply the relevant early amortisation treatment (outlined below in paragraphs CA-6.4.36 to CA-6.4.47) to that portion of the underlying pool containing revolving exposures.

CA-6.4.35 Banks are not required to calculate a capital requirement for early amortisations in the following situations:

- (a) Replenishment structures where the underlying exposures do not revolve and the early amortisation ends the ability of the bank to add new exposures;
- (b) Transactions of revolving assets containing early amortisation features that mimic term structures (i.e. where the risk on the underlying facilities does not return to the originating bank);
- (c) Structures where a bank securitises one or more credit line(s) and where investors remain fully exposed to future draws by borrowers even after an early amortisation event has occurred;
- (d) The early amortisation clause is solely triggered by events not related to the performance of the securitised assets or the selling bank, such as material changes in tax laws or regulations.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Maximum capital requirement

CA-6.4.36 For a bank subject to the early amortisation treatment, the total capital charge for all of its positions will be subject to a maximum capital requirement (i.e. a 'cap') equal to the greater of (i) that required for retained securitisation exposures, or (ii) the capital requirement that would apply had the exposures not been securitised. In addition, banks must deduct the entire amount of any gain-on-sale and credit enhancing I/Os arising from the securitisation transaction in accordance with paragraphs CA-6.4.2 to CA-6.4.4.

Mechanics

CA-6.4.37 The originator's capital charge for the investors' interest is determined as the product of (a) the investors' interest, (b) the appropriate CCF (as discussed below), and (c) the risk weight appropriate to the underlying exposure type, as if the exposures had not been securitised. As described below, the CCFs depend upon whether the early amortisation repays investors through a controlled or non-controlled mechanism. They also differ according to whether the securitised exposures are uncommitted retail credit lines (e.g. credit card receivables) or other credit lines (e.g. revolving corporate facilities). A line is considered uncommitted if it is unconditionally cancellable without prior notice.

(vii) Determination of CCFs for controlled early amortisation features

CA-6.4.38 An early amortisation feature is considered controlled when the definition as specified in paragraph CA-6.2.6 is satisfied.

Uncommitted retail exposures

CA-6.4.39 For uncommitted retail credit lines (e.g. credit card receivables) in securitisations containing controlled early amortisation features, banks must compare the three-month average excess spread defined in paragraph CA-6.2.8 to the point at which the bank is required to trap excess spread as economically required by the structure (i.e. excess spread trapping point).

CA-6.4.40 In cases where such a transaction does not require excess spread to be trapped, the trapping point is deemed to be 4.5 percentage points.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.41 The bank must divide the excess spread level by the transaction's excess spread trapping point to determine the appropriate segments and apply the corresponding conversion factors, as outlined in the following table.

Controlled early amortisation features

	Uncommitted	Committed
Retail credit lines	<p>3-month average excess spread Credit Conversion Factor (CCF)</p> <p>133.33% of trapping point or more 0% CCF</p> <p>less than 133.33% to 100% of trapping point 1% CCF</p> <p>less than 100% to 75% of trapping point 2% CCF</p> <p>less than 75% to 50% of trapping point 10% CCF</p> <p>less than 50% to 25% of trapping point 20% CCF</p> <p>less than 25% 40% CCF</p>	90% CCF
Non-retail credit lines	90% CCF	90% CCF

CA-6.4.42 Banks are required to apply the conversion factors set out above for controlled mechanisms to the investors' interest referred to in paragraph CA-6.4.37.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Other exposures

CA-6.4.43 All other securitised revolving exposures (i.e. those that are committed and all non-retail exposures) with controlled early amortisation features will be subject to a CCF of 90% against the off-balance sheet exposures.

(viii) Determination of CCFs for non-controlled early amortisation features

CA-6.4.44 Early amortisation features that do not satisfy the definition of a controlled early amortisation as specified in paragraph CA-6.2.6 will be considered non-controlled and treated as follows.

Uncommitted retail exposures

CA-6.4.45 For uncommitted retail credit lines (e.g. credit card receivables) in securitisations containing non-controlled early amortisation features, banks must make the comparison described in paragraphs CA-6.4.38 and CA-6.4.40:

CA-6.4.46 The bank must divide the excess spread level by the transaction's excess spread trapping point to determine the appropriate segments and apply the corresponding conversion factors, as outlined in the following table.

Non-controlled early amortisation features

	Uncommitted	Committed
Retail credit lines	<p>3-month average excess spread Credit Conversion Factor (CCF)</p> <p>133.33% or more of trapping point 0% CCF</p> <p>less than 133.33% to 100% of trapping point 5% CCF</p> <p>less than 100% to 75% of trapping point 15% CCF</p> <p>less than 75% to 50% of trapping point 50% CCF</p> <p>less than 50% of trapping point 100% CCF</p>	100% CCF
Non-retail credit lines	100% CCF	100% CCF



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Other exposures

CA-6.4.47 All other securitised revolving exposures (i.e. those that are committed and all non-retail exposures) with non-controlled early amortisation features will be subject to a CCF of 100% against the off-balance sheet exposures.

Internal ratings-based approach for securitisation exposures

(i) Scope

CA-6.4.48 Banks that have received approval from CBB to use the IRB approach for the type of underlying exposures securitised (e.g. for their corporate or retail portfolio) must use the IRB approach for securitisations. Conversely, banks may not use the IRB approach to securitisation unless they receive approval to use the IRB approach for the underlying exposures from CBB.

CA-6.4.49 If the bank is applying the IRB approach for some exposures and the standardised approach for other exposures in the underlying pool, it should generally use the approach corresponding to the predominant share of exposures within the pool. The bank must consult with the CBB on which approach to apply to its securitisation exposures. To ensure appropriate capital levels, there may be instances where the CBB requires a treatment other than this general rule.

CA-6.4.50 Where there is no specific IRB treatment for the underlying asset type, originating banks that have received approval to use the IRB approach must calculate capital charges on their securitisation exposures applying the standardised approach in the securitisation framework, and investing banks with approval to use the IRB approach must apply the RBA.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

(ii) Hierarchy of approaches

CA-6.4.51 The Ratings-Based Approach (RBA) must be applied to securitisation exposures that are rated, or where a rating can be inferred as described in paragraph CA-6.4.60. Where an external or an inferred rating is not available, either the Supervisory Formula (SF) or the Internal Assessment Approach (IAA) must be applied. The IAA is only available to exposures (e.g. liquidity facilities and credit enhancements) that banks (including third-party banks) extend to ABCP programmes. Such exposures must satisfy the conditions of paragraphs CA-6.4.62 and CA-6.4.63. For liquidity facilities to which none of these approaches can be applied, banks may apply the treatment specified in paragraph CA-6.4.84. Exceptional treatment for eligible servicer cash advance facilities is specified in paragraph CA-6.4.86. Securitisation exposures to which none of these approaches can be applied must be deducted.

(iii) Maximum capital requirement

CA-6.4.52 For a bank applying the IRB approach to securitisation, the maximum capital requirement for the securitisation exposures it holds is equal to the IRB capital requirement that would have been assessed against the underlying exposures had they not been securitised and treated under the appropriate sections of the IRB framework including section CA-5.7. In addition, banks must deduct the entire amount of any gain-on-sale and credit enhancing I/Os arising from the securitisation transaction in accordance with paragraphs CA-6.4.2 to CA-6.4.4.

(iv) Ratings-Based Approach (RBA)

CA-6.4.53 Under the RBA, the risk-weighted assets are determined by multiplying the amount of the exposure by the appropriate risk weights, provided in the tables in paragraph CA-6.4.58 and CA-6.4.59.

CA-6.4.54 The risk weights depend on (i) the external rating grade or an available inferred rating, (ii) whether the credit rating (external or inferred) represents a long-term or a short term credit rating, (iii) the granularity of the underlying pool and (iv) the seniority of the position.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.55 For purposes of the RBA, a securitisation exposure is treated as a senior tranche if it is effectively backed or secured by a first claim on the entire amount of the assets in the underlying securitised pool. While this generally includes only the most senior position within a securitisation transaction, in some instances there may be some other claim that, in a technical sense, may be more senior in the waterfall (e.g. a swap claim) but may be disregarded for the purpose of determining which positions are subject to the “senior tranches” column.

CA-6.4.56 Examples:

- (a) In a typical synthetic securitisation, the “super-senior” tranche would be treated as a senior tranche, provided that all of the conditions for inferring a rating from a lower tranche are fulfilled.
- (b) In a traditional securitisation where all tranches above the first-loss piece are rated, the most highly rated position would be treated as a senior tranche. However, when there are several tranches that share the same rating, only the most senior one in the waterfall would be treated as senior.
- (c) Usually a liquidity facility supporting an ABCP programme would not be the most senior position within the programme; the commercial paper, which benefits from the liquidity support, typically would be the most senior position. However, if the liquidity facility is sized to cover all of the outstanding commercial paper, it can be viewed as covering all losses on the underlying receivables pool that exceed the amount of over-collateralisation/reserves provided by the seller and as being most senior. As a result, the RBA risk weights in the left-most column can be used for such positions. On the other hand, if a liquidity or credit enhancement facility constituted a mezzanine position in economic substance rather than a senior position in the underlying pool, then the “Base risk weights” column is applicable.

CA-6.4.57 The risk weights provided in the table in paragraph CA-6.4.58 apply when the external assessment represents a long-term credit rating, as well as when an inferred rating based on a long-term rating is available.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.58 Banks may apply the risk weights for senior positions if the effective number of underlying exposures (N, as defined in paragraph CA-6.4.77) is 6 or more and the position is senior as defined above. When N is less than 6, the risk weights in column 4 of the first table below apply. In all other cases, the risk weights in column 3 of the first table below apply.

RBA risk weights when the external assessment represents a long-term credit rating and/or an inferred rating derived from a long-term assessment

External Rating (Illustrative)	Risk weights for senior positions and eligible senior IAA exposures	Base risk weights	Risk weights for tranches backed by non-granular pools
AAA	7%	12%	20%
AA	8%	15%	25%
A+	10%	18%	35%
A	12%	20%	
A-	20%	35%	
BBB+	35%		50%
BBB	60%		75%
BBB-		100%	
BB+		250%	
BB		425%	
BB-		650%	
Below BB- and unrated		Deduction	



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.59 The risk weights in the table below apply when the external assessment represents a short-term credit rating, as well as when an inferred rating based on a short-term rating is available. The decision rules outlined in paragraph CA-6.4.58 also apply for short-term credit ratings.

RBA risk weights when the external assessment represents a short-term credit rating and/or an inferred rating derived from a short-term assessment

External Rating (Illustrative)	Risk weights for senior positions and eligible senior IAA exposures	Base risk weights	Risk weights for tranches backed by non-granular
A-1/P-	7%	12%	2
A-2/P-	12%	20%	3
A-3/P-	60%	75%	7
All other ratings/unrated	Deduction	Deduction	Deduction



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Use of inferred ratings

CA-6.4.60 When the following minimum operational requirements are satisfied a bank must attribute an inferred rating to an unrated position. These requirements are intended to ensure that the unrated position is senior in all respects to an externally rated securitisation exposure termed the 'reference securitisation exposure'.

Operational requirements for inferred ratings

CA-6.4.61 The following operational requirements must be satisfied to recognise inferred ratings.

- (a) The reference securitisation exposure (e.g. ABS) must be subordinate in all respects to the unrated securitisation exposure. Credit enhancements, if any, must be taken into account when assessing the relative subordination of the unrated exposure and the reference securitisation exposure. For example, if the reference securitisation exposure benefits from any third-party guarantees or other credit enhancements that are not available to the unrated exposure, then the latter may not be assigned an inferred rating based on the reference securitisation exposure.
- (b) The maturity of the reference securitisation exposure must be equal to or longer than that of the unrated exposure.
- (c) On an ongoing basis, any inferred rating must be updated continuously to reflect any changes in the external rating of the reference securitisation exposure.
- (d) The external rating of the reference securitisation exposure must satisfy the general requirements for recognition of external ratings as delineated in paragraph CA-6.4.6.

(v) Internal Assessment Approach (IAA)

CA-6.4.62 A bank may use its internal assessments of the credit quality of the securitisation exposures the bank extends to ABCP programmes (e.g. liquidity facilities and credit enhancements) if the bank's internal assessment process meets the operational requirements below. Internal assessments of exposures provided to ABCP programmes must be mapped to equivalent external ratings of an ECAI. Those rating equivalents are used to determine the appropriate risk weights under the RBA for purposes of assigning the notional amounts of the exposures.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.63 A bank's internal assessment process must meet the following operational requirements in order to use internal assessments in determining the IRB capital requirement arising from liquidity facilities, credit enhancements, or other exposures extended to an ABCP programme.

- (a) For the unrated exposure to qualify for the IAA, the ABCP must be externally rated. The ABCP itself is subject to the RBA.
- (b) The internal assessment of the credit quality of a securitisation exposure to the ABCP programme must be based on an ECAI criteria for the asset type purchased and must be the equivalent of at least investment grade when initially assigned to an exposure. In addition, the internal assessment must be used in the bank's internal risk management processes, including management information and economic capital systems, and generally must meet all the relevant requirements of the IRB framework.
- (c) In order for banks to use the IAA, the CBB must be satisfied (i) that the ECAI meets the ECAI eligibility criteria outlined in section CA-3.4 and (ii) with the ECAI rating methodologies used in the process. In addition, banks have the responsibility to demonstrate to the satisfaction of the CBB how these internal assessments correspond with the relevant ECAI's standards. For instance, when calculating the credit enhancement level in the context of the IAA, the CBB may, if warranted, disallow on a full or partial basis any seller provided recourse guarantees or excess spread, or any other first loss credit enhancements that provide limited protection to the bank.
- (d) The bank's internal assessment process must identify gradations of risk. Internal assessments must correspond to the external ratings of ECAIs so that the CBB can determine which internal assessment corresponds to each external rating category of the ECAIs.
- (e) The bank's internal assessment process, particularly the stress factors for determining credit enhancement requirements, must be at least as conservative as the publicly available rating criteria of the major ECAIs that are externally rating the ABCP programme's commercial paper for the asset type being purchased by the programme. However, banks must consider, to some extent, all publicly available ECAI ratings methodologies in developing their internal assessments.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Securitisation Framework Credit Risk -

CA-6.4 Treatment of securitisation exposures (continued)

- In the case where (i) the commercial paper issued by an ABCP programme is externally rated by two or more ECAIs and (ii) the different ECAIs' benchmark stress factors require different levels of credit enhancement to achieve the same external rating equivalent, the bank must apply the ECAI stress factor that requires the most conservative or highest level of credit protection. For example, if one ECAI required enhancement of 2.5 to 3.5 times historical losses for an asset type to obtain a single A rating equivalent and another required 2 to 3 times historical losses, the bank must use the higher range of stress factors in determining the appropriate level of seller-provided credit enhancement.
- When selecting ECAIs to externally rate an ABCP, a bank must not choose only those ECAIs that generally have relatively less restrictive rating methodologies. In addition, if there are changes in the methodology of one of the selected ECAIs, including the stress factors, that adversely affect the external rating of the programme's commercial paper, then the revised rating methodology must be considered in evaluating whether the internal assessments assigned to ABCP programme exposures are in need of revision.
- A bank cannot utilise an ECAI's rating methodology to derive an internal assessment if the ECAI's process or rating criteria is not publicly available. However, banks must consider the non-publicly available methodology — to the extent that they have access to such information — in developing their internal assessments, particularly if it is more conservative than the publicly available criteria.
- In general, if the ECAI rating methodologies for an asset or exposure are not publicly available, then the IAA may not be used. However, in certain instances, for example, for new or uniquely structured transactions, which are not currently addressed by the rating criteria of an ECAI rating the programme's commercial paper, a bank may discuss the specific transaction with the CBB to determine whether the IAA may be applied to the related exposures.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

- (f) Internal or external auditors, an ECAI, or the bank's internal credit review or risk management function must perform regular reviews of the internal assessment process and assess the validity of those internal assessments. If the bank's internal audit, credit review, or risk management functions perform the reviews of the internal assessment process, then these functions must be independent of the ABCP programme business line, as well as the underlying customer relationships.
- (g) The bank must track the performance of its internal assessments over time to evaluate the performance of the assigned internal assessments and make adjustments, as necessary, to its assessment process when the performance of the exposures routinely diverges from the assigned internal assessments on those exposures.
- (h) The ABCP programme must have credit and investment guidelines, i.e. underwriting standards, for the ABCP programme. In the consideration of an asset purchase, the ABCP programme (i.e. the programme administrator) should develop an outline of the structure of the purchase transaction. Factors that should be discussed include the type of asset being purchased; type and monetary value of the exposures arising from the provision of liquidity facilities and credit enhancements; loss waterfall; and legal and economic isolation of the transferred assets from the entity selling the assets.
- (i) A credit analysis of the asset seller's risk profile must be performed and should consider, for example, past and expected future financial performance; current market position; expected future competitiveness; leverage, cash flow, and interest coverage; and debt rating. In addition, a review of the seller's underwriting standards, servicing capabilities, and collection processes should be performed.
- (j) The ABCP programme's underwriting policy must establish minimum asset eligibility criteria that, among other things:
- exclude the purchase of assets that are significantly past due or defaulted;
 - limit excess concentration to individual obligor or geographic area; and
 - limit the tenor of the assets to be purchased.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

(v) Internal Assessment Approach (IAA) (continued)

- (k) The ABCP programme should have collections processes established that consider the operational capability and credit quality of the servicer. The programme should mitigate to the extent possible seller/servicer risk through various methods, such as triggers based on current credit quality that would preclude co-mingling of funds and impose lockbox arrangements that would help ensure the continuity of payments to the ABCP programme.
- (l) The aggregate estimate of loss on an asset pool that the ABCP programme is considering purchasing must consider all sources of potential risk, such as credit and dilution risk. If the seller-provided credit enhancement is sized based on only credit-related losses, then a separate reserve should be established for dilution risk, if dilution risk is material for the particular exposure pool. In addition, in sizing the required enhancement level, the bank must review several years of historical information, including losses, delinquencies, dilutions, and the turnover rate of the receivables. Furthermore, the bank must evaluate the characteristics of the underlying asset pool, e.g. weighted average credit score, identify any concentrations to an individual obligor or geographic region, and the granularity of the asset pool.
- (m) The ABCP programme must incorporate structural features into the purchase of assets in order to mitigate potential credit deterioration of the underlying portfolio. Such features may include wind down triggers specific to a pool of exposures.

CA-6.4.64 The notional amount of the securitisation exposure to the ABCP programme must be assigned to the risk weight in the RBA appropriate to the credit rating equivalent assigned to the bank's exposure.

CA-6.4.65 If a bank's internal assessment process is no longer considered adequate, the CBB may preclude the bank from applying the internal assessment approach to its ABCP exposures, both existing and newly originated, for determining the appropriate capital treatment until the bank has remedied the deficiencies. In this instance, the bank must revert to the SF or, if not available, to the method described in paragraph CA-6.4.84.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

(vi) Supervisory Formula (SF)

CA-6.4.66 As in the IRB approaches, risk-weighted assets generated through the use of the SF are calculated by multiplying the capital charge by 12.5. Under the SF, the capital charge for a securitisation tranche depends on five bank-supplied inputs: the IRB capital charge had the underlying exposures not been securitised (K_{IRB}); the tranche's credit enhancement level (L) and thickness (T); the pool's effective number of exposures (N); and the pool's exposure-weighted average loss-given-default (LGD). The inputs K_{IRB} , L , T and N are defined below.

CA-6.4.67 The capital charge is calculated as follows:

(1) Tranche's IRB capital charge = the amount of exposures that have been securitised times the greater of (a) $0.0056 \times T$, or (b) $(S [L+T] - S [L])$.

Where the function $S[.]$ (termed the 'Supervisory Formula') is defined in the following paragraph. When the bank holds only a proportional interest in the tranche, that position's capital charge equals the prorated share of the capital charge for the entire tranche.

CA-6.4.68 The Supervisory Formula is given by the following expression:

2.

$$S[L] = \begin{cases} L & \text{when } L \leq K_{IRB} \\ K_{IRB} + K[L] - K[K_{IRB}] + (d \cdot K_{IRB} / \omega) \left(1 - e^{-\omega(K_{IRB} - L)/K_{IRB}}\right) & \text{when } K_{IRB} < L \end{cases}$$

Where

$$\begin{aligned} h &= (1 - K_{IRB} / LGD)^N \\ c &= K_{IRB} / (1 - h) \\ v &= \frac{(LGD - K_{IRB})K_{IRB} + 0.25(1 - LGD)K_{IRB}}{N} \\ f &= \left(\frac{v + K_{IRB}^2}{1 - h} - c^2 \right) + \frac{(1 - K_{IRB})K_{IRB} - v}{(1 - h)\tau} \\ g &= \frac{(1 - c)c}{f} - 1 \\ a &= g \cdot c \\ b &= g \cdot (1 - c) \\ d &= 1 - (1 - h) \cdot (1 - \text{Beta}[K_{IRB}; a, b]) \\ K[L] &= (1 - h) \cdot ((1 - \text{Beta}[L; a, b])L + \text{Beta}[L; a + 1, b]c). \end{aligned}$$



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.69 In these expressions, Beta[L; a, b] refers to the cumulative beta distribution with parameters a and b evaluated at L.⁵⁶

CA-6.4.70 The supervisory-determined parameters in the above expressions are as follows:

$$\tau = 1000, \text{ and } \omega = 20$$

Definition of K_{IRB}

CA-6.4.71 K_{IRB} is the ratio of (a) the IRB capital requirement including the EL portion for the underlying exposures in the pool to (b) the exposure amount of the pool (e.g. the sum of drawn amounts related to securitised exposures plus the EAD associated with un-drawn commitments related to securitised exposures). Quantity (a) above must be calculated in accordance with the applicable minimum IRB standards (as set out in Section CA-7.1.7 of this document) as if the exposures in the pool were held directly by the bank. This calculation should reflect the effects of any credit risk mitigant that is applied on the underlying exposures (either individually or to the entire pool), and hence benefits all of the securitisation exposures. K_{IRB} is expressed in decimal form (e.g. a capital charge equal to 15% of the pool would be expressed as 0.15). For structures involving an SPSV, all the assets of the SPSV that are related to the securitisations are to be treated as exposures in the pool, including assets in which the SPSV may have invested a reserve account, such as a cash collateral account.

CA-6.4.72 If the risk weight resulting from the SF is 1250%, banks must deduct the securitisation exposure subject to that risk weight in accordance with paragraphs CA-6.4.2 to CA-6.4.4.

CA-6.4.73 In cases where a bank has set aside a specific provision or has a non-refundable purchase price discount on an exposure in the pool, quantity (a) defined above and quantity (b) also defined above must be calculated applying the gross amount of the exposure without the specific provision and/or non-refundable purchase price discount. In this case, the amount of the non-refundable purchase price discount on a defaulted asset or the specific provision can be used to reduce the amount of any deduction from capital associated with the securitisation exposure.

⁵⁶ The cumulative beta distribution function is available, for example, in Excel as the function BETADIST.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Credit enhancement level (L)

CA-6.4.74 L is measured (in decimal form) as the ratio of (a) the amount of all securitisation exposures subordinate to the tranche in question to (b) the amount of exposures in the pool. Banks must determine L before considering the effects of any tranche-specific credit enhancements, such as third-party guarantees that benefit only a single tranche. Any gain-on-sale and/or credit enhancing I/Os associated with the securitisation are not to be included in the measurement of L. The size of interest rate or currency swaps that are more junior than the tranche in question may be measured at their current values (without the potential future exposures) in calculating the enhancement level. If the current value of the instrument cannot be measured, the instrument should be ignored in the calculation of L.

CA-6.4.75 If there is any reserve account funded by accumulated cash flows from the underlying exposures that is more junior than the tranche in question, this can be included in the calculation of L. Unfunded reserve accounts may not be included if they are to be funded from future receipts from the underlying exposures.

Thickness of exposure (T)

CA-6.4.76 T is measured as the ratio of (a) the nominal size of the tranche of interest to (b) the notional amount of exposures in the pool. In the case of an exposure arising from an interest rate or currency swap, the bank must incorporate potential future exposure. If the current value of the instrument is non-negative, the exposure size should be measured by the current value plus the add-on as in the previous capital adequacy regulations issued by CBB dated July 2004. If the current value is negative, the exposure should be measured by applying the potential future exposure only.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Effective number of exposures (N)

CA-6.4.77 The effective number of exposures is calculated as:

3.

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

CA-6.4.78 where EAD_i represents the exposure-at-default associated with the i^{th} instrument in the pool. Multiple exposures to the same obligor must be consolidated (i.e. treated as a single instrument). In the case of re-securitisation (securitisation of securitisation exposures), the formula applies to the number of securitisation exposures in the pool and not the number of underlying exposures in the original pools. If the portfolio share associated with the largest exposure, C_1 , is available, the bank may compute N as $1/C_1$.

Exposure-weighted average LGD

CA-6.4.79 The exposure-weighted average LGD is calculated as follows:

4,

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

where LGD_i represents the average LGD associated with all exposures to the i^{th} obligor. In the case of re-securitisation, an LGD of 100% must be assumed for the underlying securitised exposures. When default and dilution risks for purchased receivables are treated in an aggregate manner (e.g. a single reserve or over-collateralisation is available to cover losses from either source) within a securitisation, the LGD input must be constructed as a weighted-average of the LGD for default risk and the 100% LGD for dilution risk. The weights are the stand-alone IRB capital charges for default risk and dilution risk, respectively.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

Simplified method for computing N and LGD

CA-6.4.80 For securitisations involving retail exposures, subject to CBB review, the SF may be implemented by applying the simplifications: $h = 0$ and $v = 0$.

CA-6.4.81 Under the conditions provided below, banks may employ a simplified method for calculating the effective number of exposures and the exposure-weighted average LGD. Let C_m in the simplified calculation denote the share of the pool corresponding to the sum of the largest 'm' exposures (e.g. a 15% share corresponds to a value of 0.15). The level of m is set by each bank.

- (a) If the portfolio share associated with the largest exposure, C_1 , is no more than 0.03 (or 3% of the underlying pool), then for purposes of the SF, the bank may set $LGD=0.50$ and N equal to the following amount

$$5. \quad N = \left(C_1 C_m + \left(\frac{C_m - C_1}{m - 1} \right) \max\{1 - m C_1, 0\} \right)^{-1}$$

- (b) Alternatively, if only C_1 is available and this amount is no more than 0.03, then the bank may set $LGD=0.50$ and $N=1/ C_1$.

(vii) Liquidity facilities

CA-6.4.82 Liquidity facilities are treated as any other securitisation exposure and receive a CCF of 100% unless specified differently in paragraphs CA-6.4.83 to CA-6.4.86. If the facility is externally rated, the bank may rely on the external rating under the RBA. If the facility is not rated and an inferred rating is not available, the bank must apply the SF, unless the IAA can be applied.

CA-6.4.83 An eligible liquidity facility that can only be drawn in the event of a general market disruption as defined in paragraph CA-6.4.22 is assigned a 20% CCF under the SF. That is, an IRB bank is to recognise 20% of the capital charge generated under the SF for the facility. If the eligible facility is externally rated, the bank may rely on the external rating under the RBA provided it assigns a 100% CCF rather than a 20% CCF to the facility.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

CA-6.4.84 When it is not practical for the bank to use either the bottom-up approach or the top-down approach for calculating K_{IRB} , the bank may, on an exceptional basis and subject to CBB consent, temporarily be allowed to apply the following method. If the liquidity facility meets the definition in paragraph CA-6.4.19 or CA-6.4.22, the highest risk weight assigned under the standardised approach to any of the underlying individual exposures covered by the liquidity facility can be applied to the liquidity facility. If the liquidity facility meets the definition in paragraph CA-6.4.19, the CCF must be 50% for a facility with an original maturity of one year or less, or 100% if the facility has an original maturity of more than one year. If the liquidity facility meets the definition in paragraph CA-6.4.22, the CCF must be 20%. In all other cases, the notional amount of the liquidity facility must be deducted.

(viii) Treatment of overlapping exposures

CA-6.4.85 Overlapping exposures are treated as described in paragraph CA-6.4.23.

(ix) Eligible servicer cash advance facilities

CA-6.4.86 Eligible servicer cash advance facilities are treated as specified in paragraph CA-6.4.24.

(x) Treatment of credit risk mitigation for securitisation exposures

CA-6.4.87 As with the RBA, banks are required to apply the CRM techniques as specified in the foundation IRB approach of Section CA-5.2 when applying the SF. The bank may reduce the capital charge proportionally when the credit risk mitigant covers first losses or losses on a proportional basis. For all other cases, the bank must assume that the credit risk mitigant covers the most senior portion of the securitisation exposure (i.e. that the most junior portion of the securitisation exposure is uncovered). Examples for recognising collateral and guarantees under the SF are provided in Appendix CA-8.



MODULE	CA: Capital Adequacy
CHAPTER	CA-6: Credit Risk - Securitisation Framework

CA-6.4 Treatment of securitisation exposures (continued)

(xi) Capital requirement for early amortisation provisions

CA-6.4.88 An originating bank must use the methodology and treatment described in paragraphs CA-6.4.32 to CA-6.4.47 for determining if any capital must be held against the investors' interest. For banks applying the IRB approach to securitisation, investors' interest is defined as investors' drawn balances related to securitisation exposures and EAD associated with investors' un-drawn lines related to securitisation exposures. For determining the EAD, the un-drawn balances of securitised exposures would be allocated between the seller's and investors' interests on a pro rata basis, based on the proportions of the seller's and investors' shares of the securitised drawn balances. For IRB purposes, the capital charge attributed to the investors' interest is determined by the product of (a) the investors' interest, (b) the appropriate CCF, and (c) K_{IRB} .



MODULE	CA: Capital Adequacy
CHAPTER	CA-7: Operational Risk

CA-7.1 The Measurement Methodologies

CA-7.1.1 The framework outlined below presents two methods for calculating operational risk capital charges in a continuum of increasing sophistication and risk sensitivity:

- (a) the Basic Indicator Approach; and
- (b) the Standardised Approach.

CA-7.1.2 Banks are encouraged to move towards standardised approach as they develop more sophisticated operational risk measurement systems and practices.

CA-7.1.3 A bank will not be allowed to choose to revert to basic indicator approach once it has been approved for standardised approach without CBB's approval. However, if CBB determines that a bank using standardised approach no longer meets the qualifying criteria for standardised approach, it may require the bank to revert to basic indicator approach for some or all of its operations, until it meets the conditions specified by the CBB for returning to standardised approach.

Basic Indicator Approach

CA-7.1.4 Banks applying the Basic Indicator Approach must hold capital for operational risk equal to the average over the previous three years of a fixed percentage (denoted alpha) of positive annual gross income. Figures for any year in which annual gross income is negative or zero should be excluded from both the numerator and denominator when calculating the average.⁵⁷ The charge may be expressed as follows:

$$K_{BIA} = [\sum (GI_{1..n} \alpha n)]/n$$

where:

K_{BIA} = the capital charge under the Basic Indicator Approach

GI = annual gross income, where positive, over the previous three years (audited financial years)

N = number of the previous three years for which gross income is positive

α = 15%, relating the industry wide level of required capital to the industry wide level of the indicator.

⁵⁷ If negative gross income distorts a bank's Pillar 1 capital charge, CBB will consider appropriate supervisory action.



MODULE	CA: Capital Adequacy
CHAPTER	CA-7: Operational Risk

CA-7.1 The Measurement Methodologies (continued)

CA-7.1.5 Gross income is defined as net interest income plus net non-interest income.⁵⁸ This measure should: (i) be gross of any provisions (e.g. for unpaid interest); (ii) be gross of operating expenses, including fees paid to outsourcing service providers⁵⁹; (iii) exclude realised profits/losses from the sale of securities in the banking book;⁶⁰ and (iv) exclude extraordinary or irregular items as well as income derived from insurance.

CA-7.1.6 In case of a bank with negative gross income for the previous three years, a newly licensed bank with less than 3 years of operations, or a merger, acquisition or material restructuring, the CBB shall discuss with the concerned licensed bank an alternative method for calculating the operational risk capital charge. For example, a newly licensed bank may be required to use the projected gross income in its 3-year business plan. Another approach that the CBB may consider is to require such licensed banks to observe a higher CAR.

CA-7.1.7 Banks applying this approach are encouraged to comply with the principles set in section OM-1.2 of Operational Risk Management Module.

The Standardised Approach

CA-7.1.8 In the Standardised Approach, banks' activities are divided into eight business lines: corporate finance, trading & sales, retail banking, commercial banking, payment & settlement, agency services, asset management, and retail brokerage. The business lines are defined in detail in **Appendix CA-9**. The bank must meet the requirements detailed in section OM-1.3 to qualify for the use of standardised approach.

CA-7.1.9 Within each business line, gross income is a broad indicator that serves as a proxy for the scale of business operations and thus the likely scale of operational risk exposure within each of these business lines. The capital charge for each business line is calculated by multiplying gross income by a factor (denoted beta) assigned to that business line. Beta serves as a proxy for the industry-wide relationship between the operational risk loss experience for a given business line and the aggregate level of gross income for that business line. It should be noted that in the Standardised Approach, gross income is measured for each business line, not the whole institution, i.e. in corporate finance, the indicator is the gross income generated in the corporate finance business line. An example of calculation of gross income is provided in **Appendix CA-10**.

⁵⁸As defined under International Financial Reporting Standards as applicable in the Kingdom of Bahrain.

⁵⁹ In contrast to fees paid for services that are outsourced, fees received by banks that provide outsourcing services shall be included in the definition of gross income.

⁶⁰ Realised profits/losses from securities classified as "held to maturity" and "available for sale", which typically constitute items of the banking book, are also excluded from the definition of gross income.



MODULE	CA: Capital Adequacy
CHAPTER	CA-7: Operational Risk

CA-7.1 The Measurement Methodologies (continued)

CA-7.1.10 The total capital charge is calculated as the three-year average of the simple summation of the regulatory capital charges across each of the business lines in each year. In any given year, negative capital charges (resulting from negative gross income) in any business line can not off-set positive capital charges in other business lines. Where the aggregate capital charge across all business lines within a given year is negative, then the input to the numerator for that year will be zero.⁶¹ The total capital charge may be expressed as:

$$K_{TSA} = \{ \sum_{\text{years 1-3}} \max[(GI_{1-8} \times \beta_{1-8}), 0] \} / 3$$

where:

K_{TSA} = the capital charge under the Standardised Approach

GI_{1-8} = annual gross income in a given year, as defined above in the Basic Indicator Approach, for each of the eight business lines

β_{1-8} = a fixed percentage, relating the level of required capital to the level of the gross income for each of the eight business lines.

The values of the betas are detailed below.

Business Lines	Beta Factors
Corporate Finance (β_1)	18%
Trading and Sales (β_2)	18%
Retail Banking (β_3)	12%
Commercial Banking (β_4)	15%
Payment and Settlement (β_5)	18%
Agency Services (β_6)	15%
Asset Management (β_7)	12%
Retail Brokerage (β_8)	12%

⁶¹ As under the Basic Indicator Approach, if negative gross income distorts a bank's Pillar 1 capital charge under the Standardised Approach, CBB will consider appropriate supervisory action.



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.1 Definition of the Trading Book

CA-8.1.1 The following definition of the trading book replaces the previous definition. Chapters CA-9 to CA-14 deal with market risk rules.

CA-8.1.2 **A trading book consists of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book. To be eligible for trading book capital treatment, financial instruments must either be free of any restrictive covenants on their tradability or able to be hedged completely. In addition, positions should be frequently and accurately valued, and the portfolio should be actively managed (at the present time, open equity stakes in hedge funds, private equity investments and real estate holdings do not meet the definition of trading book, owing to significant constraints on the ability of banks to liquidate these positions and value them reliably on a daily basis. Such holdings must therefore be held in the bank's banking book and treated as equity holding in corporates, except real estates which should be treated as per CA-3.2.29).**

CA-8.1.3 A financial instrument is any contract that gives rise to both a financial asset of one entity and a financial liability or equity instrument of another entity. Financial instruments include both primary financial instruments (or cash instruments) and derivative financial instruments. A financial asset is any asset that is cash, the right to receive cash or another financial asset; or the contractual right to exchange financial assets on potentially favourable terms, or an equity instrument. A financial liability is the contractual obligation to deliver cash or another financial asset or to exchange financial liabilities under conditions that are potentially unfavourable.

CA-8.1.4 Positions held with trading intent are those held intentionally for short-term resale and/or with the intent of benefiting from actual or expected short-term price movements or to lock in arbitrage profits, and may include for example proprietary positions, positions arising from client servicing (e.g. matched principal broking) and market making.

CA-8.1.5 **Banks must have clearly defined policies and procedures for determining which exposures to include in, and to exclude from, the trading book for purposes of calculating their regulatory capital, to ensure compliance with the criteria for trading book set forth in this section and taking into account the bank's risk management capabilities and practices. Compliance with these policies and procedures must be fully documented and subject to periodic internal audit.**



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.1 Definition of the Trading Book (Continued)

CA-8.1.6 These policies and procedures must, at a minimum, address the following general considerations:

- (a) The activities the bank considers to be trading and as constituting part of the trading book for regulatory capital purposes;
- (b) The extent to which an exposure can be marked-to-market daily by reference to an active, liquid two-way market;
- (c) For exposures that are marked-to-model, the extent to which the bank can:
 - Identify the material risks of the exposure;
 - Hedge the material risks of the exposure and the extent to which hedging instruments would have an active, liquid two-way market;
 - Derive reliable estimates for the key assumptions and parameters used in the model.
- (d) The extent to which the bank can and is required to generate valuations for the exposure that can be validated externally in a consistent manner;
- (e) The extent to which legal restrictions or other operational requirements would impede the bank's ability to effect an immediate liquidation of the exposure;
- (f) The extent to which the bank is required to, and can, actively risk manage the exposure within its trading operations; and
- (g) The extent to which the bank may transfer risk or exposures between the banking and the trading books and criteria for such transfers.

The list above is not intended to provide a series of tests that a product or group of related products must pass to be eligible for inclusion in the trading book. Rather, the list provides a minimum set of key points that must be addressed by the policies and procedures for overall management of a firm's trading book.

CA-8.1.7 The following will be the basic requirements for positions eligible to receive trading book capital treatment.

- (a) Clearly documented trading strategy for the position/instrument or portfolios, approved by senior management (which would include expected holding horizon).



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.1 Definition of the Trading Book (Continued)

- (b) Clearly defined policies and procedures for the active management of the position, which must include:
- Positions are managed on a trading desk;
 - Position limits are set and monitored for appropriateness;
 - Dealers have the autonomy to enter into/manage the position within agreed limits and according to the agreed strategy;
 - Positions are marked to market at least daily and when marking to model the parameters must be assessed on a daily basis;
 - Positions are reported to senior management as an integral part of the institution's risk management process; and
 - Positions are actively monitored with reference to market information sources (assessment should be made of the market liquidity or the ability to hedge positions or the portfolio risk profiles). This would include assessing the quality and availability of market inputs to the valuation process, level of market turnover, sizes of positions traded in the market, etc.
- (c) Clearly defined policy and procedures to monitor the positions against the bank's trading strategy including the monitoring of turnover and stale positions in the bank's trading book.

CA-8.1.8 When a bank hedges a banking book credit risk exposure using a credit derivative booked in its trading book (i.e. using an internal hedge), the banking book exposure is not deemed to be hedged for capital purposes unless the bank purchases from an eligible third party protection provider a credit derivative meeting the requirements of paragraph CA-4.5.3 vis-à-vis the banking book exposure. Where such third party protection is purchased and is recognised as a hedge of a banking book exposure for regulatory capital purposes, neither the internal nor external credit derivative hedge would be included in the trading book for regulatory capital purposes.

CA-8.1.9 Term trading-related repo-style transactions that a bank accounts for in its banking book may be included in the bank's trading book for regulatory capital purposes so long as all such repo-style transactions are included. For this purpose, trading-related repo-style transactions are defined as only those that meet the requirements of paragraphs CA-8.1.4 and CA-8.1.7 and both legs are in the form of either cash or securities includable in the trading book.

CA-8.1.10 Regardless of where they are booked, all repo-style transactions are subject to a banking book counterparty credit risk charge.



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.2 Prudent valuation guidance

CA-8.2.1 This section provides banks with guidance on prudent valuation for positions in the trading book. This guidance is especially important for less liquid positions which, although they will not be excluded from the trading book solely on grounds of lesser liquidity, raise CBB's concerns about prudent valuation.

CA-8.2.2 A framework for prudent valuation practices should at a minimum include the following:

Systems and controls

CA-8.2.3 Banks must establish and maintain adequate systems and controls sufficient to give management and CBB the confidence that their valuation estimates are prudent and reliable. These systems must be integrated with other risk management systems within the organisation (such as credit analysis). Such systems must include:

- (a) Documented policies and procedures for the process of valuation. This includes clearly defined responsibilities of the various areas involved in the determination of the valuation, sources of market information and review of their appropriateness, frequency of independent valuation, timing of closing prices, procedures for adjusting valuations, end of the month and ad-hoc verification procedures; and
- (b) Clear and independent (i.e. independent of front office) reporting lines for the department accountable for the valuation process. The reporting line should ultimately be to a main board executive director.

Valuation methodologies

Marking to market

CA-8.2.4 Marking-to-market is at least the daily valuation of positions at readily available close out prices that are sourced independently. Examples of readily available close out prices include exchange prices, screen prices, or quotes from several independent reputable brokers.

CA-8.2.5 Banks must mark-to-market as much as possible. The more prudent side of bid/offer must be used unless the institution is a significant market maker in a particular position type and it can close out at mid-market.



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.2 Prudent valuation guidance (Continued)

Marking to model

CA-8.2.6 Where marking-to-market is not possible, banks may mark-to-model, where this can be demonstrated to be prudent. Marking-to-model is defined as any valuation which has to be benchmarked, extrapolated or otherwise calculated from a market input.

CA-8.2.7 When marking to model, an extra degree of conservatism is appropriate. CBB will consider the following in assessing whether a mark-to-model valuation is prudent:

- (a) Senior management should be aware of the elements of the trading book which are subject to mark to model and should understand the materiality of the uncertainty this creates in the reporting of the risk/performance of the business.
- (b) Market inputs should be sourced, to the extent possible, in line with market prices (as discussed above). The appropriateness of the market inputs for the particular position being valued should be reviewed regularly.
- (c) Where available, generally accepted valuation methodologies for particular products should be used as far as possible.
- (d) Where the model is developed by the institution itself, it should be based on appropriate assumptions, which have been assessed and challenged by suitably qualified parties independent of the development process. The model should be developed or approved independently of the front office. It should be independently tested. This includes validating the mathematics, the assumptions and the software implementation.
- (e) There should be formal change control procedures in place and a secure copy of the model should be held and periodically used to check valuations.
- (f) Risk management should be aware of the weaknesses of the models used and how best to reflect those in the valuation output.
- (g) The model should be subject to periodic review to determine the accuracy of its performance (e.g. assessing continued appropriateness of the assumptions, analysis of P&L versus risk factors, comparison of actual close out values to model outputs).
- (h) Valuation adjustments should be made as appropriate, for example, to cover the uncertainty of the model valuation (see also valuation adjustments in CA-8.2.10 to CA-8.2.13).

Independent price verification

CA-8.2.8 Independent price verification is distinct from daily mark-to-market. It is the process by which market prices or model inputs are regularly verified for accuracy. While daily marking-to-market may be performed by dealers, verification of market prices or model inputs should be performed by a unit independent of the dealing room, at least monthly (or, depending on the nature of the market/trading activity, more frequently). It need not be performed as frequently as daily mark-to-market, since the objective, i.e. independent, marking of positions, should reveal any error or bias in pricing, which should result in the elimination of inaccurate daily marks.



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.2 Prudent valuation guidance (continued)

CA-8.2.9 Independent price verification entails a higher standard of accuracy in that the market prices or model inputs are used to determine profit and loss figures, whereas daily marks are used primarily for management reporting in between reporting dates. For independent price verification, where pricing sources are more subjective, e.g. only one available broker quote, prudent measures such as valuation adjustments may be appropriate.

Valuation adjustments or reserves

CA-8.2.10 Banks must establish and maintain procedures for considering valuation adjustments/reserves. CBB expects banks using third-party valuations to consider whether valuation adjustments are necessary. Such considerations are also necessary when marking to model.

CA-8.2.11 CBB expects the following valuation adjustments/reserves to be formally considered at a minimum: unearned credit spreads, close-out costs, operational risks, early termination, investing and funding costs, and future administrative costs and, where appropriate, model risk.

CA-8.2.12 Bearing in mind that the underlying 10-day assumption of the market risk rules may not be consistent with the bank's ability to sell or hedge out positions under normal market conditions, banks must make downward valuation adjustments/reserves for these less liquid positions, and to review their continued appropriateness on an on-going basis. Reduced liquidity could arise from market events. Additionally, close-out prices for concentrated positions and/or stale positions should be considered in establishing those valuation adjustments/reserves. Banks must consider all relevant factors when determining the appropriateness of valuation adjustments/reserves for less liquid positions. These factors may include, but are not limited to, the amount of time it would take to hedge out the position/risks within the position, the average volatility of bid/offer spreads, the availability of independent market quotes (number and identity of market makers), the average and volatility of trading volumes, market concentrations, the aging of positions, the extent to which valuation relies on marking-to-model, and the impact of other model risks.

CA-8.2.13 Valuation adjustments/reserves made under paragraph CA-8.2.12 must impact Tier 2 regulatory capital and may exceed those made under financial accounting standards.



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

CA-8.3 Treatment of counterparty credit risk in the trading book

CA-8.3.1 Banks must calculate the counterparty credit risk charge for OTC derivatives, repo-style and other transactions booked in the trading book, separate from the capital charge for general market risk and specific risk.⁶² The risk weights to be used in this calculation must be consistent with those used for calculating the capital requirements in the banking book. Thus, banks applying the standardised approach in the banking book will use the standardised approach risk weights in the trading book and banks applying the IRB approach in the banking book will use the IRB risk weights in the trading book in a manner consistent with the IRB roll out situation in the banking book as described in paragraphs CA-5.2.28 to CA-5.2.31. For counterparties included in portfolios where the IRB approach is being used the IRB risk weights will have to be applied. The 50% cap on risk weights for OTC derivative transactions is abolished.

CA-8.3.2 In the trading book, for repo-style transactions, all instruments, which are included in the trading book, may be used as eligible collateral. Those instruments which fall outside the banking book definition of eligible collateral shall be subject to a haircut at the level applicable to non-main index equities listed on recognised exchanges (as noted in paragraph CA-4.3.7. Where banks are applying a VaR approach to measuring exposure for repo-style transactions, they also may apply this approach in the trading book in accordance with paragraphs CA-4.3.22 to CA-4.3.25 and **Appendix CA-2**.

CA-8.3.3 The calculation of the counterparty credit risk charge for collateralised OTC derivative transactions is the same as the rules prescribed for such transactions booked in the banking book.

CA-8.3.4 The calculation of the counterparty charge for repo-style transactions will be conducted using the rules in paragraphs CA-4.3.3 to CA-4.3.25 and **Appendix CA-2** spelt out for such transactions booked in the banking book. The firm-size adjustment for SMEs as set out in paragraph CA-5.3.4 shall also be applicable in the trading book.

Credit derivatives

CA-8.3.5 The counterparty credit risk charge for single name credit derivative transactions in the trading book will be calculated applying the following potential future exposure add-on factors:

⁶² The treatment for unsettled foreign exchange and securities trades is set forth in paragraph CA-3.3.13.



MODULE	CA: Capital Adequacy
CHAPTER	CA-8: Market Risk - Trading Book

**CA-8.3 Treatment of counterparty credit risk in the trading book
(continued)**

	Protection buyer	Protection seller
Total Return Swap		
“Qualifying” reference obligation	5%	5%
“Non-qualifying” reference obligation	10%	10%
Credit Default Swap		
“Qualifying” reference obligation	5%	5%**
“Non-qualifying” reference obligation	10%	10%**

There will be no difference depending on residual maturity.

The definition of “qualifying” is the same as for the “qualifying” category for the treatment of specific risk under the standardised measurement method in chapter CA-9.

** The protection seller of a credit default swap shall only be subject to the add-on factor where it is subject to closeout upon the insolvency of the protection buyer while the underlying is still solvent. Add-on should then be capped to the amount of unpaid premiums.

CA-8.3.6 Where the credit derivative is a first to default transaction, the add-on will be determined by the lowest credit quality underlying in the basket, i.e. if there are any non-qualifying items in the basket, the non-qualifying reference obligation add-on should be used. For second and subsequent to default transactions, underlying assets should continue to be allocated according to the credit quality, i.e. the second lowest credit quality will determine the add-on for a second to default transaction etc.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.1 Introduction

CA-9.1.1 This chapter describes the standardised approach for the measurement of the interest rate risk in the bank's trading book, in order to determine the capital requirement for this risk. The interest rate exposure captured includes exposure arising from interest-bearing and discounted financial instruments, derivatives which are based on the movement of interest rates, foreign exchange forwards, and interest rate exposure embedded in derivatives which are based on non-interest rate related instruments.

CA-9.1.2 For the guidance of the banks, and without being exhaustive, the following list includes financial instruments in the trading book to which interest rate risk capital requirements will apply, irrespective of whether or not the instruments carry coupons:

- (a) bonds/loan stocks, debentures etc.;
- (b) non-convertible preference shares;
- (c) convertible securities such as preference shares and bonds, which are treated as debt instruments⁶³;
- (d) mortgage backed securities and other securitised assets⁶⁴;
- (e) Certificates of Deposit;
- (f) treasury bills, local authority bills, banker's acceptances;
- (g) commercial paper;
- (h) euronotes, medium term notes, etc.;
- (i) floating rate notes, FRCDs etc.;
- (j) foreign exchange forward positions;
- (k) derivatives based on the above instruments and interest rates; and
- (l) interest rate exposure embedded in other financial instruments.

⁶³ See section CA-10.1 for an explanation of the circumstances in which convertible securities should be treated as equity instruments. In other circumstances, they should be treated as debt instruments.

⁶⁴ Traded mortgage securities and mortgage derivative products possess unique characteristics because of the risk of pre-payment. It is possible that including such products within the standardised methodology as if they were similar to other securitised assets may not capture all the risks of holding positions in them. Banks which have traded mortgage securities and mortgage derivative products should discuss their proposed treatment with the CBB and obtain the CBB's prior written approval for it.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.1 Introduction (continued)

- CA-9.1.3 A security which is the subject of a repurchase or securities lending agreement will be treated as if it were still owned by the lender of the security, i.e., it will be treated in the same manner as other securities positions.
- CA-9.1.4 The minimum capital requirement is expressed in terms of two separately calculated charges, one applying to the '*specific risk*' of each position, and the other to the interest rate risk in the portfolio, termed '*general market risk*'. The aggregate capital requirement for interest rate risk is the sum of the general market interest rate risk capital requirements across currencies, and the specific risk capital requirements.
- CA-9.1.5 The specific risk capital requirement recognises that individual instruments may change in value for reasons other than shifts in the yield curve of a given currency. The general risk capital requirement reflects the price change of these products caused by parallel and non-parallel shifts in the yield curve, as well as the difficulty of constructing perfect hedges.
- CA-9.1.6 There is general market risk inherent in all interest rate risk positions. This may be accompanied by one or more out of specific interest rate risk, counterparty risk, equity risk and foreign exchange risk, depending on the nature of the position. Banks must consider carefully which risks are generated by each individual position. It should be recognised that the identification of the risks will require the application of the appropriate level of technical skills and professional judgment.
- CA-9.1.7 Banks which have the intention and capability to use internal models for the measurement of general and specific interest rate risks and, hence, for the calculation of the capital requirement, should seek the prior written approval of the CBB for those models. The CBB's detailed rules for the recognition and use of internal models are included in chapter CA-14. Banks which do not use internal models should adopt the standardised approach to calculate the interest rate risk capital requirement, as set out in detail in this chapter.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.2 Specific risk calculation

CA-9.2.1 The capital charge for specific risk is designed to protect against a movement in the price of an individual instrument, owing to factors related to the individual issuer.

CA-9.2.2 In measuring the specific risk for interest rate related instruments, a bank may net, by value, long and short positions (including positions in derivatives) in the same debt instrument to generate the individual net position in that instrument. Instruments will be considered to be the same where the issuer is the same, they have an equivalent ranking in a liquidation, and the currency, the coupon and the maturity are the same.

CA-9.2.3 The specific risk capital requirement is determined by weighting the current market value of each individual net position, whether long or short, according to its allocation among the following broad categories:

Categories	External credit assessment	Specific risk capital charge
Government (including GCC governments)	AAA to AA-	0%
	A+ to BBB-	0.25% (residual term to final maturity 6 months or less) 1.00% (residual term to final maturity greater than 6 and up to and including 24 months) 1.60% (residual term to final maturity exceeding 24 months)
	BB+ to B-	8.00%
	Below B-	12.00%
	Unrated	8.00%
Qualifying		0.25% (residual term to final maturity 6 months or less) 1.00% (residual term to final maturity greater than 6 and up to and including 24 months) 1.60% (residual term to final maturity exceeding 24 months)
Other	Similar to credit risk charges under the standardised approach, e.g.:	
	BB+ to BB-	8.00%
	Below BB-	12.00%
	Unrated	8.00%



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.2 Specific risk calculation (continued)

CA-9.2.4 When the government paper is denominated in the domestic currency and funded by the bank in the same currency, a 0% specific risk charge may be applied.

CA-9.2.5 Central "government" debt instruments will include all forms of government paper, including bonds, treasury bills and other short-term instruments.

CA-9.2.6 However the CBB reserves the right to apply a specific risk weight to securities issued by certain foreign governments, especially to securities denominated in a currency other than that of the issuing government.

CA-9.2.7 The "qualifying" category includes securities issued by or fully guaranteed by public sector entities and multilateral development banks (refer to paragraph CA-3.2.8), plus other securities that are:

- (a) rated investment grade by at least two internationally recognised credit rating agencies (to be agreed with the CBB); or
- (b) deemed to be of comparable investment quality by the reporting bank, provided that the issuer is rated investment grade by at least two internationally recognised credit rating agencies (to be agreed with the CBB); or
- (c) rated investment grade by one credit rating agency and not less than investment grade by any internationally recognised credit rating agencies (to be agreed with the CBB); or
- (d) unrated (subject to the approval of the CBB), but deemed to be of comparable investment quality by the reporting bank and where the issuer has securities listed on a recognised stock exchange, may also be included.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.2 Specific risk calculation (continued)

Specific risk rules for unrated debt securities

CA-9.2.8 Unrated securities may be included in the “qualifying” category when they are (subject to CBB’s approval) unrated, but deemed to be of comparable investment quality by the reporting bank, and the issuer has securities listed on a recognised stock exchange. This will remain unchanged for banks applying the standardised approach. For banks applying the IRB approach for a portfolio, unrated securities can be included in the “qualifying” category if both of the following conditions are met:

- (a) the securities are rated equivalent⁶⁵ to investment grade under the reporting bank’s internal rating system, which the CBB has confirmed complies with the requirements for an IRB approach; and
- (b) the issuer has securities listed on a recognised stock exchange.

Specific risk rules for non-qualifying issuers

CA-9.2.9 Instruments issued by a non-qualifying issuer will receive the same specific *risk charge as a non-investment* grade corporate borrower under the standardised approach for credit risk under chapter CA-4.

CA-9.2.10 However, since this may in certain cases considerably underestimate the specific risk for debt instruments which have a high yield to redemption relative to government debt securities, CBB will have the discretion, on a case by case basis:

- (a) to apply a higher specific risk charge to such instruments; and/or
- (b) to disallow offsetting for the purposes of defining the extent of general market risk between such instruments and any other debt instruments.

CA-9.2.11 In that respect, securitisation exposures that would be subject to a deduction treatment under the securitisation framework set forth in chapter CA-6 (e.g. equity tranches that absorb first loss), as well as securitisation exposures that are unrated liquidity lines or letters of credit must be subject to a capital charge that is no less than the charge set forth in the securitisation framework.

⁶⁵ Equivalent means the debt security has a one-year PD equal to or less than the one year PD implied by the long-run average one-year PD of a security rated investment grade or better by a qualifying rating agency.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.2 Specific risk calculation (continued)

Specific risk capital charges for positions hedged by credit derivatives

CA-9.2.12 Full allowance will be recognised when the values of two legs (i.e. long and short) always move in the opposite direction and broadly to the same extent. This would be the case in the following situations:

- (a) the two legs consist of completely identical instruments, or
- (b) a long cash position is hedged by a total rate of return swap (or vice versa) and there is an exact match between the reference obligation and the underlying exposure (i.e. the cash position).⁶⁶

In these cases, no specific risk capital requirement applies to both sides of the position.

CA-9.2.13 An 80% offset will be recognised when the value of two legs (i.e. long and short) always moves in the opposite direction but not broadly to the same extent. This would be the case when a long cash position is hedged by a credit default swap or a credit linked note (or vice versa) and there is an exact match in terms of the reference obligation, the maturity of both the reference obligation and the credit derivative, and the currency to the underlying exposure. In addition, key features of the credit derivative contract (e.g. credit event definitions, settlement mechanisms) should not cause the price movement of the credit derivative to materially deviate from the price movements of the cash position. To the extent that the transaction transfers risk (i.e. taking account of restrictive payout provisions such as fixed payouts and materiality thresholds), an 80% specific risk offset will be applied to the side of the transaction with the higher capital charge, while the specific risk requirement on the other side will be zero.

⁶⁶ The maturity of the swap itself may be different from that of the underlying exposure.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.2 Specific risk calculation (continued)

CA-9.2.14 Partial allowance will be recognised when the value of the two legs (i.e. long and short) usually moves in the opposite direction. This would be the case in the following situations:

- (a) the position is captured in paragraph CA-9.2.12 under (b), but there is an asset mismatch between the reference obligation and the underlying exposure. Nonetheless, the position meets the requirements in paragraph CA-4.5.3 (g).
- (b) the position is captured in paragraph CA-9.2.12 under (a) or CA-9.2.13 but there is a currency or maturity mismatch⁶⁷ between the credit protection and the underlying asset.
- (c) the position is captured in paragraph CA-9.2.13 but there is an asset mismatch between the cash position and the credit derivative. However, the underlying asset is included in the (deliverable) obligations in the credit derivative documentation.

CA-9.2.15 In each of these cases in paragraphs CA-9.2.12 to CA-9.2.14, the following rule applies. Rather than adding the specific risk capital requirements for each side of the transaction (i.e. the credit protection and the underlying asset) only the higher of the two capital requirements will apply.

CA-9.2.16 In cases not captured in paragraphs CA-9.2.12 to CA-9.2.14, a specific risk capital charge will be assessed against both sides of the position.

CA-9.2.17 With regard to banks' first-to-default and second-to-default products in the trading book, the basic concepts developed for the banking book will also apply. Banks holding long positions in these products (e.g. buyers of basket credit linked notes) would be treated as if they were protection sellers and would be required to add the specific risk charges or use the external rating if available. Issuers of these notes would be treated as if they were protection buyers and are therefore allowed to offset specific risk for one of the underlyings, i.e. the asset with the lowest specific risk charge.

⁶⁷ Currency mismatches should feed into the normal reporting of foreign exchange risk.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.3 General market risk calculation

CA-9.3.1 The capital requirements for general market risk are designed to capture the risk of loss arising from changes in market interest rates, i.e. the risk of parallel and non-parallel shifts in the yield curve. A choice between two principal methods of measuring the general market risk is permitted, a "maturity" method and a "duration" method. In each method, the capital charge is the sum of the following four components:

- (a) the net short or long position in the whole trading book;
- (b) a small proportion of the matched positions in each time-band (the "vertical disallowance");
- (c) a larger proportion of the matched positions across different time-bands (the "horizontal disallowance"); and
- (d) a net charge for positions in options, where appropriate (see section CA-13).

CA-9.3.2 Separate maturity ladders should be used for each currency and capital charges should be calculated for each currency separately and then summed, by applying the prevailing foreign exchange spot rates, with no off-setting between positions of opposite sign.

CA-9.3.3 In the case of those currencies in which the value and volume of business is insignificant, separate maturity ladders for each currency are not required. Instead, the bank may construct a single maturity ladder and slot, within each appropriate time-band, the net long or short position for each currency. However, these individual net positions are to be summed within each time-band, irrespective of whether they are long or short positions, to arrive at the gross position figure for the time-band.

CA-9.3.4 A combination of the two methods (referred to under paragraph CA- 9.3.1) is not permitted. Any exceptions to this rule will require the prior written approval of the CBB. It is expected that such approval will only be given in cases where a bank clearly demonstrates to the CBB, the difficulty in applying, to a definite category of trading instruments, the method otherwise chosen by the bank as the normal method. It is further expected that the CBB may, in future years, consider recognising the duration method as the approved method, and the use of the maturity method may be discontinued.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.4 Maturity method

CA-9.4.1 A worked example of the maturity method is included in **Appendix CA-11**. The various time-bands and their risk weights, relevant to the maturity method, are illustrated in paragraph CA-9.4.2(a) below.

CA-9.4.2 The steps in the calculation of the general market risk for interest rate positions, under this method, are set out below:

- (a) Individual long or short positions in interest-rate related instruments, including derivatives, are slotted into a maturity ladder comprising thirteen time-bands (or fifteen time-bands in the case of zero-coupon and deep-discount instruments, defined as those with a coupon of less than 3%), on the following basis:
- fixed rate instruments are allocated according to their residual term to maturity (irrespective of embedded puts and calls), and whether their coupon is below 3%;
 - floating rate instruments are allocated according to the residual term to the next repricing date;
 - positions in derivatives, and all positions in repos, reverse repos and similar products are decomposed into their components within each time band. Derivative instruments are covered in greater detail in sections CA-9.6 to CA-9.9;
 - opposite positions of the same amount in the same issues (but not different issues by the same issuer), whether actual or notional, can be omitted from the interest rate maturity framework, as well as closely matched swaps, forwards, futures and FRAs which meet the conditions set out in section CA 9.8. In other words, these positions are netted within their relevant time-bands; and
 - the CBB's advice must be sought on the treatment of instruments that deviate from the above structures, or which may be considered sufficiently complex to warrant the CBB's attention.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.4 Maturity method (continued)

Maturity method: time-bands and risk weights

	Coupon 3% or more	Coupon < 3%	Risk weight
Zone 1	1 month or less	1 month or less	0.00%
	1 to 3 months	1 to 3 months	0.20%
	3 to 6 months	3 to 6 months	0.40%
	6 to 12 months	6 to 12 months	0.70%
Zone 2	1 to 2 years	1 to 1.9 years	1.25%
	2 to 3 years	1.9 to 2.8 years	1.75%
	3 to 4 years	2.8 to 3.6 years	2.25%
Zone 3	4 to 5 years	3.6 to 4.3 years	2.75%
	5 to 7 years	4.3 to 5.7 years	3.25%
	7 to 10 years	5.7 to 7.3 years	3.75%
	10 to 15 years	7.3 to 9.3 years	4.50%
	15 to 20 years	9.3 to 10.6 years	5.25%
	> 20 years	10.6 to 12 years	6.00%
		12 to 20 years	8.00%
	> 20 years	12.50%	

- (b) The market values of the individual long and short net positions in each maturity band are multiplied by the respective risk weighting factors given in paragraph CA 9.4.2(a) above.
- (c) Matching of positions within each maturity band (i.e. vertical matching) is done as follows:
- Where a maturity band has both weighted long and short positions, the extent to which the one offsets the other is called the matched weighted position. The remainder (i.e. the excess of the weighted long positions over the weighted short positions, or vice versa, within a band) is called the unmatched weighted position for that band.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.4 Maturity method (continued)

(d) Matching of positions, across maturity bands, within each zone (i.e. horizontal matching - level 1), is done as follows:

- Where a zone has both unmatched weighted long and short positions for various bands, the extent to which the one offsets the other is called the matched weighted position for that zone. The remainder (i.e. the excess of the weighted long positions over the weighted short positions, or vice versa, within a zone) is called the unmatched weighted position for that zone.

(e) Matching of positions, across zones (i.e. horizontal matching - level 2), is done as follows:

- (i) The unmatched weighted long or short position in zone 1 may be offset against the unmatched weighted short or long position in zone 2. The extent to which the unmatched weighted positions in zones 1 and 2 are offsetting is described as the matched weighted position between zones 1 and 2.
- (ii) After step (i) above, any residual unmatched weighted long or short position in zone 2 may be matched by offsetting the unmatched weighted short or long position in zone 3. The extent to which the unmatched positions in zones 2 and 3 are offsetting is described as the matched weighted position between zones 2 and 3.

The calculations in steps (i) and (ii) above may be carried out in reverse order (i.e. zones 2 and 3, followed by zones 1 and 2).

- (i) After steps (i) and (ii) above, any residual unmatched weighted long or short position in zone 1 may be matched by offsetting the unmatched weighted short or long position in zone 3. The extent to which the unmatched positions in zones 1 and 3 are offsetting is described as the matched weighted position between zones 1 and 3.
- (f) Any residual unmatched weighted positions, following the matching within and between maturity bands and zones as described above, will be summed.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.4 Maturity method (continued)

(g) The general interest rate risk capital requirement is the sum of:

- (i) Matched weighted positions in all maturity bands x 10%
- (ii) Matched weighted positions in zone 1 x 40%
- (iii) Matched weighted positions in zone 2 x 30%
- (iv) Matched weighted positions in zone 3 x 30%
- (v) Matched weighted positions between zones 1 & 2 x 40%
- (vi) Matched weighted positions between zones 2 & 3 x 40%
- (vii) Matched weighted positions between zones 1 & 3 x 100%
- (viii) Residual unmatched weighted positions x 100%

Item (i) is referred to as the vertical disallowance, items (ii) through (iv) as the first set of horizontal disallowances, and items (v) through (vii) as the second set of horizontal disallowances.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.5 Duration method

CA-9.5.1 The duration method is an alternative approach to measuring the exposure to parallel and non-parallel shifts in the yield curve, and recognises the use of duration as an indicator of the sensitivity of individual positions to changes in market yields. Under this method, banks may use a duration-based system for determining their general interest rate risk capital requirements for traded debt instruments and other sources of interest rate exposures including derivatives. A worked example of the duration method is included in Appendix CA-12. The various time-bands and assumed changes in yield, relevant to the duration method, are illustrated below.

Duration method: time-bands and assumed changes in yield

	Time-band	Assumed change in yield
Zone 1	1 month or less	1.00
	1 to 3 months	1.00
	3 to 6 months	1.00
	6 to 12 months	1.00
Zone 2	1 to 1.9 years	0.90
	1.9 to 2.8 years	0.80
	2.8 to 3.6 years	0.75
Zone 3	3.6 to 4.3 years	0.75
	4.3 to 5.7 years	0.70
	5.7 to 7.3 years	0.65
	7.3 to 9.3 years	0.60
	9.3 to 10.6 years	0.60
	10.6 to 12 years	0.60
	12 to 20 years	0.60
> 20 years	0.60	

CA-9.5.2 Banks must notify the CBB of the circumstances in which they elect to use this method. Once chosen, the duration method must be consistently applied, in accordance with the requirements of section CA-9.3.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.5 Duration method (continued)

CA-9.5.3 Where a bank has chosen to use the duration method, it is possible that it will not be suitable for certain instruments. In such cases, the bank must seek the advice of the CBB or obtain approval for application of the maturity method to the specific category(ies) of instruments, in accordance with the provisions of section CA-9.3.

CA-9.5.4 The steps in the calculation of the general market risk for interest rate positions, under this method, are set out below:

- (a) The bank will determine the Yield-to-Maturity (YTM) for each individual net position in fixed rate and floating rate instruments, based on the current market value. The basis of arriving at individual net positions is explained in section CA-9.4 above. The YTM for fixed rate instruments is determined without any regard to whether the instrument is coupon bearing, or whether the instrument has any embedded options. In all cases, YTM for fixed rate instruments is calculated with reference to the final maturity date and, for floating rate instruments, with reference to the next repricing date.
- (b) The bank will calculate, for each debt instrument, the modified duration (M) on the basis of the following formula:

$$M = \frac{D}{(1+r)}$$

where,

$$D \text{ (duration)} = \frac{\sum_{t=1}^m \frac{t \times C}{(1+r)^t}}{\sum_{t=1}^m \frac{C}{(1+r)^t}}$$

r = YTM % per annum expressed as a decimal

C = Cash flow at time t

t = time at which cash flows occur, in years

m = time to maturity, in years

- (a) Individual net positions, at current market value, are allocated to the time-bands illustrated in paragraph CA-9.5.1, based on their modified duration.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.5 Duration method (continued)

- (b) The bank will then calculate the modified duration-weighted position for each individual net position by multiplying its current market value by the modified duration and the assumed change in yield.
- (c) Matching of positions within each time band (i.e. vertical matching) is done as follows:
- Where a time band has both weighted long and short positions, the extent to which the one offsets the other is called the matched weighted position. The remainder (i.e. the excess of the weighted long positions over the weighted short positions, or vice versa, within a band) is called the unmatched weighted position for that band.
- (d) Matching of positions, across time bands, within each zone (i.e. horizontal matching - level 1), is done as follows:
- Where a zone has both unmatched weighted long and short positions for various bands, the extent to which the one offsets the other is called the matched weighted position for that zone. The remainder (i.e. the excess of the weighted long positions over the weighted short positions, or vice versa, within a zone) is called the unmatched weighted position for that zone.
- (e) Matching of positions, across zones (i.e. horizontal matching - level 2), is done as follows:
- (i) The unmatched weighted long or short position in zone 1 may be offset against the unmatched weighted short or long position in zone 2. The extent to which the unmatched weighted positions in zones 1 and 2 are offsetting is described as the matched weighted position between zones 1 and 2.
 - (ii) After step (i) above, any residual unmatched weighted long or short position in zone 2 may be matched by offsetting the unmatched weighted short or long position in zone 3. The extent to which the unmatched positions in zones 2 and 3 are offsetting is described as the matched weighted position between zones 2 and 3.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.5 Duration method (continued)

The calculations in steps (i) and (ii) above may be carried out in reverse order (i.e. zones 2 and 3, followed by zones 1 and 2).

- (iii) After steps (a) and (b) above, any residual unmatched weighted long or short position in zone 1 may be matched by offsetting the unmatched weighted short or long position in zone 3. The extent to which the unmatched positions in zones 1 and 3 are offsetting is described as the matched weighted position between zones 1 and 3.
- (f) Any residual unmatched weighted positions, following the matching within and between maturity bands and zones as described above, will be summed.
- (g) The general interest rate risk capital requirement is the sum of:
- | | | |
|--------|--|--------|
| (i) | Matched weighted positions in all maturity bands | x 5% |
| (ii) | Matched weighted positions in zone 1 | x 40% |
| (iii) | Matched weighted positions in zone 2 | x 30% |
| (iv) | Matched weighted positions in zone 3 | x 30% |
| (v) | Matched weighted positions between zones 1 & 2 | x 40% |
| (vi) | Matched weighted positions between zones 2 & 3 | x 40% |
| (vii) | Matched weighted positions between zones 1 & 3 | x 100% |
| (viii) | Residual unmatched weighted positions | x 100% |

Item (i) is referred to as the vertical disallowance, items (ii) through (iv) as the first set of horizontal disallowances, and items (v) through (vii) as the second set of horizontal disallowances.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.6 Derivatives

CA-9.6.1 Banks which propose to use internal models to measure the interest rate risk inherent in derivatives will seek the prior written approval of the CBB for applying those models. The use of internal models to measure market risk, and the CBB's rules applicable to them, are discussed in detail in chapter CA-14.

CA-9.6.2 Where a bank, with the prior written approval of the CBB, uses an interest rate sensitivity model, the output of that model is used, by the duration method, to calculate the general market risk as described in section CA-9.5.

CA-9.6.3 Where a bank does not propose to use models, it must use the techniques described in the following paragraphs, for measuring the market risk on interest rate derivatives. The measurement system should include all interest rate derivatives and off-balance-sheet instruments in the trading book which react to changes in interest rates (e.g. forward rate agreements, other forward contracts, bond futures, interest rate and cross-currency swaps, options and forward foreign exchange contracts). Where a bank has obtained the approval of the CBB for the use of non-interest rate derivatives models, the embedded interest rate exposures should be incorporated in the standardised measurement framework described in sections CA-9.7 to CA-9.9.

CA-9.6.4 Derivative positions will attract specific risk only when they are based on an underlying instrument or security. For instance, where the underlying exposure is an interest rate exposure, as in a swap based upon inter-bank rates, there will be no specific risk, but only counterparty risk. A similar treatment applies to FRAs, forward foreign exchange contracts and interest rate futures. However, for a swap based on a bond yield, or a futures contract based on a debt security or an index representing a basket of debt securities, the credit risk of the issuer of the underlying bond will generate a specific risk capital requirement. Future cash flows derived from positions in derivatives will generate counterparty risk requirements related to the counterparty in the trade, in addition to position risk requirements (specific and general market risk) related to the underlying security.

CA-9.6.5 A summary of the rules for dealing with interest rate derivatives (other than options) is set out in section CA-9.9. The treatment of options, being a complex issue, is dealt with in detail in chapter CA-13.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.7 Calculation of derivative positions

CA-9.7.1 The derivatives should be converted to positions in the relevant underlying and become subject to specific and general market risk charges as described in sections CA-9.2 and CA-9.3, respectively. For the purpose of calculation by the standard formulae, the amounts reported are the market values of the principal amounts of the underlying or of the notional underlying. For instruments where the apparent notional amount differs from the effective notional amount, banks must use the latter.

CA-9.7.2 The remaining paragraphs in this section include the guidelines for the calculation of positions in different categories of interest rate derivatives. Banks which need further assistance in the calculation, particularly in relation to complex instruments, should contact the CBB in writing.

Forward foreign exchange contracts

CA-9.7.3 A forward foreign exchange position is decomposed into legs representing the paying and receiving currencies. Each of the legs is treated as if it were a zero coupon bond, with zero specific risk, in the relevant currency and included in the measurement framework as follows:

- (a) If the maturity method is used, each leg is included at the notional amount.
- (c) If the duration method is used, each leg is included at the present value of the notional zero coupon bond.

Deposit futures and FRAs

CA-9.7.4 Deposit futures, forward rate agreements and other instruments where the underlying is a money market exposure will be split into two legs as follows:

- (a) The first leg will represent the time to expiry of the futures contract, or settlement date of the FRA as the case may be.
- (b) The second leg will represent the time to expiry of the underlying instrument.
- (c) Each leg will be treated as a zero coupon bond with zero specific risk.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.7 Calculation of derivative positions (continued)

- (d) For deposit futures, the size of each leg is the notional amount of the underlying money market exposure. For FRAs, the size of each leg is the notional amount of the underlying money market exposure discounted to present value, although in the maturity method, the notional amount may be used without discounting.

For example, under the maturity method, a single 3-month Euro\$ 1,000,000 deposit futures contract expiring in 3 months' time will have one leg of \$ 1,000,000 representing the 8 months to contract expiry, and another leg of \$ 1,000,000 in the 11 months' time-band representing the time to expiry of the deposit underlying the futures contract.

Bond futures and forward bond transactions

CA-9.7.5 Bond futures, forward bond transactions and the forward leg of repos, reverse repos and other similar transactions will use the two-legged approach. A forward bond transaction is one where the settlement is for a period other than the prevailing norm for the market.

- (a) The first leg is a zero coupon bond with zero specific risk. Its maturity is the time to expiry of the futures or forward contract. Its size is the cash flow on maturity discounted to present value, although in the maturity method, the cash flow on maturity may be used without discounting.
- (b) The second leg is the underlying bond. Its maturity is that of the underlying bond for fixed rate bonds, or the time to the next reset for floating rate bonds. Its size is as set out in (c) and (d) below.
- (c) For forward bond transactions, the underlying bond and amount is used at the present spot price.
- (d) For bond futures, the principal amounts for each of the two legs is reckoned as the futures price times the notional underlying bond amount.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.7 Calculation of derivative positions (continued)

- (e) Where a range of deliverable instruments may be delivered to fulfil a futures contract (at the option of the "short"), then the following rules are used to determine the principal amount, taking account of any conversion factors defined by the exchange:
- (i) The "long" may use one of the deliverable bonds, or the notional bond on which the contract is based, as the underlying instrument, but this notional long leg may not be offset against a short cash position in the same bond.
 - (ii) The "short" may treat the notional underlying bond as if it were one of the deliverable bonds, and it may be offset against a short cash position in the same bond.
- (f) For futures contracts based on a corporate bond index, the positions will be included at the market value of the notional underlying portfolio of securities.
- (g) A repo (or sell-buy or stock lending) involving exchange of a security for cash should be represented as a cash borrowing - i.e. a short position in a government bond with maturity equal to the repo and coupon equal to the repo rate. A reverse repo (or buy-sell or stock borrowing) should be represented as a cash loan - i.e. a long position in a government bond with maturity equal to the reverse repo and coupon equal to the repo rate. These positions are referred to as "cash legs".
- (h) It should be noted that, where a security owned by the bank (and included in its calculation of market risk) is repo'd, it continues to contribute to the bank's interest rate or equity position risk calculation.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.7 Calculation of derivative positions (continued)

Swaps

CA-9.7.6 Swaps are treated as two notional positions in government securities with the relevant maturities.

- (a) Interest rate swaps will be decomposed into two legs, and each leg will be allocated to the maturity band equating to the time remaining to repricing or maturity. For example, an interest rate swap in which a bank is receiving floating rate interest and paying fixed is treated as a long position in a floating rate instrument of maturity equivalent to the period until the next interest fixing and a short position in a fixed rate instrument of maturity equivalent to the residual life of the swap.
- (b) For swaps that pay or receive a fixed or floating interest rate against some other reference price, e.g. a stock index, the interest rate component should be slotted into the appropriate repricing or maturity category, with the equity component being included in the equity risk measurement framework as described in chapter CA-10.
- (c) For cross currency swaps, the separate legs are included in the interest rate risk measurement for the currencies concerned, as having a fixed/floating leg in each currency. Alternatively, the two parts of a currency swap transaction are split into forward foreign exchange contracts and treated accordingly.
- (d) Where a swap has a deferred start, and one or both legs have been fixed, then the fixed leg(s) will be sub-divided into the time to the commencement of the leg and the actual swap leg with fixed or floating rate. A swap is deemed to have a deferred start when the commencement of the interest rate calculation periods is more than two business days from the transaction date, and one or both legs have been fixed at the time of the commitment. However, when a swap has a deferred start and neither leg has been fixed, there is no interest rate exposure, albeit there will be counterparty exposure.
- (e) Where a swap has a different structure from those discussed above, it may be necessary to adjust the underlying notional principal amount, or the notional maturity of one or both legs of the transaction.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.7 Calculation of derivative positions (continued)

CA-9.7.7 Banks with large swap books may use alternative formulae for these swaps to calculate the positions to be included in the maturity or duration ladder. One method would be to first convert the cash flows required by the swap into their present values. For this purpose, each cash flow should be discounted using the zero coupon yields, and a single net figure for the present value of the cash flows entered into the appropriate time-band using procedures that apply to zero or low coupon (less than 3%) instruments. An alternative method would be to calculate the sensitivity of the net present value implied by the change in yield used in the duration method (as set out in section CA-9.5), and allocate these sensitivities into the appropriate time-bands.

CA-9.7.8 Banks which propose to use the approaches described in paragraph CA-9.7.7, or any other similar alternative formulae, should obtain the prior written approval of the CBB. The CBB will consider the following factors before approving any alternative methods for calculating the swap positions:

- (a) Whether the systems proposed to be used are accurate;
- (b) Whether the positions calculated fully reflect the sensitivity of the cash flows to interest rate changes and are entered into the appropriate time-bands; and
- (c) Whether the positions are denominated in the same currency.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.8 Netting of derivative positions

Permissible offsetting of fully matched positions for both specific and general market risk

CA-9.8.1 Banks may exclude from the interest rate risk calculation, altogether, the long and short positions (both actual and notional) in identical instruments with exactly the same issuer, coupon, currency and maturity. A matched position in a future or a forward and its corresponding underlying may also be fully offset, albeit the leg representing the time to expiry of the future is included in the calculation.

CA-9.8.2 When the future or the forward comprises a range of deliverable instruments, offsetting of positions in the futures or forward contract and its underlying is only permitted in cases where there is a readily identifiable underlying security which is most profitable for the trader with a short position to deliver. The price of this security, sometimes called the "cheapest-to-deliver", and the price of the future or forward contract should, in such cases, move in close alignment. No offsetting will be allowed between positions in different currencies. The separate legs of cross-currency swaps or forward foreign exchange contracts are treated as notional positions in the relevant instruments and included in the appropriate calculation for each currency.

Permissible offsetting of closely matched positions for general market risk only

CA-9.8.3 For the purpose of calculation of the general market risk, in addition to the permissible offsetting of fully matched positions as described in paragraph CA-9.8.1 above, opposite positions giving rise to interest rate exposure can be offset if they relate to the same underlying instruments, are of the same nominal value and are denominated in the same currency and, in addition, fulfil the following conditions:

(a) For futures:

Offsetting positions in the notional or underlying instruments to which the futures contract relates should be for identical products and mature within seven days of each other.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk - Interest rate risk – (STA)

CA-9.8 Netting of derivative positions (continued)

(b) For swaps and FRAs:

The reference rate (for floating rate positions) must be identical and the coupons must be within 15 basis points of each other.

(c) For swaps, FRAs and forwards:

The next interest fixing date or, for fixed coupon positions or forwards, the residual maturity must correspond within the following limits:

- less than one month: same day;
- between one month and one year: within 7 days;
- over one year: within 30 days.



MODULE	CA: Capital Adequacy
CHAPTER	CA 9: Market Risk- Interest rate risk – (STA)

CA-9.9 Calculation of capital charge for derivatives

CA-9.9.1 After calculating the derivatives positions, taking account of the permissible offsetting of matched positions, as explained in section CA-9.8, the capital charges for specific and general market risk for interest rate derivatives are calculated in the same manner as for cash positions, as described earlier in this chapter.

Summary of treatment of interest rate derivatives

Instrument	Specific risk charge*	General market risk charge
Exchange-traded futures		
- Government** debt <u>security</u>	No	Yes, as two positions
- Corporate debt <u>security</u>	Yes	Yes, as two positions
- Index on interest rates (e.g. LIBOR)	No	Yes, as two positions
- Index on basket of debt <u>securities</u>	Yes	Yes, as two positions
OTC forwards		
- Government** debt <u>security</u>	No	Yes, as two positions
- Corporate debt <u>security</u>	Yes	Yes, as two positions
- Index on interest rates	No	Yes, as two positions
FRAs	No	Yes, as two positions
Swaps		
- Based on inter-bank rates	No	Yes, as two positions
- Based on Government** bond yields	No	Yes, as two positions
- Based on corporate bond yields	Yes	Yes, as two positions
Forward foreign exchange	No	Yes, as one position in each currency
Options		Either (a) or (b) as below (see chapter CA-13 for a detailed description):
- Government** debt <u>security</u>	No	(a) Carve out together with the associated <u>hedging</u> positions, and use:
- Corporate debt <u>security</u>	Yes	- simplified approach; or
- Index on interest rates	No	- scenario analysis; or
- FRAs, <u>swaps</u>	No	- internal models (see chapter CA-14).
		(b) General market risk charge according to the delta-plus method (gamma and vega should receive separate capital charges).
* This is the specific risk charge relating to the issuer of the instrument. Under the credit risk rules, there remains a separate capital charge for the <u>counterparty</u> risk.		
** As defined in section CA-9.2.		



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.1 Introduction

CA-10.1.1 This chapter sets out the minimum capital requirements to cover the risk of holding or taking positions in equities in the bank's trading book.

CA-10.1.2 For the guidance of the banks, and without being exhaustive, the following list includes financial instruments in the trading book, including forward positions, to which equity position risk capital requirements will apply:

- (a) common stocks, whether voting or non-voting;
- (b) depository receipts (which should be included in the measurement framework in terms of the underlying shares);
- (c) convertible preference securities (non-convertible preference securities are treated as bonds);
- (d) convertible debt securities which convert into equity instruments and are, therefore, treated as equities (see paragraph CA-10.1.3 below);
- (e) commitments to buy or sell equity securities;
- (f) derivatives based on the above instruments.

CA-10.1.3 Convertible debt securities must be treated as equities where:

- (a) the first date at which the conversion may take place is less than three months ahead, or the next such date (where the first date has passed) is less than a year ahead; and
- (b) the convertible is trading at a premium of less than 10%, where the premium is defined as the current marked-to-market value of the convertible less the marked-to-market value of the underlying equity, expressed as a percentage of the latter.

In other instances, convertibles should be treated as either equity or debt securities, based reasonably on their market behaviour.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.1 Introduction (continued)

- CA-10.1.4 For instruments that deviate from the structures described in paragraphs CA-10.1.2 and CA-10.1.3 above, or which could be considered complex, each bank must agree on a written policy statement with the CBB about the intended treatment, on a case-by-case basis. In some circumstances, the treatment of an instrument may be uncertain, for example bonds whose coupon payments are linked to equity indices. The position risk of such instruments should be broken down into its components and allocated appropriately between the equity, interest rate and foreign exchange risk categories. Advice must be sought from the CBB in cases of doubt, particularly when a bank is trading an instrument for the first time.
- CA-10.1.5 Where equities are part of a forward contract, a future or an option (i.e. a quantity of equities to be received or delivered), any interest rate or foreign currency exposure from the other leg of the contract should be included in the measurement framework as described in chapters CA-9 and CA-11, respectively.
- CA-10.1.6 As with interest rate related instruments, the minimum capital requirement for equities is expressed in terms of two separately calculated charges, one applying to the "*specific risk*" of holding a long or short position in an individual equity, and the other to the "*general market risk*" of holding a long or short position in the market as a whole.
- CA-10.1.7 Banks which have the intention and capability to use internal models for the measurement of general and specific equity risk and, hence, for the calculation of the capital requirement, should seek the prior written approval of the CBB for those models. The CBB's detailed rules for the recognition and use of internal models are included in chapter CA-14. Banks which do not use internal models should adopt the standardised approach to calculate the equity position risk capital requirement, as set out in detail in this chapter.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.2 Calculation of equity positions

- CA-10.2.1 A bank may net long and short positions in the same equity instrument, arising either directly or through derivatives, to generate the individual net position in that instrument. For example, a future in a given equity may be offset against an opposite cash position in the same equity, albeit the interest rate risk arising out of the future should be calculated separately in accordance with the rules set out in chapter CA-9.
- CA-10.2.2 A bank may net long and short positions in one tranche of an equity instrument against another tranche only where the relevant tranches:
- (a) rank *pari passu* in all respects; and
 - (b) become fungible within 180 days, and thereafter the equity instruments of one tranche can be delivered in settlement of the other tranche.
- CA-10.2.3 Positions in depository receipts may only be netted against positions in the underlying stock if the stock is freely deliverable against the depository receipt. If a bank takes a position in depository receipts against an opposite position in the underlying equity in different markets (i.e. arbitrage), it may offset the position provided that any costs on conversion are fully taken into account. Furthermore, the foreign exchange risk arising out of these positions should be included in the measurement framework as set out in chapter CA-11.
- CA-10.2.4 More detailed guidance on the treatment of equity derivatives is set out in section CA-10.5.
- CA-10.2.5 Equity positions, arising either directly or through derivatives, should be allocated to the country in which each equity is listed. Where an equity is listed in more than one country, the bank must discuss the appropriate country allocation with the CBB.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.3 Specific risk calculation

CA-10.3.1 Specific risk is defined as the bank's gross equity positions (i.e. the sum of all long equity positions and of all short equity positions), and is calculated for each country or equity market. For each national market in which the bank holds equities, it should sum the market values of its individual net positions as determined in accordance with section CA-10.2, irrespective of whether they are long or short positions, to produce the overall gross equity position for that market.

CA-10.3.2 The capital charge for specific risk is 8%, unless the portfolio is both liquid and well-diversified, in which case the capital charge will be 4%. To qualify for the reduced 4% capital charge, the following requirements need to be met:

- (a) The portfolio equities should be listed on a recognised stock exchange;
- (b) No individual equity position shall comprise more than 10% of the gross value of the country portfolio; and
- (c) The total value of the equity positions which individually comprise between 5% and 10% of the gross value of the country portfolio, shall not exceed 50% of the gross value of the country portfolio.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.4 General risk calculation

CA-10.4.1 The general market risk is the difference between the sum of the long positions and the sum of the short positions (i.e. the overall net position) in each national equity market. In other words, to calculate the general market risk, the bank must sum the market value of its individual net positions for each national market, as determined in accordance with section CA-10.2, taking into account whether the positions are long or short.

CA-10.4.2 The general market equity risk measure is 8% of the overall net position in each national market.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.5 Equity derivatives

CA-10.5.1 For the purpose of calculating the specific and general market risk by the standardised approach, equity derivative positions should be converted into notional underlying equity positions, whether long or short. All equity derivatives and off-balance-sheet positions which are affected by changes in equity prices should be included in the measurement framework. This includes futures and swaps on both individual equities and on stock indices.

CA-10.5.2 The following guidelines will apply to the calculation of positions in different categories of equity derivatives. Banks which need further assistance in the calculation, particularly in relation to complex instruments, should contact the CBB.

- (a) Futures and forward contracts relating to individual equities should, in principle, be included in the calculation at current market prices.
- (b) Futures relating to stock indices should be included in the calculation, at the marked-to-market value of the notional underlying equity portfolio, i.e. as a single position based on the sum of the current market values of the underlying instruments.
- (c) Equity swaps are treated as two notional positions. For example, an equity swap in which a bank is receiving an amount based on the change in value of one particular equity or stock index, and paying a different index is treated as a long position in the former and a short position in the latter. Where one of the swap legs involves receiving/paying a fixed or floating interest rate, that exposure should be slotted into the appropriate time-band for interest rate related instruments as set out in chapter CA-9. The stock index leg should be covered by the equity treatment as set out in this chapter.
- (d) Equity options and stock index options are either "carved out" together with the associated underlying instruments, or are incorporated in the general market risk measurement framework, described in this chapter, based on the delta-plus method. The treatment of options, being a complex issue, is dealt with in detail in chapter CA-13.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.5 Equity derivatives (continued)

CA-10.5.3 A summary of the treatment of equity derivatives is set out in paragraph CA-10.5.8.

Specific risk on positions in equity indices

CA-10.5.4 Positions in highly liquid equity indices whether they arise directly or through derivatives, attract a 2% capital charge in addition to the general market risk, to cover factors such as execution risk.

CA-10.5.5 For positions in equity indices not regarded as highly liquid, the specific risk capital charge is the highest specific risk charge that would apply to any of its components, as set out in section CA-10.3.

CA-10.5.6 In the case of the futures-related arbitrage strategies set out below, the specific risk capital charge described above may be applied to only one index with the opposite position exempt from a specific risk capital charge. The strategies are as follows;

- (a) where a bank takes an opposite position in exactly the same index, at different dates or in different market centres;
- (b) where a bank takes opposite positions in contracts at the same date in different but similar indices, provided the two indices contain at least 90% common components.

CA-10.5.7 Where a bank engages in a deliberate arbitrage strategy, in which a futures contract on a broad-based index matches a basket of stocks, it will be allowed to carve out both positions from the standardised methodology on the following conditions:

- (a) the trade has been deliberately entered into, and separately controlled; and
- (b) the composition of the basket of stocks represents at least 90% of the index when broken down into its notional components.

In such a case, the minimum capital requirement is limited to 4% (i.e. 2% of the gross value of the positions on each side) to reflect divergence and execution risks. This applies even if all of the stocks comprising the index are held in identical proportions. Any excess value of the stocks comprising the basket over the value of the futures contract or vice versa is treated as an open long or short position.



MODULE	CA: Capital Adequacy
CHAPTER	CA 10: Market Risk - Equity position risk – (STA)

CA-10.5 Equity derivatives (continued)

Counterparty risk

CA-10.5.8 Derivative positions may also generate counterparty risk exposure related to the counterparty in the trade, in addition to position risk requirements (specific and general) related to the underlying instrument, e.g. counterparty risk related to OTC trades through margin payments, fees payable or settlement exposures. The credit risk capital requirements will apply to such counterparty risk exposure.

Summary of treatment of equity derivatives

Instrument	Specific risk charge*	General market risk charge
Exchange-traded or <u>OTC</u> futures		
- Individual equity	Yes	Yes, as underlying
- Index	Yes (see section CA-10.5)	Yes, as underlying
Options		
- Individual equity	Yes	Either (a) or (b) as below (chapter CA-13 for a detailed description): (a) Carve out together with the associated <u>hedging</u> positions, and use: - simplified approach; or - scenario analysis; or - internal models (chapter CA-15). (b) General market risk charge according to the delta-plus method (gamma and vega should receive separate capital charges).
- Index	Yes	
* This is the specific risk charge relating to the issuer of the instrument. Under the credit risk rules, there remains a separate capital charge for the <u>counterparty</u> risk.		



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.1 Introduction

CA-11.1.1 A bank which holds net open positions (whether long or short) in foreign currencies is exposed to the risk that exchange rates may move against it. The open positions may be either trading positions or, simply, exposures caused by the bank's overall assets and liabilities.

CA-11.1.2 This chapter describes the standardised method for calculation of the bank's foreign exchange risk, and the capital required against that risk. The measurement of the foreign exchange risk involves, as a first step, the calculation of the net open position in each individual currency including gold⁶⁸ and, as a second step, the measurement of the risks inherent in the bank's mix of long and short positions in different currencies.

CA-11.1.3 The open positions and the capital requirements are calculated with reference to the entire business, i.e. the banking and trading books combined.

CA-11.1.4 The open positions are calculated with reference to the bank's base currency, which will be either BD or US\$.

CA-11.1.5 Banks which have the intention and capability to use internal models for the measurement of their foreign exchange risk and, hence, for the calculation of the capital requirement, should seek the prior written approval of the CBB for those models. The CBB's detailed rules for the recognition and use of internal models are included in chapter CA-14. Banks which do not use internal models should adopt the standardised approach, as set out in detail in this chapter.

CA-11.1.6 In addition to foreign exchange risk, positions in foreign currencies may be subject to interest rate risk and credit risk which should be treated separately.

CA-11.1.7 For the purposes of calculating "Foreign Exchange Risk" only, positions in those GCC currencies which are pegged to US\$, will be treated as positions in US\$.

⁶⁸ Positions in gold should be treated as if they were foreign currency positions, rather than as commodity positions, because the volatility of gold is more in line with that of foreign currencies and most banks manage it in similar manner to foreign currencies.



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.2 De minimis exemptions

CA-11.2.1 A bank doing negligible business in foreign currencies and which does not take foreign exchange positions for its own account may, at the discretion of the CBB evidenced by the CBB's prior written approval, be exempted from calculating the capital requirements on these positions. The CBB is likely to be guided by the following criteria in deciding to grant exemption to any bank:

- (a) the bank's holdings or taking of positions in foreign currencies, including gold, defined as the greater of the sum of the gross long positions and the sum of the gross short positions in all foreign currencies and gold, does not exceed 100% of its eligible capital; and
- (b) the bank's overall net open position, as defined in paragraph CA-11.3.1, does not exceed 2% of its eligible capital as defined in chapter CA-2.

CA-11.2.2 The criteria listed in paragraph CA-11.2.1 above are only intended to be guidelines, and a bank will not automatically qualify for exemptions upon meeting them. The CBB may also, in its discretion, fix a minimum capital requirement for a bank which is exempted from calculating its foreign exchange risk capital requirement, to cover the risks inherent in its foreign currency business.

CA-11.2.3 The CBB may, at a future date, revoke an exemption previously granted to a bank, if the CBB is convinced that the conditions on which the exemption was granted no longer exist.



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.3 Calculation of net open positions

CA-11.3.1 A bank's exposure to foreign exchange risk in any currency is its net open position in that currency, which is calculated by summing the following items:

- (a) the net spot position in the currency (i.e. all asset items less all liability items, including accrued interest, other income and expenses, denominated in the currency in question, assets are included gross of provisions for bad and doubtful debts, except in cases where the provisions are maintained in the same currency as the underlying assets);
- (b) the net forward position in the currency (i.e. all amounts to be received less all amounts to be paid under forward foreign exchange contracts, in the concerned currency, including currency futures and the principal on currency swaps not included in the spot position);
- (c) guarantees and similar off-balance-sheet contingent items that are certain to be called and are likely to be irrecoverable where the provisions, if any, are not maintained in the same currency;
- (d) net future income/expenses not yet accrued but already fully hedged by forward foreign exchange contracts may be included provided that such anticipatory hedging is part of the bank's formal written policy and the items are included on a consistent basis;
- (e) profits (i.e. the net value of income and expense accounts) held in the currency in question;
- (f) specific provisions held in the currency in question where the underlying asset is in a different currency, net of assets held in the currency in question where a specific provision is held in a different currency; and
- (g) the net delta-based equivalent of the total book of foreign currency options (subject to a separately calculated capital charge for gamma and vega as described in chapter CA-13, alternatively, options and their associated underlying positions are dealt with by one of the other methods described in chapter CA-13).



MODULE	CA:	Capital Adequacy
CHAPTER	CA 11:	Market Risk - Foreign exchange risk – (STA)

CA-11.3 Calculation of net open positions (continued)

CA-11.3.2 All assets and liabilities, as described above, should be included at closing mid-market spot exchange rates. Marked-to-market items should be included on the basis of the current market value of the positions. However, banks which base their normal management accounting on net present values are expected to use the net present values of each position, discounted using current interest rates and valued at current spot rates, for measuring their forward currency and gold positions.

CA-11.3.3 Net positions in composite currencies, such as the SDR, may either be broken down into the component currencies according to the quotas in force and included in the net open position calculations for the individual currencies, or treated as a separate currency. In any case, the mechanism for treating composite currencies should be consistently applied.

CA-11.3.4 For calculating the net open position in gold, the bank will first express the net position (spot plus forward) in terms of the standard unit of measurement (i.e. ounces or grams) and, then, convert it at the current spot rate into the base currency.

CA-11.3.5 Forward currency and gold positions should be valued at current spot market exchange rates. Applying forward exchange rates is inappropriate as it will result in the measured positions reflecting current interest rate differentials, to some extent.

CA-11.3.6 Where gold is part of a forward contract (i.e. quantity of gold to be received or to be delivered), any interest rate or foreign currency exposure from the other leg of the contract should be reported as set out in chapter CA-9 or section CA-11.1 above, respectively.



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.3 Calculation of net open positions (continued)

Structural positions

CA-11.3.7 Positions of a structural, i.e. non-dealing, nature as set out below, may be excluded from the calculation of the net open currency positions:

- (a) positions are taken deliberately in order to hedge, partially or totally, against the adverse effects of exchange rate movements on the bank's CAR;
- (b) positions related to items that are deducted from the bank's capital when calculating its capital base in accordance with the rules and guidelines in this module, such as investments in non-consolidated subsidiaries; and
- (c) Retained profits held for payout to parent.

The CBB will consider approving the exclusion of the above positions for the purpose of calculating the capital requirement, only if the following conditions are met:

- (i) the concerned bank provides adequate documentary evidence to the CBB which establishes the fact that the positions proposed to be excluded are, indeed, of a structural, i.e. non-dealing, nature and are merely intended to protect the bank's CAR. For this purpose, the CBB may ask for written representations from the bank's management or directors; and
- (ii) any exclusion of a position is consistently applied, with the treatment of the hedge remaining the same for the life of the associated assets or other items.

Derivatives

CA-11.3.8 A currency swap is treated as a combination of a long position in one currency and a short position in the second currency.



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.3 Calculation of net open positions (continued)

CA-11.3.9 There are a number of alternative approaches to the calculation of the foreign exchange risk in options. As stated in section CA-11.1, with the CBB's prior written approval, a bank may choose to use internal models to measure the options risk. Extra capital charges will apply to those option risks that the bank's internal model does not capture. The standardised framework for the calculation of options risks and the resultant capital charges is described, in detail, in chapter CA-13. Where, as explained in paragraph CA-11.3.1, the option delta value is incorporated in the net open position, the capital charges for the other option risks are calculated separately.



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.4 Calculation of the overall net open positions

CA-11.4.1 The net long or short position in each currency is converted, at the spot rate, into the reporting currency. The overall net open position is measured by aggregating the following:

- (a) The sum of the net short positions or the sum of the net long positions, whichever is greater; plus
- (b) The net position (short or long) in gold, regardless of sign.

CA-11.4.2 Where the bank is assessing its foreign exchange risk on a consolidated basis, it may be technically impractical in the case of some marginal operations to include the currency positions of a foreign branch or subsidiary of the bank. In such cases, the internal limit for that branch/subsidiary, in each currency, may be used as a proxy for the positions. The branch/subsidiary limits should be added, without regard to sign, to the net open position in each currency involved. When this simplified approach to the treatment of currencies with marginal operations is adopted, the bank must adequately monitor the actual positions of the branch/subsidiary against the limits, and revise the limits, if necessary, based on the results of the ex-post monitoring.



MODULE	CA: Capital Adequacy
CHAPTER	CA 11: Market Risk - Foreign exchange risk – (STA)

CA-11.5 Calculation of the capital charge

CA-11.5.1 The capital charge is 8% of the overall net open position.

CA-11.5.2 The table below illustrates the calculation of the overall net open position and the capital charge:

Example of the calculation of the foreign exchange overall net open position and the capital charge

GBP	EURO	CAS	US\$	JPY	Gold
+100	+150	+50	-180	-20	-20
+300			-200		20
<p>The capital charge is 8% of the higher of either the sum of the net long currency positions or the sum of the net short positions (i.e. 300) and of the net position in gold (i.e. 20) = $320 \times 8\% = 25.6$</p>					



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.1 Introduction

CA-12.1.1 This chapter sets out the minimum capital requirements to cover the risk of holding or taking positions in commodities, including precious metals, but excluding gold (which is treated as a foreign currency according to the methodology explained in chapter CA-11).

CA-12.1.2 **The commodities position risk and the capital charges are calculated with reference to the entire business of a bank, i.e., the banking and trading books combined.**

CA-12.1.3 The price risk in commodities is often more complex and volatile than that associated with currencies and interest rates. Commodity markets may also be less liquid than those for interest rates and currencies and, as a result, changes in supply and demand can have a more dramatic effect on price and volatility. Banks need also to guard against the risk that arises when a short position falls due before the long position. Owing to a shortage of liquidity in some markets, it might be difficult to close the short position and the bank might be "squeezed by the market". All these market characteristics, of commodities, can make price transparency and the effective hedging of risks more difficult.

CA-12.1.4 For spot or physical trading, the directional risk arising from a change in the spot price is the most important risk. However, banks applying portfolio strategies involving forward and derivative contracts are exposed to a variety of additional risks, which may well be larger than the risk of a change in spot prices (directional risk). These include:

- (a) 'basis risk', i.e., the risk that the relationship between the prices of similar commodities alters through time;
- (b) 'interest rate risk', i.e., the risk of a change in the cost of carry for forward positions and options; and
- (c) 'forward gap risk', i.e., the risk that the forward price may change for reasons other than a change in interest rates.



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.1 Introduction (continued)

CA-12.1.5 The capital charges for commodities risk envisaged by the rules within this chapter are intended to cover the risks identified in paragraph CA-12.1.4. In addition, however, banks face credit counterparty risk on over-the-counter derivatives, which must be incorporated into their credit risk capital requirements. Furthermore, the funding of commodities positions may well open a bank to interest rate or foreign exchange risk which should be captured within the measurement framework set out in chapters CA-9 and CA-11, respectively.⁶⁹

CA-12.1.6 Banks which have the intention and capability to use internal models for the measurement of their commodities risks and, hence, for the calculation of the capital requirement, should seek the prior written approval of the CBB for those models. The CBB's detailed rules for the recognition and use of internal models are included in chapter CA-14. It is essential that the internal models methodology captures the directional risk, forward gap and interest rate risks, and the basis risk which are defined in paragraph CA-12.1.4. It is also particularly important that models take proper account of market characteristics, notably the delivery dates and the scope provided to traders to close out positions.

CA-12.1.7 Banks which do not propose to use internal models should adopt either the maturity ladder approach or the simplified approach to calculate their commodities risk and the resultant capital charges. Both these approaches are described in sections CA-12.3 and CA-12.4, respectively.

⁶⁹ Where a commodity is part of a forward contract (i.e., a quantity of commodity to be received or to be delivered), any interest rate or foreign exchange risk from the other leg of the contract should be captured, within the measurement framework set out in chapters CA-9 and CA-11, respectively. However, positions which are purely of a stock financing nature (i.e., a physical stock has been sold forward and the cost of funding has been locked in until the date of the forward sale) may be omitted from the commodities risk-calculation although they will be subject to the interest rate and counterparty risk capital requirements.



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.2 Calculation of commodities positions

Netting

CA-12.2.1 Banks must first express each commodity position (spot plus forward) in terms of the standard unit of measurement (i.e., barrels, kilograms, grams etc.). Long and short positions in a commodity are reported on a net basis for the purpose of calculating the net open position in that commodity. For markets which have daily delivery dates, any contracts maturing within ten days of one another may be offset. The net position in each commodity is then converted, at spot rates, into the bank's reporting currency.

CA-12.2.2 Positions in different commodities cannot be offset for the purpose of calculating the open positions as described in paragraph CA-12.2.1 above. However, where two or more sub-categories⁷⁰ of the same category are, in effect, deliverable against each other, netting between those sub-categories is permitted. Furthermore, if two or more sub-categories of the same category are considered as close substitutes for each other, and minimum correlation of 0.9 between their price movements is clearly established over a minimum period of one year, the bank may, with the prior written approval of the CBB, net positions in those sub-categories. Banks which wish to net positions based on correlations, in the manner discussed above, will need to satisfy the CBB of the accuracy of the method which it proposes to adopt.

Derivatives

CA-12.2.3 All commodity derivatives and off-balance-sheet positions which are affected by changes in commodity prices should be included in the measurement framework for commodities risks. This includes commodity futures, commodity swaps, and options where the "delta plus" method is used⁷¹. In order to calculate the risks, commodity derivatives are converted into notional commodities positions and assigned to maturities as follows:

⁷⁰ Commodities can be grouped into clans, families, sub-groups and individual commodities. For example, a clan might be Energy Commodities, within which Hydro-Carbons is a family with Crude Oil being a sub-group and West Texas Intermediate, Arabian Light and Brent being individual commodities.

⁷¹ For banks applying other approaches to measure options risks, all Options and the associated underlying instruments should be excluded from both the maturity ladder approach and the simplified approach. The treatment of options is described, in detail, in chapter CA-13.



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.2 Calculation of commodities positions (continued)

- (a) *futures and forward contracts relating to individual commodities* should be incorporated in the measurement framework as notional amounts of barrels, kilograms etc., and should be assigned a maturity with reference to their expiry date;
- (b) *commodity swaps* where one leg is a fixed price and the other one is the current market price, should be incorporated as a series of positions equal to the notional amount of the contract, with one position corresponding to each payment on the swap and slotted into the maturity time-bands accordingly. The positions would be long positions if the bank is paying fixed and receiving floating, and short positions if vice versa. (If one of the legs involves receiving/paying a fixed or floating interest rate, that exposure should be slotted into the appropriate repricing maturity band for the calculation of the interest rate risk, as described in chapter CA-9);
- (c) *commodity swaps* where the legs are in different commodities should be incorporated in the measurement framework of the respective commodities separately, without any offsetting. Offsetting will only be permitted if the conditions set out in paragraphs CA-12.2.1 and CA-12.2.2 are met.



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.3 Maturity ladder approach

CA-12.3.1 A worked example of the maturity ladder approach is set out in Appendix CA-13 and the table in paragraph CA-12.3.2 illustrates the maturity time-bands of the maturity ladder for each commodity.

CA-12.3.2 The steps in the calculation of the commodities risk by the maturity ladder approach are:

- (a) The net positions in individual commodities, expressed in terms of the standard unit of measurement, are first slotted into the maturity ladder. Physical stocks are allocated to the first time-band. A separate maturity ladder is used for each commodity as defined in section CA-12.2 earlier in this chapter. The net positions in commodities are calculated as explained in section CA-12.2.
- (b) Long and short positions in each time-band are matched. The sum of the matched long and short positions is multiplied first by the spot price of the commodity, and then by a spread rate of 1.5% for each time-band as set out in the table below. This represents the capital charge in order to capture forward gap and interest rate risk within a time-band (which, together, are sometimes referred to as curvature/spread risk).

Time-bands ⁷²
0 – 1 months
1 – 3 months
3 – 6 months
6 – 12 months
1 – 2 years
2 – 3 years
over 3 years

⁷² For instruments, the maturity of which is on the boundary of two maturity time-bands, the instrument should be placed into the earlier maturity band. For example, instruments with a maturity of exactly one year are placed into the 6 to 12 months time-band.



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.3 Maturity ladder approach (continued)

- (c) The residual (unmatched) net positions from nearer time-bands are then carried forward to offset opposite positions (i.e. long against short, and vice versa) in time-bands that are further out. However, a surcharge of 0.6% of the net position carried forward is added in respect of each time-band that the net position is carried forward, to recognise that such hedging of positions between different time-bands is imprecise. The surcharge is in addition to the capital charge for each matched amount created by carrying net positions forward, and is calculated as explained in step (b) above.
- (d) At the end of step (c) above, there will be either only long or only short positions, to which a capital charge of 15% will apply. The CBB recognises that there are differences in volatility between different commodities, but has, nevertheless, decided that one uniform capital charge for open positions in all commodities shall apply in the interest of simplicity of the measurement, and given the fact that banks normally run rather small open positions in commodities. Banks must submit, in writing, details of their commodities business, to enable the CBB to evaluate whether the models approach should be adopted by the bank, to capture the market risk on this business.



MODULE	CA: Capital Adequacy
CHAPTER	CA 12: Market Risk - Commodities risk – (STA)

CA-12.4 Simplified approach

CA-12.4.1 By the simplified approach, the capital charge of 15% of the net position, long or short, in each commodity is applied to capture directional risk. Net positions in commodities are calculated as explained in section CA-12.2.

CA-12.4.2 An additional capital charge equivalent to 3% of the bank's gross positions, long plus short, in each commodity is applied to protect the bank against basis risk, interest rate risk and forward gap risk. In valuing the gross positions in commodity derivatives for this purpose, banks must use the current spot price.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.1 Introduction

CA-13.1.1 It is recognised that the measurement of the price risk of options is inherently a difficult task, which is further complicated by the wide diversity of banks' activities in options. The CBB has decided that the following approaches should be adopted to the measurement of options risks:

- (a) Banks which solely use purchased options are permitted to use the *simplified (carve-out) approach* described later in this chapter.
- (b) Banks which also write options should use either the *delta-plus (buffer) approach* or the *scenario approach*, or alternatively use a comprehensive risk management model. The CBB's detailed rules for the recognition and use of internal models are included in chapter CA-14.

CA-13.1.2 The scenario approach and the internal models approach are generally regarded as more satisfactory for managing and measuring options risk, as they assess risk over a range of outcomes rather than focusing on the point estimate of the 'Greek' risk parameters as in the delta-plus approach. The more significant the level and/or complexity of the bank's options trading activities, the more the bank will be expected to use a sophisticated approach to the measurement of options risks. The CBB will monitor the banks' options trading activities, and the adequacy of the risk measurement framework adopted.

CA-13.1.3 Where written option positions are hedged by perfectly matched long positions in exactly the same options, no capital charge for market risk is required in respect of those matched positions.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.2 Simplified approach (carve-out)

CA-13.2.1 In the simplified approach, positions for the options and the associated underlying (hedges), cash or forward, are entirely omitted from the calculation of capital charges by the standardised methodology and are, instead, "carved out" and subject to separately calculated capital charges that incorporate both general market risk and specific risk. The capital charges thus generated are then added to the capital charges for the relevant risk category, i.e., interest rate related instruments, equities, foreign exchange and commodities as described in chapters CA-9, CA-10, CA-11 and CA-12 respectively.

CA-13.2.2 The capital charges for the carved out positions are as set out in the table below. As an example of how the calculation would work, if a bank holds 100 shares currently valued at \$ 10 each, and also holds an equivalent put option with a strike price of \$ 11, the capital charge would be as follows:

$$[\$ 1,000 \times 16\%^{73}] \text{ minus } [(\$ 11 - \$ 10)^{74} \times 100] = \$ 60$$

A similar methodology applies to options whose underlying is a foreign currency, an interest rate related instrument or a commodity.

⁷³ 8% specific risk plus 8% general market risk.

⁷⁴ The amount the option is "in the money".



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.2 Simplified approach (carve-out) (continued)

Simplified approach: Capital charges

Position	Treatment
Long cash and long put or Short cash and long call (i.e., <u>hedged</u> positions)	The capital charge is: [Market value of underlying instrument ⁷⁵ x Sum of specific and general market risk charges ⁷⁶ for the underlying] <i>minus</i> [Amount, if any, the <u>option</u> is in the money ⁷⁷] The capital charge calculated as above is bounded at zero, i.e., it cannot be a negative number.
Long call or Long put (i.e., naked <u>option</u> positions)	The capital charge is the lesser of: i) Market value of the underlying instrument x Sum of specific and general market risk charges for the underlying; and ii) Market value of the <u>option</u> ⁷⁸ .

⁷⁵ In some cases such as foreign exchange, it may be unclear which side is the "underlying instrument"; this should be taken to be the asset which would be received if the option were exercised. In addition, the nominal value should be used for items where the market value of the underlying instrument could be zero, e.g., caps and floors, swaptions etc.

⁷⁶ Some options (e.g., where the underlying is an interest rate, a currency or a commodity) bear no specific risk, but specific risk is present in the case of options on certain interest rate related instruments (e.g., options on a corporate debt security or a corporate bond index - see chapter CA-9 for the relevant capital charges), and in the case of options on equities and stock indices (see chapter CA-10 for the relevant capital charges). The capital charge for currency options is 8% and for options on commodities is 15%.

⁷⁷ For options with a residual maturity of more than six months, the strike price should be compared with the forward, not the current, price. A bank unable to do this should take the "in the money" amount to be zero.

⁷⁸ Where the position does not fall within the trading book options on certain foreign exchange and commodities positions not belonging to the trading book), it is acceptable to use the book value instead of the market value.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.3 Delta-plus method (buffer approach)

CA-13.3.1 Banks which write options are allowed to include delta-weighted option positions within the standardised methodology set out in chapters CA-9 through CA-12. Each option should be reported as a position equal to the market value of the underlying multiplied by the delta. The delta should be calculated by an adequate model with appropriate documentation of the process and controls, to enable the CBB to review such models, if considered necessary. A worked example of the delta-plus method is set out in Appendix CA-14.

CA-13.3.2 Since delta does not sufficiently cover the risks associated with options positions, there will be additional capital buffers to cover gamma (which measures the rate of change of delta) and vega (which measures the sensitivity of the value of an option with respect to a change in volatility), in order to calculate the total capital charge. The gamma and vega buffers should be calculated by an adequate exchange model or the bank's proprietary options pricing model, with appropriate documentation of the process and controls, to enable the CBB to review such models, if considered necessary.

Treatment of delta

CA-13.3.3 The treatment of the delta-weighted positions, for the calculation of the capital charges arising from delta risk, is summarised in paragraphs CA-13.3.4 to CA-13.3.9.

Where the underlying is a debt security or an interest rate

CA-13.3.4 The delta-weighted option positions are slotted into the interest rate time-bands as set out in chapter CA-9. A two-legged approach should be used as for other derivatives, as explained in chapter CA-9, requiring one entry at the time the underlying contract takes effect and a second at the time the underlying contract matures. A few examples to elucidate the two-legged treatment are set out below:

- (a) A bought call option on a June three-month interest rate future will, in April, be considered, on the basis of its delta-equivalent value, to be a long position with a maturity of five months and a short position with a maturity of two months.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.3 Delta-plus method (buffer approach) (continued)

- (b) A written option with the same underlying as in (a) above, will be included in the measurement framework as a long position with a maturity of two months and a short position with a maturity of five months.
- (c) A two months call option on a bond future where delivery of the bond takes place in September will be considered in April, as being long the bond and short a five months deposit, both positions being delta-weighted.

CA-13.3.5 Floating rate instruments with caps or floors are treated as a combination of floating rate securities and a series of European-style options. For example, the holder of a three-year floating rate bond indexed to six month LIBOR with a cap of 10% will treat it as:

- (a) a debt security that reprices in six months; and
- (b) a series of five written call options on an FRA with a reference rate of 10%, each with a negative sign at the time the underlying FRA takes effect and a positive sign at the time the underlying *FRA* matures.

CA-13.3.6 The rules applying to closely matched positions, set out in paragraph CA-9.8.2, will also apply in this respect.

Where the underlying is an equity instrument

CA-13.3.7 The delta-weighted positions are incorporated in the measure of market risk described in chapter CA-10. For purposes of this calculation, each national market is treated as a separate underlying.

Options on foreign exchange and gold positions

CA-13.3.8 The net delta-based equivalent of the foreign currency and gold options are incorporated in the measurement of the exposure for the respective currency or gold position, as described in chapter CA-11.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.3 Delta-plus method (buffer approach) (continued)

Options on commodities

CA-13.3.9 The delta-weighted positions are incorporated in the measurement of the commodities risk by the simplified approach or the maturity ladder approach, as described in chapter CA-12.

Calculation of the gamma and vega buffers

CA-13.3.10 As explained in paragraph CA-13.3.2, in addition to the above capital charges to cover delta risk, banks are required to calculate additional capital charges to cover the gamma and vega risks. The additional capital charges are calculated as follows:

Gamma

- (a) For each individual option position (including hedge positions), a gamma impact is calculated according to the following formula derived from the Taylor series expansion:

$$\text{Gamma impact} = 0.5 \times \text{Gamma} \times \text{VU}$$

where VU = variation of the underlying of the option,
calculated as in (b) below

- (b) VU is calculated as follows:
- (i) For interest rate options⁷⁹, where the underlying is a bond, the market value of the underlying is multiplied by the risk weights set out in section CA-9.4. An equivalent calculation is carried out where the underlying is an interest rate, based on the assumed changes in yield as set out in the table in section CA-9.5;
 - (ii) For options on equities and equity indices, the market value of the underlying is multiplied by 8%;
 - (iii) For foreign exchange and gold options, the market value of the underlying is multiplied by 8%;
 - (iv) For commodities options, the market value of the underlying is multiplied by 15%.

⁷⁹ For interest rate and equity options, the present set of rules do not attempt to capture specific risk when calculating gamma capital Charges. See section CA-13.4 for an explanation of the CBB's views on this subject.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.3 Delta-plus method (buffer approach) (continued)

- (c) For the purpose of the calculation of the gamma buffer, the following positions are treated as the same underlying:
- (i) For interest rates, each time-band as set out in the table in section CA-9.4. Positions should be slotted into separate maturity ladders by currency. Banks using the duration method should use the time-bands as set out in the table in section CA-9.5;
 - (ii) For equities and stock indices, each individual national market;
 - (iii) For foreign currencies and gold, each currency pair and gold; and
 - (iv) For commodities, each individual commodity as defined in section CA-12.2.
- (d) Each option on the same underlying will have a gamma impact that is either positive or negative. These individual gamma impacts are summed, resulting in a net gamma impact for each underlying that is either positive or negative. Only those net gamma impacts that are negative are included in the capital calculation.
- (e) The total gamma capital charge is the sum of the absolute value of the net negative gamma impacts calculated for each underlying as explained in (d) above.

Vega

- (f) For volatility risk (vega), banks are required to calculate the capital charges by multiplying the sum of the vegas for all options on the same underlying, as defined above, by a proportional shift in volatility of $\pm 25\%$.
- (g) The total vega capital charge is the sum of the absolute value of the individual vega capital charges calculated for each underlying.

CA-13.3.11 The capital charges for delta, gamma and vega risks described in paragraphs CA-13.3.1 through CA-13.3.10 are in addition to the specific risk capital charges which are determined separately by multiplying the delta-equivalent of each option position by the specific risk weights set out in chapters CA-9 through CA-12.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.3 Delta-plus method (buffer approach) (continued)

CA-13.3.12 To summarise, capital requirements for, say OTC options, applying the delta-plus method are as follows:

- (a) Counterparty risk capital charges (on purchased options only), calculated in accordance with the credit risk regulations; PLUS
- (b) Specific risk capital charges (calculated as explained in paragraph CA-13.3.11); PLUS
- (c) Delta risk capital charges (calculated as explained in paragraphs CA-13.3.3 through CA-13.3.9) PLUS
- (d) Gamma and vega capital buffers (calculated as explained in paragraph CA-13.3.10).



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.4 Scenario approach

CA-13.4.1 As stated in section CA-13.1, banks which have a significant level of options trading activities, or have complex options trading strategies, are expected to use more sophisticated methods for measuring and monitoring the options risks. Banks with the appropriate capability will be permitted, with the prior approval of the CBB, to base the market risk capital charge for options portfolios and associated hedging positions on scenario matrix analysis. Before giving its approval, the CBB will closely review the accuracy of the analysis that is constructed. Furthermore, like in the case of internal models, the banks' use of scenario analysis as part of the standardised methodology will also be subject to external validation, and to those of the qualitative standards listed in chapter CA-14 which are appropriate given the nature of the business.

CA-13.4.2 The scenario matrix analysis involves specifying a fixed range of changes in the option portfolio's risk factors and calculating changes in the value of the option portfolio at various points along this "grid" or "matrix". For the purpose of calculating the capital charge, the bank will revalue the option portfolio using matrices for simultaneous changes in the option's underlying rate or price and in the volatility of that rate or price. A different matrix is set up for each individual underlying as defined in section CA-13.3 above. As an alternative, in respect of interest rate options, banks which are significant traders in such options are permitted to base the calculation on a minimum of six sets of time- bands. When applying this alternative method, not more than three of the time-bands as defined in chapter CA-9 should be combined into any one set.

CA-13.4.3 The first dimension of the matrix involves a specified range of changes in the option's underlying rate or price. The CBB has set the range, for each risk category, as follows:



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.4 Scenario approach (continued)

- (a) *Interest rate related instruments* - The range for interest rates is consistent with the assumed changes in yield set out in section CA-9.5. Those banks applying the alternative method of grouping time-bands into sets, as explained in paragraph CA-13.4.2, should use, for each set of time-bands, the highest of the assumed changes in yield applicable to the individual time-bands in that group. If, for example, the time-bands 3 to 4 years, 4 to 5 years and 5 to 7 years are combined, the highest assumed change in yield of these three bands would be 0.75 which would be applicable to that set.
- (b) For *equity instruments*, the range is $\pm 8\%$.
- (c) For foreign exchange and gold, the range is $\pm 8\%$.
- (d) For *commodities*, the range is $\pm 15\%$,

For all risk categories, at least seven observations (including the current observation) should be used to divide the range into equally spaced intervals.

CA-13.4.4 The second dimension of the matrix entails a change in the volatility of the underlying rate or price. A single change in the volatility of the underlying rate or price equal to a shift in volatility of $\pm 25\%$ is applied.

CA-13.4.5 The CBB will closely monitor the need to reset the parameters for the amounts by which the price of the underlying instrument and volatility must be shifted to form the rows and columns of the scenario matrix. For the time being, the parameters set, as above, only reflect general market risk (see paragraphs CA-13.4.10 to CA-13.4.12).

CA-13.4.6 After calculating the matrix, each cell contains the net profit or loss of the option and the underlying hedge instrument. The general market risk capital charge for each underlying is then calculated as the largest loss contained in the matrix.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.4 Scenario approach (continued)

CA-13.4.7 In addition to the capital charge calculated as above, the specific risk capital charge is determined separately by multiplying the delta-equivalent of each option position by the specific risk weights set out in chapters CA-9 through CA-12.

CA-13.4.8 To summarise, capital requirements for, say OTC options, applying the scenario approach are as follows:

- (a) Counterparty risk capital charges (on purchased options only), calculated in accordance with the credit risk regulations; PLUS
- (b) Specific risk capital charges (calculated as explained in paragraph CA-13.4.7); PLUS
- (c) Directional and volatility risk capital charges (i.e., the worst case loss from a given scenario matrix analysis).

CA-13.4.9 Banks doing business in certain classes of complex exotic options (e.g. barrier options involving discontinuities in deltas etc.), or in options at the money that are close to expiry, are required to use either the scenario approach or the internal models approach, both of which can accommodate more detailed revaluation approaches. The CBB expects the concerned banks to work with it closely to produce an agreed method, within the framework of these rules. If a bank uses scenario matrix analysis, it must be able to demonstrate that no substantially larger loss could fall between the nodes.

CA-13.4.10 In drawing up the delta-plus and the scenario approaches, the CBB's present set of rules do not attempt to capture specific risk other than the delta-related elements (which are captured as explained in paragraphs CA-13.4.7 and CA-13.4.11). The CBB recognises that introduction of those other specific risk elements will make the measurement framework much more complex. On the other hand, the simplifying assumptions used in these rules will result in a relatively conservative treatment of certain options positions.



MODULE	CA: Capital Adequacy
CHAPTER	CA 13: Market Risk - Treatment of Options – (STA)

CA-13.4 Scenario approach (continued)

CA-13.4.11 In addition to the options risks described earlier in this chapter, the CBB is conscious of the other risks also associated with options, e.g., rho or interest rate risk (the rate of change of the value of the option with respect to the interest rate) and theta (the rate of change of the value of the option with respect to time). While not proposing a measurement system for those risks at present, the CBB expects banks undertaking significant options business, at the very least, to monitor such risks closely. Additionally, banks will be permitted to incorporate rho into their capital calculations for interest rate risk, if they wish to do so.

CA-13.4.12 The CBB will closely review the treatment of options for the calculation of market risk capital charges, particularly in the light of the aspects described in paragraphs CA-13.4.10 and CA-13.4.11.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.1 Introduction

CA-14.1.1 As stated in chapter CA-1, as an alternative to the standardised approach to the measurement of market risks (which is described in chapters CA-9 through CA-13), and subject to the explicit prior approval of the CBB, banks will be allowed to use risk measures derived from their own internal models.

CA-14.1.2 This chapter describes the seven sets of conditions that should be met before a bank is allowed to use the internal models approach, namely:

- (a) general criteria regarding the adequacy of the risk management system;
- (b) qualitative standards for internal oversight of the use of models, notably by senior management;
- (c) guidelines for specifying an appropriate set of market risk factors (i.e., the market rates and prices that affect the value of a bank's positions);
- (d) quantitative standards setting out the use of common minimum statistical parameters for measuring risk;
- (e) guidelines for stress testing;
- (f) validation procedures for external oversight of the use of models; and
- (g) rules for banks which use a mixture of the internal models approach and the standardised approach.

CA-14.1.3 The standardised methodology, described in chapters CA-9 through CA-13, uses a "building-block" approach in which the specific risk and the general market risk arising from debt and equity positions are calculated separately. The focus of most internal models is a bank's general market risk exposure, typically leaving specific risk (i.e., exposures to specific issuers of debt securities and equities) to be measured largely through separate credit risk measurement systems. Banks applying models are subject to separate capital charges for the specific risk not captured by their models, which shall be calculated by the standardised methodology. The capital charge for banks which are modelling specific risk is set out in section CA-14.10.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.1 Introduction (continued)

CA-14.1.4 While the models recognition criteria described in this chapter are primarily intended for comprehensive Value-at-Risk (VaR) models, nevertheless, the same set of criteria will be applied, to the extent that it is appropriate, to other pre-processing or valuation models the output of which is fed into the standardised measurement system, e.g., interest rate sensitivity models (from which the residual positions are fed into the duration ladders) and option pricing models (for the calculation of the delta, gamma and vega sensitivities).

CA-14.1.5 As a number of strict conditions are required to be met before internal models can be recognised by the CBB, including external validation, banks which are contemplating applying internal models should submit their detailed written proposals for the CBB's approval, immediately upon receipt of these regulations.

CA-14.1.6 As the model approval process will encompass a review of both the model and its operating environment, it is not the case that a commercially produced model which is recognised for one bank will automatically be recognised for another bank.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.2 General criteria

CA-14.2.1 The CBB will give its approval for the use of internal models to measure market risks only if, in addition to the detailed requirements described later in this chapter, it is satisfied that the following general criteria are met:

- (a) that the bank's risk management system is conceptually sound and is implemented with integrity;
- (b) that the bank has, in the CBB's view, sufficient numbers of staff skilled in the use of sophisticated models not only in the trading area but also in the risk control, audit and the back office areas;
- (c) that the bank's models have, in the CBB's judgement, a proven track record of reasonable accuracy in measuring risk. The CBB recognises that the use of internal models is, for most banks in Bahrain, a relatively new development and, therefore, it is difficult to establish a track record of reasonable accuracy. The CBB, therefore, will require a period of initial monitoring and live testing of a bank's internal model before it is used for supervisory capital purposes; and
- (d) that the bank regularly conducts stress tests as outlined in section CA-14.7 and conducts back-testing as described in section CA-14.6.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.3 Qualitative standards

CA-14.3.1 In order to ensure that banks using models have market risk management systems that are conceptually sound and implemented with integrity, the CBB has set the following qualitative criteria that banks are required to meet before they are permitted to use the models-based approach for calculating capital charge. Apart from influencing the CBB's decision to permit a bank to use internal models, where such permission is granted, the extent to which the bank meets the qualitative criteria will further influence the level at which the CBB will set the multiplication factor for that bank, referred to in section CA-14.5. Only those banks whose models, in the CBB's judgement, are in full compliance with the qualitative criteria will be eligible for application of the minimum multiplication factor of 3. The qualitative criteria include the following:

- (a) The bank should have an independent risk management unit that is responsible for the design and implementation of the bank's risk management system. The unit should produce and analyse daily reports on the output of the bank's risk measurement model, including an evaluation of the relationship between the measures of risk exposure and the trading limits. This unit must be independent from the business trading units and should report directly to the senior management of the bank.
- (b) The independent risk management unit should conduct a regular back-testing programme, i.e. an ex-post comparison of the risk measure generated by the model against the actual daily changes in portfolio value over longer periods of time, as well as hypothetical changes based on static positions. See CA-14.5.1 (j).
- (c) The unit should also conduct the initial and on-going validation of the internal model. Further guidance on validation of internal models is given in section CA-14.12.
- (d) The board of directors and senior management of the bank should be actively involved in the risk management process and must regard such process as an essential aspect of the business to which significant resources need to be devoted. In this regard, the daily reports prepared by the independent risk management unit must be reviewed by a level of management with sufficient seniority and authority to enforce both reductions of positions taken by individual traders and reductions in the bank's overall risk exposure.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.3 Qualitative standards (continued)

- (e) The bank's internal model must be closely integrated into the day-to-day risk management process of the bank. Its output should, accordingly, be an integral part of the process of planning, monitoring and controlling the bank's market risk profile.
- (f) The risk measurement system should be used in conjunction with the internal trading and exposure limits. In this regard, the trading limits should be related to the bank's risk measurement model in a manner that is consistent over time and that is well-understood by both traders and senior management.
- (g) A routine and rigorous programme of stress testing, along the general lines set out in section CA-14.6, should be in place as a supplement to the risk analysis based on the day-to-day output of the bank's risk measurement model. The results of stress testing should be reviewed periodically by senior management and should be reflected in the policies and limits set by management and the board of directors. Where stress tests reveal particular vulnerability to a given set of circumstances, prompt steps should be taken to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of the bank's exposures).
- (h) The bank should have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operation of the risk measurement system. The bank's risk measurement system must be well documented, for example, through a risk management manual that describes the basic principles of the risk management system and that provides an explanation of the empirical techniques used to measure market risk.
- (i) An independent review of the risk measurement system should be carried out regularly in the bank's own internal auditing process. This review should include both the activities of the business trading units and of the independent risk management unit. A review, by the internal auditor, of the overall risk management process should take place at regular intervals (ideally not less than once every six months) and should specifically address, at a minimum:
 - the adequacy of the documentation of the risk management system and process;



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.3 Qualitative standards (continued)

- the organisation of the risk management unit;
- the integration of market risk measures into daily risk management;
- the approval process for risk pricing models and valuation systems used by front- and back-office personnel;
- the validation of any significant changes in the risk measurement process;
- the scope of market risks captured by the risk measurement model;
- the integrity of the management information system;
- the accuracy and completeness of position data;
- the verification of the consistency, timeliness and reliability of data sources used to run internal models, including the independence of such data sources;
- the accuracy and appropriateness of volatility and correlation assumptions;
- the accuracy of valuation and risk transformation calculations;
- the verification of the model's accuracy through frequent back-testing as described in (b) above and in the Appendix 15.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.4 Specification of market risk factors

CA-14.4.1 An important part of a bank's internal market risk measurement system is the specification of an appropriate set of market risk factors, i.e. the market rates and prices that affect the value of the bank's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in the bank's portfolio of on- and off-balance-sheet trading positions. Banks should follow the CBB's guidelines, set out below, for specifying the risk factors for their internal models. Where a bank has difficulty in specifying the risk factors for any currency or market within a risk category, in accordance with the following guidelines, the bank should immediately contact the CBB. The CBB will review and discuss the specific circumstances of each such case with the concerned bank, and will decide alternative methods of calculating the risks which are not captured by the bank's model.

(a) For interest rates:

- There should be a set of risk factors corresponding to interest rates in each currency in which the bank has interest-rate-sensitive on- or off-balance-sheet positions.
- The risk measurement system should model the yield curve using one of a number of generally accepted approaches, for example, by estimating forward rates of zero coupon yields. The yield curve should be divided into various maturity segments in order to capture variation in the volatility of rates along the yield curve; there will typically be one risk factor corresponding to each maturity segment. For material exposures to interest rate movements in the major currencies and markets, banks must model the yield curve using a minimum of six factors. However, the number of risk factors used should ultimately be driven by the nature of the bank's trading strategies. For instance, a bank which has a portfolio of various types of securities across many points of the yield curve and which engages in complex arbitrage strategies would require a greater number of risk factors to capture interest rate risk accurately.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.4 Specification of market risk factors (continued)

- The risk measurement system must incorporate separate risk factors to capture spread risk (e.g. between bonds and swaps). A variety of approaches may be used to capture the spread risk arising from less than perfectly correlated movements between government and other fixed-income interest rates, such as specifying a completely separate yield curve for non-government fixed-income instruments (for instance, swaps or municipal securities) or estimating the spread over government rates at various points along the yield curve.

(b) For exchange rates (which includes gold):

- The risk measurement system should incorporate risk factors corresponding to the individual foreign currencies in which the bank's positions are denominated. Since the value-at-risk figure calculated by the risk measurement system will be expressed in the bank's reporting currency, any net position denominated in a currency other than the reporting currency will introduce a foreign exchange risk. Thus, there must be risk factors corresponding to the exchange rate between the reporting currency and each other currency in which the bank has a significant exposure.

(c) For equity prices:

- There should be risk factors corresponding to each of the equity markets in which the bank holds significant positions.
- At a minimum, there should be a risk factor that is designed to capture market-wide movements in equity prices (e.g., a market index). Positions in individual securities or in sector indices may be expressed in "beta-equivalents" relative to this market-wide index.
- A somewhat more detailed approach would be to have risk factors corresponding to various sectors of the overall equity market (for instance, industry sectors or cyclical and non-cyclical sectors). As above, positions in individual stocks within each sector could be expressed in "beta-equivalents" relative to the sector index.
- The most extensive approach would be to have risk factors corresponding to the volatility of individual equity issues.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.4 Specification of market risk factors (continued)

- The sophistication and nature of the modelling technique for a given market should correspond to the bank's exposure to the overall market as well as its concentration in individual equity issues in that market.

(d) For commodity prices:

- There should be risk factors corresponding to each of the commodity markets in which the bank holds significant positions (also see section CA-12.1).
- For banks with relatively limited positions in commodity-based instruments, a straight-forward specification of risk factors is acceptable. Such a specification would likely entail one risk factor for each commodity price to which the bank is exposed. In cases where the aggregate positions are reasonably small, it may be acceptable to use a single risk factor for a relatively broad sub-category of commodities (for instance, a single risk factor for all types of oil). However, banks which propose to use this simplified approach should obtain the prior written approval of the CBB.
- For more active trading, the model should also take account of variation in the “convenience yield” between derivatives positions such as forwards and swaps and cash positions in the commodity.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.5 Quantitative standards

CA-14.5.1 The following minimum quantitative standards will apply for the purpose of calculating the capital charge.

- (a) "Value-at-risk" must be computed on a daily basis.
- (b) In calculating the value-at-risk, a 99th percentile, one-tailed confidence interval is to be used.
- (c) In calculating the value-at-risk, an instantaneous price shock equivalent to a 10-day movement in prices is to be used, i.e., the minimum "holding period" will be ten trading days. Banks may use value-at-risk numbers calculated according to shorter holding periods scaled up to ten days by the square root of time (for the treatment of options, also see (h) below).
- (d) The minimum historical observation period (sample period) for calculating value-at-risk is one year. For banks which use a weighting scheme or other methods for the historical observation period, the "effective" observation period must be at least one year (i.e., the weighted average time lag of the individual observations cannot be less than 6 months).

The CBB may, as an exceptional case, require a bank to calculate its value-at-risk applying a shorter observation period if, in the CBB's judgement, this is justified by a significant upsurge in price volatility.
- (e) Banks must update their data sets no less frequently than once every week and should also reassess them whenever market prices are subject to material changes.
- (f) No particular type of model is prescribed by the CBB. So long as each model used captures all the material risks run by the bank, as set out in section CA-14.4, banks will be free to use models based, for example, on variance-covariance matrices, historical simulations, or Monte Carlo simulations.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.5 Quantitative standards (continued)

- (g) Banks shall have discretion to recognise empirical correlations within broad risk categories (i.e., interest rates, exchange rates, equity prices and commodity prices, including related options volatilities in each risk factor category). Banks are not permitted to recognise empirical correlations across broad risk categories without the prior approval of the CBB. Banks may apply, on a case-by-case basis, for empirical correlations across broad risk categories to be recognised by the CBB, subject to its satisfaction with the soundness and integrity of the bank's system for measuring those correlations.
- (h) Banks' models must accurately capture the unique risks associated with options within each of the broad risk categories. The following criteria shall apply to the measurement of options risk:
- banks' models must capture the non-linear price characteristics of options positions;
 - banks are expected to ultimately move towards the application of a full 10-day price shock to options positions or positions that display option-like characteristics. In the interim period, banks may adjust their capital measure for options risk through other methods, e.g., periodic simulations or stress testing;
 - each bank's risk measurement system must have a set of risk factors that captures the volatilities of the rates and prices underlying the option positions, i.e., vega risk. Banks with relatively large and/or complex options portfolios should have detailed specifications of the relevant volatilities. This means that banks must measure the volatilities of options positions broken down by different maturities.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.5 Quantitative standards (continued)

- (i) Each bank must meet, on a daily basis, a capital requirement expressed as the higher of (1) and (2) below, multiplied by a multiplication factor (see (j) below):
1. its previous day's value-at-risk number measured according to the parameters specified in (a) to (h) above; and
 2. an average of the daily value-at-risk measures on each of the preceding sixty business days.
- (j) The multiplication factor will be set by the CBB, separately for each individual bank, on the basis of the CBB's assessment of the quality of the bank's risk management system, subject to an absolute minimum of 3. Banks must add to the factor set by the CBB, a "plus" directly related to the ex-post performance of the model, thereby introducing a built-in positive incentive to maintain the predictive quality of the model. The plus will range from 0 to 1 based on the outcome of the bank's back-testing. If the back-testing results are satisfactory and the bank meets all of the qualitative standards referred in section CA-14.3 above, the plus factor could be zero. Appendix 15 presents in detail the approach to be followed for back-testing and the plus factor. Banks are expected to strictly comply with this approach.
- (k) As stated earlier in section CA-14.1, banks applying models will also be subject to a capital charge to cover specific risk (as defined under the standardised approach) of interest rate related instruments and equity instruments. The manner in which the specific risk capital charge is to be calculated is set out in section CA-14.10.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.6 Back-testing

CA-14.6.1 The contents of this section outline the key requirements as set out in Appendix 15. The appendix presents in detail the approach to be followed for back-testing by the banks.

Key requirements

CA-14.6.2 The contents of this paper lay down recommendations for carrying out back-testing procedures in order to determine the accuracy and robustness of bank's internal models for measuring market risk capital requirements. These back-testing procedures typically consist of a periodic comparison of the bank's daily value-at-risk measures with the subsequent daily profit or loss ("trading outcome"). The procedure involves calculating and identifying the number of times over the prior 250 business days that observed daily trading losses exceed the bank's one-day, 99% confidence level VaR estimate (so-called "exceptions").

CA-14.6.3 Based on the number of exceptions identified from the back-testing procedures, the banks will be classified into three exception categories for the determination of the "scaling factor" to be applied to the banks' market risk measure generated by its internal models. The three categories, termed as zones and distinguished by colours into a hierarchy of responses, are listed below:

- (a) Green zone
- (b) Yellow zone
- (c) Red zone

CA-14.6.4 The green zone corresponds to back-testing results that do not themselves suggest a problem with the quality or accuracy of a bank's internal model. The yellow zone encompasses results that do raise questions in this regard, but where such a conclusion is not definitive. The red zone indicates a back-testing result that almost certainly indicates a problem with a bank's risk model.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.6 Back-testing (continued)

CA-14.6.5 The corresponding “scaling factors” applicable to banks falling into respective zones based on their back-testing results are shown in Table 2 of the Appendix 15.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.7 Stress testing

- CA-14.7.1 Banks that use the internal models approach for calculating market risk capital requirements must have in place a rigorous and comprehensive stress testing programme. Stress testing to identify events or influences that could greatly impact the bank is a key component of a bank's assessment of its capital position.
- CA-14.7.2 Banks' stress scenarios need to cover a range of factors that can create extraordinary losses or gains in trading portfolios, or make the control of risk in those portfolios very difficult. These factors include low-probability events in all major types of risks, including the various components of market, credit and operational risks. Stress scenarios need to shed light on the impact of such events on positions that display both linear and non-linear characteristics (i.e., options and instruments that have option-like characteristics).
- CA-14.7.3 Banks' stress tests should be both of a quantitative and qualitative nature, incorporating both market risk and liquidity aspects of market disturbances. Quantitative criteria should identify plausible stress scenarios to which banks could be exposed. Qualitative criteria should emphasise that two major goals of stress testing are to evaluate the capacity of the bank's capital to absorb potential large losses and to identify steps the bank can take to reduce its risk and conserve capital. This assessment is integral to setting and evaluating the bank's management strategy and the results of stress testing should be routinely communicated to senior management and, periodically, to the bank's board of directors.
- CA-14.7.4 Banks must combine the use of stress scenarios as advised under (a), (b) and (c) below by the CBB, with stress tests developed by the banks themselves to reflect their specific risk characteristics. The CBB may ask banks to provide information on stress testing in three broad areas, as discussed below.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.7 Stress testing (continued)

(a) *Scenarios requiring no simulation by the bank*

Banks must have information on the largest losses experienced during the reporting period available for review by the CBB. This loss information will be compared with the level of capital that results from a bank's internal measurement system. For example, it could provide the CBB with a picture of how many days of peak day losses would have been covered by a given value-at-risk estimate.

(b) *Scenarios requiring simulation by the bank*

Banks must subject their portfolios to a series of simulated stress scenarios and provide the CBB with the results. These scenarios could include testing the current portfolio against past periods of significant disturbance, for example, the 9/11 attacks on the USA, the 1987 equity market crash, the ERM crises of 1992 and 1993 or the fall in the international bond markets in the first quarter of 1994, the Far East and ex-Soviet bloc equity crises of 1997-99 and the collapse of the TMT equities market of 2000-01 incorporating both the large price movements and the sharp reduction in liquidity associated with these events. A second type of scenario would evaluate the sensitivity of the bank's market risk exposure to changes in the assumptions about volatilities and correlations. Applying this test would require an evaluation of the historical range of variation for volatilities and correlations and evaluation of the bank's current positions against the extreme values of the historical range. Due consideration should be given to the sharp variation that, at times, has occurred in a matter of days in periods of significant market disturbance. The market events, cited above as examples, all involved correlations within risk factors approaching the extreme values of 1 and -1 for several days at the height of the disturbance.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.7 Stress testing (continued)

- (c) *Scenarios developed by the bank to capture the specific characteristics of its portfolio*

In addition to the general scenarios prescribed by the CBB under (a) and (b) above, each bank must also develop its own stress scenarios which it identifies as most adverse based on the characteristics of its portfolio (e.g., any significant political or economic developments that may result in a sharp move in oil prices). Banks must provide the CBB with a description of the methodology used to identify and carry out the scenarios as well as with a description of the results derived from these stress tests.

- CA-14.7.5 Once a stress scenario has been identified, it should be used for conducting stress tests at least once every quarter, as long as the scenario continues to be relevant to the bank's portfolio.

- CA-14.7.6 The results of all stress tests should be reviewed by senior management within 15 days from the time they are available, and should be promptly reflected in the policies and limits set by management and the board of directors. Moreover, if the testing reveals particular vulnerability to a given set of circumstances, the CBB would expect the bank to take prompt steps to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of its exposures).



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.8 External validation of models

CA-14.8.1 Before granting its approval for the use of internal models by a bank, the CBB will require that the models are validated by both the internal and external auditors of the bank. The CBB will review the validation procedures performed by the internal and external auditors, and may independently carry out further validation procedures.

CA-14.8.2 The internal validation procedures to be carried out by the internal auditors are set out in section CA-14.3. As stated in that section, the internal auditor's review of the overall risk management process should take place at regular intervals (not less than once every six months). The internal auditor shall make a report to senior management and the board of directors, in writing, of the results of the validation procedures. The report shall be made available to the CBB for its review.

CA-14.8.3 The validation of the models by the external auditors should include, at a minimum, the following steps:

- (a) verifying and ensuring that the internal validation processes described in section CA-14.3 are operating satisfactorily;
- (b) ensuring that the formulae used in the calculation process as well as for the pricing of options and other complex instruments are validated by a qualified unit, which in all cases should be independent from the trading area;
- (c) checking and ensuring that the structure of the internal models is adequate with respect to the bank's activities and geographical coverage;
- (d) checking the results of the bank's back-testing of its internal measurement system (i.e., comparing value-at-risk estimates with actual profits and losses) to ensure that the model provides a reliable measure of potential losses over time; and
- (e) making sure that data flows and processes associated with the risk measurement system are transparent and accessible.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.8 External validation of models (continued)

CA-14.8.4 The external auditors should carry out their validation/review procedures, at a minimum, once every year. Based on the above procedures, the external auditors shall make a report, in writing, on the accuracy of the bank's models, including all significant findings of their work. The report shall be addressed to the senior management and/or the board of directors of the bank, and a copy of the report shall be made available to the CBB. The mandatory annual review by the external auditors shall be carried out during the third quarter of the calendar year, and the CBB expects to receive their final report by 30 September of each year. The results of additional validation procedures carried out by the external auditors at other times during the year, should be made available to the CBB promptly.

CA-14.8.5 Banks are required to ensure that external auditors and the CBB's representatives are in a position to have easy access, whenever they judge it necessary and under appropriate procedures, to the models' specifications and parameters as well as to the results of, and the underlying inputs to, their value-at-risk calculations.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.9 Letter of model recognition

CA-14.9.1 As stated in section CA-14.1, banks which propose to use internal models for the calculation of their market risk capital requirements should submit their detailed proposals, in writing, to the CBB. The CBB will review these proposals, and upon ensuring that the bank's internal models meet all the criteria for recognition set out earlier in this chapter, and after satisfying itself with the results of validation procedures carried out by the internal and external auditors and/or by itself, will issue a letter of model recognition to the bank.

CA-14.9.2 The letter of model recognition should be specific. It will set out the products covered, the method for calculating capital requirements on the products and the conditions of model recognition. In the case of pre-processing models, the bank will also be told how the output of recognised models should feed into the processing of other interest rate, equity, foreign exchange and commodities risk. The conditions of model recognition may include additional reporting requirements. The CBB's prior written approval should be obtained for any modifications proposed to be made to the models previously recognised by the CBB. In cases where a bank proposes to apply the model to new but similar products, there will be a requirement to obtain the CBB's prior approval. In some cases, the CBB may be able to give provisional approval for the model to be applied to a new class of products, in others it will be necessary to revisit the bank.

CA-14.9.3 The CBB may withdraw its approval granted for any bank's model if it believes that the conditions based on which the approval was granted are no longer valid or have changed significantly.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.10 Combination of internal models and the standardised methodology

CA-14.10.1 Unless a bank's exposure to a particular risk factor is insignificant, the internal models approach will, in principle, require banks to have an integrated risk measurement system that captures the broad risk factor categories (i.e., interest rates, exchange rates (which includes gold), equity prices and commodity prices, with related options volatilities being included in each risk factor category). Thus, banks which start to use models for one or more risk factor categories will, over a reasonable period of time, be expected to extend the models to all their market risks.

CA-14.10.2 A bank which has obtained the CBB's approval for the use of one or more models will no longer be able to revert to measuring the risk measured by those models according to the standardised methodology (unless the CBB withdraws its approval for the model(s), as explained in section CA-14.9). However, what constitutes a reasonable period of time for an individual bank which uses a combination of internal models and the standardised methodology to move to a comprehensive model, will be decided by the CBB after taking into account the relevant circumstances of the bank.

CA-14.10.3 Notwithstanding the goal of moving to comprehensive internal models as set out in paragraph CA-14.10.1 above, for banks which, for the time being, will be applying a combination of internal models and the standardised methodology, the following conditions will apply:

- (a) each broad risk factor category must be assessed by applying a single approach (either internal models or the standardised approach), i.e., no combination of the two methods will, in principle, be permitted within a risk factor category or across a bank's different entities for the same type of risk (see, however, the transitional provisions in section CA-A.4)⁸⁰;
- (b) all of the criteria laid down in this chapter will apply to the models being used;

⁸⁰ However, banks may incur risks in positions which are not captured by their models, for example, in minor currencies or in negligible business areas. Such risks should be measured according to the standard methodology.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.10 Combination of internal models and the standardised methodology (continued)

- (c) banks may not modify the combination of the two approaches which they are applying, without justifying to the CBB that they have a valid reason for doing so, and obtaining the CBB's prior written approval;
- (d) no element of market risk may escape measurement, i.e. the exposure for all the various risk factors, whether calculated according to the standardised approach or internal models, would have to be captured; and
- (e) the capital charges assessed under the standardised approach and under the models approach should be aggregated applying the simple sum method.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.11 Treatment of specific risk

CA-14.11.1 Banks applying models will be permitted to base their specific risk capital charge on modelled estimates if they meet all of the qualitative and quantitative requirements for general risk models as well as the additional criteria set out in paragraph CA-14.11.2. Banks which are unable to meet these additional criteria will be required to base their specific risk capital charge on the full amount of the specific risk charge calculated by the standardised methodology (as illustrated in chapters CA-9 to CA-13).

CA-14.11.2 The criteria for applying modelled estimates of specific risk require that a bank's model:

- explain the historical price variation in the portfolio⁸¹;
- demonstrably capture concentration (magnitude and changes in composition)⁸²;
- be robust to an adverse environment⁸³; and
- be validated through back-testing aimed at assessing whether specific risk is being accurately captured.

In addition, the bank must be able to demonstrate that it has methodologies in place which allow it to adequately capture event and default risk for its traded debt and equity positions.

⁸¹ The key measurement of model quality are “goodness-of-fit” measures which address the question of how much of the historical variation in price value is explained by the model. One measure of this type which can often be used is an R-squared measure from regression methodology. If this measure is to be used, the bank’s model would be expected to be able to explain a high percentage, such as 90%, of the historical price variation or to explicitly include estimates of the residual variability not captured in the factors included in this regression. For some types of model, it may not be feasible to calculate a goodness-of-fit measure. In such an instance, a bank is expected to contact the CBB to define an acceptable alternative measure which would meet this regulatory objective.

⁸² The bank should be expected to demonstrate that the model is sensitive to changes in portfolio construction and that higher capital charges are attracted for portfolios that have increasing concentrations.

⁸³ The bank should be able to demonstrate that the model will signal rising risk in an adverse environment. This could be achieved by incorporating in the historical estimation period of the model at least one full credit cycle and ensuring that the model would not have been inaccurate in model at least one full the downward portion of the cycle. Another approach for demonstrating this is through simulation of historical or plausible worst-case environments.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.11 Treatment of specific risk (continued)

CA-14.11.3 Banks which meet the criteria set out above for models but do not have methodologies in place to adequately capture event and default risk will be required to calculate their specific risk capital charge based on the internal model measurements plus an additional prudential surcharge as defined in paragraph CA-14.11.4. The surcharge is designed to treat the modelling of specific risk on the same basis as a general market risk model that has proven deficient during back-testing. That is the equivalent of a scaling factor of four would apply to the estimate of specific risk until such time as a bank can demonstrate that the methodologies it uses adequately capture event and default risk. Once a bank is able to demonstrate this, the minimum multiplication factor of three can be applied. However, a higher multiplication factor of four on the modelling of specific risk would remain possible if future back-testing results were to indicate a serious deficiency in the model.

CA-14.11.4 For banks applying the surcharge, the total market risk measure will equal a minimum of three times the internal model's general and specific risk measure plus a surcharge in the amount of either;

- (a) the specific risk portion of the value-at-risk measure which should be isolated⁸⁴; or, at the bank's option,
- (b) the value-at-risk measures of sub-portfolios of debt and equity positions that contain specific risk⁸⁵.

⁸⁴ Techniques for separating general market risk and specific risk would include the following:

Equities:

The market should be identified with a single factor that is representative of the market as a whole, for example, a widely accepted broadly based stock index for the country concerned.

Banks that use factor models may assign one factor of their model, or a single linear combination of factors, as their general market risk factor.

Bonds:

The market should be identified with a reference curve for the currency concerned. For example, the curve might be a government bond yield curve or a swap curve; in any case, the curve should be based on a well-established and liquid underlying market and should be accepted by the market as a reference curve for the currency concerned.

Banks may select their own technique for identifying the specific risk component of the value-at-risk measure for purposes of applying the multiplier of 4. Techniques would include:

- Using the incremental increase in value-at-risk arising from the modelling of specific risk factors;
- Applying the difference between the value-at-risk measure and a measure calculated by substituting each individual equity position by a representative index; or
- Applying an analytic separation between general market risk and specific risk by a particular model.

⁸⁵ This would apply to sub-portfolios containing positions that would be subject to specific risk under the standardised approach.



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.11 Treatment of specific risk (continued)

Banks applying option (b) above are required to identify their sub-portfolios structure ahead of time and should not change it without the CBB's prior written consent.

CA-14.11.5 Banks which apply modelled estimates of specific risk are required to conduct back-testing aimed at assessing whether specific risk is being accurately captured. The methodology a bank must use for validating its specific risk estimates is to perform separate back-tests on sub-portfolios using daily data on sub-portfolios subject to specific risk. The key sub-portfolios for this purpose are traded debt and equity positions. However, if a bank itself decomposes its trading portfolio into finer categories (e.g., emerging markets, traded corporate debt, etc.), it is appropriate to keep these distinctions for sub-portfolio back-testing purposes. Banks are required to commit to a sub-portfolio structure and stick to it unless it can be demonstrated to the CBB that it would make sense to change the structure.

CA-14.11.6 Banks are required to have in place a process to analyse exceptions identified through the back-testing of specific risk. This process is intended to serve as the fundamental way in which banks correct their models of specific risk in the event they become inaccurate. There will be a presumption that models that incorporate specific risk are "unacceptable" if the results at the sub-portfolio level produce a number of exceptions commensurate with the Red Zone⁸⁶. Banks with "unacceptable" specific risk models are expected to take immediate action to correct the problem in the model and to ensure that there is a sufficient capital buffer to absorb the risk that, the back-test showed, had not been adequately captured.

⁸⁶ As defined in the Basel Committee's document titled "Supervisory framework for the use of back-testing in conjunction with the internal models approach to market risk capital requirements".



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.12 Model validation standards

CA-14.12.1 It is important that banks have processes in place to ensure that their internal models have been adequately validated by suitably qualified parties independent of the development process to ensure that they are conceptually sound and adequately capture all material risks. This validation should be conducted when the model is initially developed and when any significant changes are made to the model. The validation should also be conducted on a periodic basis but especially where there have been any significant structural changes in the market or changes to the composition of the portfolio which might lead to the model no longer being adequate. More extensive model validation is particularly important where specific risk is also modelled and is required to meet the further specific risk criteria. As techniques and best practices evolve, banks must avail themselves of these advances. Model validation should not be limited to back-testing, but should, at a minimum, also include the following:

- (a) Tests to demonstrate that any assumptions made within the internal model are appropriate and do not underestimate risk. This may include the assumption of the normal distribution, the use of the square root of time to scale from a one day holding period to a 10 day holding period or where extrapolation or interpolation techniques are used, or pricing models;
- (b) Further to the regulatory back-testing programmes, testing for model validation should be carried out using additional tests, which may include, for instance:
 - Testing carried out using hypothetical changes in portfolio value that would occur were end-of-day positions to remain unchanged. It therefore excludes fees, commissions, bid-ask spreads, net interest income and intra-day trading;
 - Testing carried out for longer periods than required for the regular back-testing programme (e.g. 3 years). The longer time period generally improves the power of the back-testing. A longer time period may not be desirable if the VaR model or market conditions have changed to the extent that historical data is no longer relevant;
 - Testing carried out using confidence intervals other than the 99 percent interval required under the quantitative standards;
 - Testing of portfolios below the overall bank level;
- (c) The use of hypothetical portfolios to ensure that the model is able to account for particular structural features that may arise, for example:



MODULE	CA: Capital Adequacy
CHAPTER	CA 14: Market Risk - Use of internal models

CA-14.12 Model validation standards (continued)

- Where data histories for a particular instrument do not meet the quantitative standards and where the bank has to map these positions to proxies, then the bank must ensure that the proxies produce conservative results under relevant market scenarios;
- Ensuring that material basis risks are adequately captured. This may include mismatches between long and short positions by maturity or by issuer;
- Ensuring that the model captures concentration risk that may arise in an undiversified portfolio.