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 Conventional bank licensees are encouraged to move towards standardised approach as they develop more sophisticated operational risk measurement systems and practices.

CA-7.1.3 **A conventional bank licensee 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 conventional bank licensee using standardised approach no longer meets the qualifying criteria for standardised approach, it may require the conventional bank licensee 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 **Conventional bank licensees 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.[59] The charge may be expressed as follows:**

$$K_{BIA} = [\sum (GI_{1..n}\, \alpha)]/n$$

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.

[59] If negative gross income distorts a bank's Pillar 1 capital charge, CBB will consider appropriate supervisory action.

CA-7.1 The Measurement Methodologies (continued)

CA-7.1.5 Gross income is defined as net interest income plus net non-interest income.[60] 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 providers[61]; (iii) exclude realised profits/losses from the sale of securities in the banking book;[62] 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 Conventional bank licensees applying this approach are encouraged to comply with the principles set in Section OM-8.2 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 conventional bank licensee must meet the requirements detailed in Section OM-8.3 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.**

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[60] As defined under International Financial Reporting Standards as applicable in the Kingdom of Bahrain.

61 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.

62 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.

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.[63] The total capital charge may be expressed as:

$$K_{TSA} = \{\sum_{\text{years } 1\text{-}3} \max[(GI_{1\text{-}8} \times \beta_{1\text{-}8}, 0]\ \}/3$$

where:

K_{TSA} = the capital charge under the Standardised Approach

$GI_{1\text{-}8}$ = annual gross income in a given year, as defined above in the Basic Indicator Approach, for each of the eight business lines

$\beta_{1\text{-}8}$ = 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%

[63] 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.

CA-8.1 Definition of the Trading Book

CA-8.1.1 Market risk" is defined as the risk of losses in on- and off-balance sheet positions arising from movements in market prices. The risks that are subject to the market risk capital requirement are:

(a) Equity position risk in the trading book (see Chapter CA-10);[6]
(b) Interest rate risk in trading positions in financial instruments in the trading book (see Chapter CA-9);
(c) Foreign exchange risk (see Chapter CA-11); and
(d) Commodities risk (see Chapter CA-12).

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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, along with open foreign exchange positions in both the banking and 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 (open equity stakes in hedge funds, private equity investments, positions in a securitisation warehouse and real estate holdings do not meet the definition of the 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 conventional bank licensee's banking book and treated as equity holding in corporates, except real estate 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. It is therefore possible that conventional bank licensees may sometimes not have a trading book as defined above. Nonetheless the conventional bank licensee's strategy and business plan must take account of the requirements of this Chapter in case a conventional bank licensee does take on positions with trading intent.

[6] Equity positions in the banking book are dealt with under paragraph CA-3.2.26.

CA-8.1 Definition of the Trading Book (continued)

CA-8.1.5 Conventional bank licensees 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 conventional bank licensee's risk management capabilities and practices. The conventional bank licensee must have well-documented procedures to comply with stated policies, which must be fully documented and subject to periodic internal audit.

CA-8.1.6 These policies and procedures must, at a minimum, address the following general considerations:

(a) The activities the conventional bank licensee 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 conventional bank licensee 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 conventional bank licensee 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 conventional bank licensee's ability to effect an immediate liquidation of the exposure;

(f) The extent to which the conventional bank licensee is required to, and can, actively risk manage the exposure within its trading operations; and

(g) The extent to which the conventional bank licensee 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 conventional bank licensee's trading book.

CA-8.1 Definition of the Trading Book (Continued)

CA-8.1.7 **The basic requirements for positions eligible to receive trading book capital treatment are as follows:**

(a) Clearly documented trading strategy for the position/instrument or portfolios, approved by senior management (which would include expected holding horizon);

(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 conventional bank licensee's trading strategy including the monitoring of turnover and stale positions in the conventional bank licensee's trading book.

CA-8.1.8 When a conventional bank licensee 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 conventional bank licensee 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-8.1.8.A **Positions in the conventional bank licensee's own regulatory capital instruments are deducted from capital (as detailed in Chapter CA-2 of this module). Positions in other conventional bank licensees', securities firms', and other financial entities' eligible regulatory capital instruments, as well as intangible assets, are subject to the treatment set down in Chapter CA-2 of this Module (see also Module PCD for additional details on consolidation treatment of such investments).**

CA-8.1 Definition of the Trading Book (Continued)

CA-8.1.9 Term trading-related repo-style transactions that a conventional bank licensee accounts for in its banking book may be included in the conventional bank licensee'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.

CA-8.1.11 For the purposes of this framework, the correlation trading portfolio incorporates securitisation exposures and n-th-to-default credit derivatives that meet the following criteria:

(a) The positions are neither re-securitisation positions, nor derivatives of securitisation exposures that do not provide a pro-rata share in the proceeds of a securitisation tranche (this therefore excludes options on a securitisation tranche, or a synthetically leveraged super-senior tranche); and

(b) All reference entities are single-name products, including single-name credit derivatives, for which a liquid two-way market exists. This will include commonly traded indices based on these reference entities. A two-way market is deemed to exist where there are independent bona fide offers to buy and sell so that a price reasonably related to the last sales price or current bona fide competitive bid and offer quotations can be determined within one day and settled at such price within a relatively short time conforming to trade custom.

Positions which reference an underlying that would be treated as a retail exposure, a residential mortgage exposure or a commercial mortgage exposure under the standardised approach to credit risk are not included in the correlation trading portfolio. Positions which reference a claim on a special purpose entity are not included either. A conventional bank licensee may also include in the correlation trading portfolio positions that hedge the positions described above and which are neither securitisation exposures nor n-th-to-default credit derivatives and where a liquid two-way market as described above exists for the instrument or its underlyings.

CA-8.2 [This Chapter has been moved to Chapter CA-16 in January 2012]

CA-8.3 Treatment of Counterparty Credit Risk in the Trading Book

CA-8.3.1 Conventional bank licensees 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.[65] 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, conventional bank licensees must use the standardised approach risk weights in the trading book.

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 conventional bank licensees 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 must follow the rules in Paragraphs CA-4.3.3 to CA-4.3.25 and Appendix CA-2.

Credit Derivatives

CA-8.3.5 The counterparty credit risk charge for single name credit derivative transactions in the trading book must be calculated applying the following potential future exposure add-on factors:

[65] The treatment for unsettled foreign exchange and securities trades is set forth in Paragraph CA-3.3.13.

CA-8.3 Treatment of Counterparty Credit Risk in the Trading Book (continued)

	Protection buyer	eller
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 treatment of specific risk in chapter CA-9.

** The protection seller of a credit default swap is only 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 must 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 is 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 is used. For second and subsequent to default transactions, underlying assets must continue to be allocated according to the credit quality, i.e. the second lowest credit quality determines the add-on for a second to default transaction etc.

CA-9.1 Introduction

CA-9.1.1 This chapter describes the standardised approach for the measurement of the interest rate risk in the conventional bank licensee'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 conventional bank licensees, 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 instruments[66];
(d) Mortgage backed securities and other securitised assets[67];
(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.

CA-9.1.3 **A security which is the subject of a repurchase or securities lending agreement must be treated as if it were still owned by the lender of the security, i.e. it is treated in the same manner as other securities positions.**

[66] 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.

[67] 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.

CA-9.1 Introduction (continued)

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 security, whether it is a short or a long position, and the other to the interest rate risk in the portfolio (termed "general market risk") where long and short positions in different securities or instruments can be offset. The conventional bank licensees must, however, determine the specific risk capital charge for the correlation trading portfolio as follows: The conventional bank licensee computes (i) the total specific risk capital charges that would apply just to the net long positions from the net long correlation trading exposures combined, and (ii) the total specific risk capital charges that would apply just to the net short positions from the net short correlation trading exposures combined. The larger of these total amounts is then the specific risk capital charge for the correlation trading portfolio.**

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. Conventional bank licensees 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 **Conventional bank licensees which have the intention and capability to use internal models for the measurement of general interest rate 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. Conventional bank licensees 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.**

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 conventional bank licensee 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%

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 conventional bank licensee in the same currency, a 0% specific risk charge may be applied.

CA-9.2.5 **Central "government" debt instruments 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.

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.

Specific Risk Rules for Non-qualifying Issuers

CA-9.2.9 Instruments issued by a non-qualifying issuer 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 Specific Risk Calculation (continued)

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.

Specific Risk Rules for Positions Covered under the Securitisation Framework

CA-9.2.11A **The specific risk of securitisation positions as defined in Paragraphs CA-6.1.1 to CA-6.1.6 which are held in the trading book is to be calculated according to the method used for such positions in the banking book unless specified otherwise below. To that effect, the risk weight has to be calculated as specified below and applied to the net positions in securitisation instruments in the trading book. The total specific risk capital charge for the correlation trading portfolio is to be computed according to Paragraph CA-9.2.17, and the total specific risk capital charge for securitisation exposures is to be computed according to Paragraph CA-9.1.4.**

CA-9.2.11B **The specific risk capital charges for positions covered under the standardised approach for securitisation exposures are defined in the table below. These charges must be applied by conventional bank licensees using the standardised approach for credit risk. 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, a 1,250% risk weighting as defined in Paragraph CA-6.4.8 is required. A 1,250% weighting is also required for unrated positions with the exception of the circumstances described in Paragraphs CA-6.4.12 to CA-6.4.16. The operational requirements for the recognition of external credit assessments outlined in Paragraph CA-6.4.6 apply.**

CA-9.2 Specific Risk Calculation (continued)

Specific Risk Capital Charges under the Standardised Approach Based on External Credit Ratings

External Credit Assessment	AAA to AA- A-1/P-1	A+ to A- A-2/P-2	BBB+ BBB- A-3/P-3	BB+ to BB-	Below BB- and below A-3/P-3 or unrated
Securitisation Exposures	1.6%	4%	8%	28%	Deduction
Re-securitisation Exposures	3.2%	8%	18%	52%	Deduction

CA-9.2.11C **The specific risk capital charges for unrated positions under the securitisation framework as defined in Paragraphs CA-6.1.1 to CA-6.1.6 must be calculated as set out below, subject to CBB approval. The capital charge can be calculated as 12% of the weighted average risk weight that would be applied to the securitised exposures under the standardised approach, multiplied by a concentration ratio. If the concentration ratio is 12.5 or higher the position has to be deducted from capital as defined in Paragraph CA-6.4.2. This concentration ratio is equal to the sum of the nominal amounts of all the tranches divided by the sum of the nominal amounts of the tranches junior to or pari passu with the tranche in which the position is held including that tranche itself.**

The resulting specific risk capital charge must not be lower than any specific risk capital charge applicable to a rated more senior tranche. If a conventional bank licensee is unable to determine the specific risk capital charge as described above or prefers not to apply the treatment described above to a position, it must deduct that position from capital.

CA-9.2.11D A position subject to deduction according to Paragraphs CA-9.2.11B to CA-9.2.11C may be excluded from the calculation of the capital charge for general market risk.

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).[10]

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.

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 mismatch[11] between the credit protection and the underlying asset; or

(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.

[10] The maturity of the swap itself may be different from that of the underlying exposure.

[11] Currency mismatches should feed into the normal reporting of foreign exchange risk.

CA-9.2 Specific Risk Calculation (continued)

CA-9.2.16 In cases not captured in Paragraphs CA-9.2.12 to CA-9.2.14, a specific risk capital charge must be assessed against both sides of the position.

CA-9.2.17 An n-th-to-default credit derivative is a contract where the payoff is based on the n-th asset to default in a basket of underlying reference instruments. Once the n-th default occurs the transaction terminates and is settled:

(a) The capital charge for specific risk for a first-to-default credit derivative is the lesser of (1) the sum of the specific risk capital charges for the individual reference credit instruments in the basket, and (2) the maximum possible credit event payment under the contract. Where a conventional bank licensee has a risk position in one of the reference credit instruments underlying a first-to-default credit derivative and this credit derivative hedges the conventional bank licensee's risk position, the conventional bank licensee is allowed to reduce with respect to the hedged amount both the capital charge for specific risk for the reference credit instrument and that part of the capital charge for specific risk for the credit derivative that relates to this particular reference credit instrument. Where a conventional bank licensee has multiple risk positions in reference credit instruments underlying a first-to-default credit derivative this offset is allowed only for that underlying reference credit instrument having the lowest specific risk capital charge;

(b) The capital charge for specific risk for an n-th-to-default credit derivative with n greater than one is the lesser of (1) the sum of the specific risk capital charges for the individual reference credit instruments in the basket but disregarding the (n-1) obligations with the lowest specific risk capital charges; and (2) the maximum possible credit event payment under the contract. For n-th-to-default credit derivatives with n greater than 1 no offset of the capital charge for specific risk with any underlying reference credit instrument is allowed;

(c) If a first or other n-th-to-default credit derivative is externally rated, then the protection seller must calculate the specific risk capital charge using the rating of the derivative and apply the respective securitisation risk weights as specified in Paragraph CA-9.2.11B; and

(d) The capital charge against each net n-th-to-default credit derivative position applies irrespective of whether the conventional bank licensee has a long or short position, i.e. obtains or provides protection.

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 conventional bank licensee 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.

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.**

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.

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.

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.

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, conventional bank licensees 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 Conventional bank licensees 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.

CA-9.5 Duration Method (continued)

CA-9.5.3 Where a conventional bank licensee has chosen to use the duration method, it is possible that it will not be suitable for certain instruments. In such cases, the conventional bank licensee 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 conventional bank licensee 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 conventional bank licensee will calculate, for each debt instrument, the modified duration (M) on the basis of the following formula:

$$M = \frac{D}{(1+r)}$$

where,

$$D \text{ (duration)} = \frac{\sum_{t=} \frac{t \times C}{(1+r)^t}}{\sum_{t=} \frac{C}{(1+r)^t}}$$

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

(c) 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;

CA-9.5 Duration Method (continued)

(d) The conventional bank licensee must 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;

(e) 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.

(f) 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.

(g) 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.

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.

(h) Any residual unmatched weighted positions, following the matching within and between maturity bands and zones as described above, will be summed; and

(i) 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.

CA-9.6 Derivatives

CA-9.6.1 **Conventional bank licensees which propose to use internal models to measure the interest rate risk inherent in derivatives must 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 conventional bank licensee, 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 conventional bank licensee 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 conventional bank licensee 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 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.

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, conventional bank licensees 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. Conventional bank licensees 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; and

(b) 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 represents the time to expiry of the futures contract, or settlement date of the FRA as the case may be;

(b) The second leg represents the time to expiry of the underlying instrument;

(c) Each leg is treated as a zero coupon bond with zero specific risk; and

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 has 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 must apply 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;

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"; and

(h) It should be noted that, where a security owned by the conventional bank licensee (and included in its calculation of market risk) is repo'd, it continues to contribute to the conventional bank licensee's interest rate or equity position risk calculation.

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 conventional bank licensee 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; and

(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.

CA-9.7 Calculation of Derivative Positions (continued)

CA-9.7.7 Conventional bank licensees 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 Conventional bank licensees 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.

CA-9.8 Netting of Derivative Positions

Permissible Offsetting of Fully Matched Positions for Both Specific and General Market Risk

CA-9.8.1 Conventional bank licensees 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.

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.

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 security**	**No**	**Yes, as two positions**
- Corporate debt security	**Yes**	**Yes, as two positions**
- Index on interest rates (e.g. LIBOR)	**No**	**Yes, as two positions**
- Index on basket of debt securities	**Yes**	**Yes, as two positions**
OTC forwards		
- Government debt security**	**No**	**Yes, as two positions**
- Corporate debt security	**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 security**	**No**	**(a) Carve out together with the associated hedging positions, and use:**
- Corporate debt security	**Yes**	**- simplified approach; or**
- Index on interest rates	**No**	**- scenario analysis; or**
		- internal models (see chapter CA-14).
- FRAs, swaps	**No**	**(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 counterparty risk.
** As defined in Section CA-9.2.

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 conventional bank licensee's trading book.

CA-10.1.2 **For the guidance of the conventional bank licensees, 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; and
(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.

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 conventional bank licensees 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 conventional bank licensee 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 Conventional bank licensees must follow the standardised approach to calculate the equity position risk capital requirement, as set out in detail in this chapter.

CA-10.2 Calculation of Equity Positions

CA-10.2.1 **A conventional bank licensee 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 conventional bank licensee 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 conventional bank licensee 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 must 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 conventional bank licensee must discuss the appropriate country allocation with the CBB.**

CA-10.3 Specific Risk Calculation

CA-10.3.1 Specific risk is defined as the conventional bank licensee'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 conventional bank licensee 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%.

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 conventional bank licensee 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.

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. Conventional bank licensees 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 conventional bank licensee 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; and

(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.

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 conventional bank licensee takes an opposite position in exactly the same index, at different dates or in different market centres; and

(b) Where a conventional bank licensee 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 conventional bank licensee 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.

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 apply to such counterparty risk exposure.

Summary of Treatment of Equity Derivatives

Instrument	Specific risk charg	General market risk charge
Exchange-traded or OTC futures		
- Individual equity	Yes	Yes, as underlying
- Index	Yes (see CA-10.5)	Yes, as underlying
Options		
- Individual equity	Yes	Either (a) or (b) as below (chapter CA-13 for a detailed description):
- Index	Yes	(a) Carve out together with the associated hedging 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).
* 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 counterparty risk.		

CA-11.1 Introduction

CA-11.1.1 A conventional bank licensee 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 conventional bank licensee's overall assets and liabilities.

CA-11.1.2 **This chapter describes the standardised method for calculation of the conventional bank licensee'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 gold[70] and, as a second step, the measurement of the risks inherent in the conventional bank licensee'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 conventional bank licensee's base currency, which will be either BD or US$.**

CA-11.1.5 **Conventional bank licensees 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, must obtain 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. Conventional bank licensees which do not use internal models must follow 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$, will be treated as positions in US$.**

[70] 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.

CA-11.2 De Minimis Exemptions

CA-11.2.1 **A conventional bank licensee 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 conventional bank licensee:**

(a) The conventional bank licensee'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 Total Capital; and

(b) The conventional bank licensee's overall net open position, as defined in Paragraph CA-11.3.1, does not exceed 2% of its Total 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 conventional bank licensee will not automatically qualify for exemptions upon meeting them. The CBB may also, in its discretion, fix a minimum capital requirement for a conventional bank licensee 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 conventional bank licensee, if the CBB is convinced that the conditions on which the exemption was granted no longer exist.

CA-11.3 Calculation of Net Open Positions

CA-11.3.1 A conventional bank licensee'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 conventional bank licensee'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).

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, conventional bank licensees 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 conventional bank licensee must 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.

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 conventional bank licensee's CAR;

(b) Positions related to items that are deducted from the conventional bank licensee'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 conventional bank licensee 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 conventional bank licensee's CAR. For this purpose, the CBB may ask for written representations from the conventional bank licensee'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.

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 conventional bank licensee may choose to use internal models to measure the options risk. Extra capital charges will apply to those option risks that the conventional bank licensee'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.

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 conventional bank licensee 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 conventional bank licensee. 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 conventional bank licensee 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.

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	CA$	US$	JPY	Gold
+100	+150	+50	-180	-20	-20
+300			-200		20
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 x 8% = 25.6					

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 conventional bank licensee, 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. Conventional bank licensees 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 conventional bank licensee 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, conventional bank licensees 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.

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, conventional bank licensees 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 conventional bank licensee 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.[71]

CA-12.1.6 Conventional bank licensees 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 Conventional bank licensees 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.

[71] 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.

CA-12.2 Calculation of Commodities Positions

Netting

CA-12.2.1 Conventional bank licensees 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 conventional bank licensee'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-categories[72] 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 conventional bank licensee may, with the prior written approval of the CBB, net positions in those sub-categories. Conventional bank licensees 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 used[73]. In order to calculate the risks, commodity derivatives are converted into notional commodities positions and assigned to maturities as follows:

[72] 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.

[73] 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.

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 conventional bank licensee 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); and

(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.

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[74]
0 – 1 months
1 – 3 months
3 – 6 months
6 – 12 months
1 – 2 years
2 – 3 years
over 3 years

[74] 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.

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; and

(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 conventional bank licensees normally run rather small open positions in commodities. Conventional bank licensees must submit, in writing, details of their commodities business, to enable the CBB to evaluate whether the models approach should be adopted by the conventional bank licensee, to capture the market risk on this business.

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 conventional bank licensee's gross positions, long plus short, in each commodity is applied to protect the conventional bank licensee against basis risk, interest rate risk and forward gap risk. In valuing the gross positions in commodity derivatives for this purpose, conventional bank licensees must use the current spot price.

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 conventional bank licensees' activities in options. The CBB has decided that the following approaches should be adopted to the measurement of options risks:**

(a) Conventional bank licensees which solely use purchased options are permitted to use the *simplified (carve-out) approach* described later in this chapter; and

(b) Conventional bank licensees 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 conventional bank licensee's options trading activities, the more the conventional bank licensee will be expected to use a sophisticated approach to the measurement of options risks. The CBB will monitor the conventional bank licensees' 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.**

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 conventional bank licensee 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 x 16%[75]] minus [($ 11 - $ 10)[76] x 100] = $ 60
A similar methodology applies to options whose underlying is a foreign currency, an interest rate related instrument or a commodity.

[75] 8% specific risk plus 8% general market risk.

[76] The amount the option is "in the money".

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., hedged positions)**	**The capital charge is:** **[Market value of underlying instrument[77] x Sum of specific and general market risk charges[78] for the underlying]** ***minus*** **[Amount, if any, the option is in the money[79]]** **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 option 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 option[80].**

[77] 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.

[78] 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%.

[79] 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.

[80] 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.

CA-13.3 Delta-plus Method (Buffer Approach)

CA-13.3.1 Conventional bank licensees 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 conventional bank licensee'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;

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; and

(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% must 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, 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.

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, conventional bank licensees 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:

Gamma impact = 0.5 x Gamma x 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 options[81], 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%.

[81] 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.

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. Conventional bank licensees 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), conventional bank licensees 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 ±25%; and

(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.

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 rules(see also Appendix CA-2); 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).

CA-13.4 Scenario Approach

CA-13.4.1 As stated in Section CA-13.1, conventional bank licensees 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. Conventional bank licensees 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 conventional bank licensees' 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 conventional bank licensee 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, conventional bank licensees 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:

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 conventional bank licensees 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 ±8%;

(c) For foreign exchange and gold, the range is ±8%; and

(d) For *commodities,* the range is ±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 ±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. 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.

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 rules (see also Appendix CA-2); 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 **Conventional bank licensees 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 conventional bank licensees to work with it closely to produce an agreed method, within the framework of these rules. If a conventional bank licensee 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.

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 conventional bank licensees undertaking significant options business, at the very least, to monitor such risks closely. Additionally, conventional bank licensees 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.

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, conventional bank licensees 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 conventional bank licensee 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 conventional bank licensee'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 conventional bank licensees 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 conventional bank licensee'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. Conventional bank licensees applying models are subject to separate capital charges for the specific risk not captured by their models, which must be calculated by the standardised methodology.**

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, conventional bank licensees 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 conventional bank licensee will automatically be recognised for another bank.

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 conventional bank licensee's risk management system is conceptually sound and is implemented with integrity;

(b) That the conventional bank licensee 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 conventional bank licensee'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 conventional bank licensee's internal model before it is used for supervisory capital purposes; and

(d) That the conventional bank licensee regularly conducts stress tests as outlined in Section CA-14.7 and conducts back-testing as described in Section CA-14.6.

CA-14.3 Qualitative Standards

CA-14.3.1 In order to ensure that conventional bank licensees using models have market risk management systems that are conceptually sound and implemented with integrity, the CBB has set the following qualitative criteria that conventional bank licensees 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 conventional bank licensee to use internal models, where such permission is granted, the extent to which the conventional bank licensee meets the qualitative criteria will further influence the level at which the CBB will set the multiplication factor for that conventional bank licensee, referred to in Section CA-14.5. Only those conventional bank licensees 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 conventional bank licensee must have an independent risk management unit that is responsible for the design and implementation of the conventional bank licensee's risk management system. The unit should produce and analyse daily reports on the output of the conventional bank licensee'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 conventional bank licensee;

(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 conventional bank licensee must 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 conventional bank licensee's overall risk exposure;

CA-14.3 Qualitative Standards (continued)

(e) The conventional bank licensee's internal model must be closely integrated into the day-to-day risk management process of the conventional bank licensee. Its output should, accordingly, be an integral part of the process of planning, monitoring and controlling the conventional bank licensee'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 conventional bank licensee'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 conventional bank licensee's 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 conventional bank licensee's exposures);

(h) The conventional bank licensee must 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 conventional bank licensee'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; and

(i) An independent review of the risk measurement system should be carried out regularly in the conventional bank licensee'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;

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 Appendix CA-15.

CA-14.4 Specification of Market Risk Factors

CA-14.4.1 An important part of a conventional bank licensee'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 conventional bank licensee's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in the conventional bank licensee's portfolio of on- and off-balance-sheet trading positions. Conventional bank licensees must follow the CBB's guidelines, set out below, for specifying the risk factors for their internal models. Where a conventional bank licensee has difficulty in specifying the risk factors for any currency or market within a risk category, in accordance with the following guidelines, the conventional bank licensee must 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 conventional bank licensee's model:

(a) Factors that are deemed relevant for pricing should be included as risk factors in the value-at-risk model. Where a risk factor is incorporated in a pricing model but not in the value-at-risk model, the conventional bank licensees must justify this omission to the satisfaction of the CBB. In addition, the value-at-risk model must capture nonlinearities for options and other relevant products (e.g. mortgage backed securities, tranched exposures or n-th-to-default credit derivatives), as well as correlation risk and basis risk (e.g. between credit default swaps and bonds). Moreover, the CBB has to be satisfied that proxies are used which show a good track record for the actual position held (i.e. an equity index for a position in an individual stock).

(b) For interest rates:

- There should be a set of risk factors corresponding to interest rates in each currency in which the conventional bank licensee has interest-rate-sensitive on- or off-balance-sheet positions.

CA-14.4 Specification of Market Risk Factors (continued)

- 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, conventional bank licensees 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 conventional bank licensee's trading strategies. For instance, a conventional bank licensee 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.
- 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.

(c) For exchange rates (which includes gold):

- The risk measurement system should incorporate risk factors corresponding to the individual foreign currencies in which the conventional bank licensee's positions are denominated. Since the value-at-risk figure calculated by the risk measurement system will be expressed in the conventional bank licensee'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 conventional bank licensee has a significant exposure.

(d) For equity prices:

- There should be risk factors corresponding to each of the equity markets in which the conventional bank licensee holds significant positions.

CA-14.4 Specification of Market Risk Factors (continued)

- 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.
- The sophistication and nature of the modelling technique for a given market should correspond to the conventional bank licensee's exposure to the overall market as well as its concentration in individual equity issues in that market.

(e) For commodity prices:

- There should be risk factors corresponding to each of the commodity markets in which the conventional bank licensee holds significant positions (also see Section CA-12.1).
- For conventional bank licensees 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 conventional bank licensee 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, conventional bank licensees 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.

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. Conventional bank licensees may use value-at-risk numbers calculated according to shorter holding periods scaled up to ten days, for example, by the square root of time (for the treatment of options, also see (h) below). A conventional bank licensee using this approach must justify the reasonableness of its approach to the satisfaction of the CBB during the annual model review process preformed by the external auditor;

(d) The minimum historical observation period (sample period) for calculating value-at-risk is one year. For conventional bank licensees 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), and the method results in a capital charge at least equivalent to a one year observation period.

The CBB may, as an exceptional case, require a conventional bank licensee 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) Conventional bank licensees 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. The updating process must be flexible enough to allow for more frequent updates;

(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 conventional bank licensee, as set out in Section CA-14.4, conventional bank licensees will be free to use models based, for example, on variance-covariance matrices, historical simulations, or Monte Carlo simulations;

CA-14.5 Quantitative Standards (continued)

(g) Conventional bank licensees must 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). Conventional bank licensees are not permitted to recognise empirical correlations across broad risk categories without the prior approval of the CBB. Conventional bank licensees 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 conventional bank licensee's system for measuring those correlations;

(h) Conventional bank licensees' 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:

- Conventional bank licensees' models must capture the non-linear price characteristics of options positions;
- Conventional bank licensees 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, conventional bank licensees may adjust their capital measure for options risk through other methods, e.g., periodic simulations or stress testing;
- Each conventional bank licensee'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. Conventional bank licensees with relatively large and/or complex options portfolios should have detailed specifications of the relevant volatilities. This means that conventional bank licensees must measure the volatilities of options positions broken down by different maturities.

CA-14.5 Quantitative Standards (continued)

(i) In addition, a conventional bank licensee must calculate a 'stressed value-at-risk' measure. This measure is intended to replicate a value-at-risk calculation that would be generated on the conventional bank licensee's current portfolio if the relevant market factors were experiencing a period of stress; and should therefore be based on the 10-day, 99th percentile, one-tailed confidence interval value-at-risk measure of the current portfolio, with model inputs calibrated to historical data from a continuous 12-month period of significant financial stress relevant to the conventional bank licensee's portfolio. The period used must be approved by the CBB and regularly reviewed. As an example, for many portfolios, a 12-month period relating to significant losses in 2007/2008 would adequately reflect a period of such stress; although other periods relevant to the current portfolio must be considered by the conventional bank licensee.

(j) As no particular model is prescribed under Paragraph (f) above, different techniques might need to be used to translate the model used for value-at-risk into one that delivers a stressed value-at-risk. For example, conventional bank licensees should consider applying anti-thetic data, or applying absolute rather than relative volatilities to deliver an appropriate stressed value-at-risk. The stressed value-at-risk should be calculated at least weekly.

(k) Each conventional bank licensee must meet, on a daily basis, a capital requirement expressed as the sum of:

- The higher of (1) its previous day's value-at-risk number measured according to the parameters specified in this Section (VaR_{t-1}); and (2) an average of the daily value-at-risk measures on each of the preceding sixty business days (VaR_{avg}), multiplied by a multiplication factor (m_c); plus.
- The higher of (1) its latest available stressed-value-at-risk number calculated according to (i) above ($_sVaR_{t-1}$); and (2) an average of the stressed value-at-risk numbers calculated according to (i) above over the preceding sixty business days ($_sVaR_{avg}$), multiplied by a multiplication factor (m_s).

CA-14.5 Quantitative standards (continued)

Therefore, the capital requirement (c) is calculated according to the following formula:

$c = \max \{VaR_{t-1}; m_c \cdot VaR_{avg}\} + \max \{ {}_sVaR_{t-1}; m_s \cdot {}_sVaR_{avg}\}$

(l) The multiplication factors m_c and m_s will be set by the CBB, separately for each individual conventional bank licensee, on the basis of the CBB's assessment of the quality of the conventional bank licensee's risk management system, subject to an absolute minimum of 3 for m_c and an absolute minimum of 3 for m_s. Conventional bank licensees must add to these factors 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 conventional bank licensee's back-testing. The back-testing results applicable for calculating the plus are based on value-at-risk only and not stressed value-at-risk. If the back-testing results are satisfactory and the conventional bank licensee 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. Conventional bank licensees are expected to strictly comply with this approach.

(m) As stated earlier in Section CA-14.1, conventional bank licensees 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.

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 conventional bank licensees.

Key Requirements

CA-14.6.2 The contents of this Section lay down recommendations for carrying out back-testing procedures in order to determine the accuracy and robustness of conventional bank licensee's internal models for measuring market risk capital requirements. These back-testing procedures typically consist of a periodic comparison of the conventional bank licensee'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 conventional bank licensee'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 conventional bank licensees will be classified into three exception categories for the determination of the "scaling factor" to be applied to the conventional bank licensees' 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; and
(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 conventional bank licensee'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 conventional bank licensee's risk model.

CA-14.6 Back-testing (continued)

CA-14.6.5 The corresponding "scaling factors" applicable to conventional bank licensees falling into respective zones based on their back-testing results are shown in Table 2 of Appendix CA-15.

CA-14.7 Stress Testing

CA-14.7.1 Conventional bank licensees 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 conventional bank licensee is a key component of a conventional bank licensee's assessment of its capital position.

CA-14.7.2 Conventional bank licensees' 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 Conventional bank licensees' 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 conventional bank licensees could be exposed. Qualitative criteria should emphasise that two major goals of stress testing are to evaluate the capacity of the conventional bank licensee's capital to absorb potential large losses and to identify steps the conventional bank licensee can take to reduce its risk and conserve capital. This assessment is integral to setting and evaluating the conventional bank licensee's management strategy and the results of stress testing should be routinely communicated to senior management and, periodically, to the conventional bank licensee's board of directors.

CA-14.7.4 Conventional bank licensees must combine the use of stress scenarios as advised under (a), (b) and (c) below by the CBB, with stress tests developed by the conventional bank licensees themselves to reflect their specific risk characteristics. The CBB may ask conventional bank licensees to provide information on stress testing in three broad areas, as discussed below:

CA-14.7 Stress Testing (continued)

(a) *Scenarios requiring no simulation by the bank:*
Conventional bank licensees 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 conventional bank licensee'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:*
Conventional bank licensees 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 Exchange Rate Mechanism crises of 1992 and 1993 or the fall in the international bond markets in the first quarter of 1994, the 1998 Russian financial crisis, the 2000 bursting of the technology stock bubble or the 2007/2008 sub-prime crisis, 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 conventional bank licensee'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 conventional bank licensee'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. For example, the above-mentioned situations involved correlations within risk factors approaching the extreme values of 1 and -1 for several days at the height of the disturbance.

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 conventional bank licensee 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). Conventional bank licensees 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 conventional bank licensee'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 conventional bank licensee to take prompt steps to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of its exposures).

CA-14.7.7 Conventional bank licensees must conduct, at least weekly, a set of pre-determined stress-tests for the correlation trading portfolio encompassing shocks to default rates, recovery rates, credit spreads, and correlations. Appendix CA-19 provides guidance on the stress testing that must be undertaken to satisfy this requirement.

CA-14.8 External Validation of Models

CA-14.8.1 Before granting its approval for the use of internal models by a conventional bank licensee, the CBB will require that the models are validated by both the internal and external auditors of the conventional bank licensee. 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 conventional bank licensee's activities and geographical coverage;

(d) Checking the results of the conventional bank licensee'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.

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 conventional bank licensee'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 conventional bank licensee, 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 Conventional bank licensees 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.

CA-14.9 Letter of Model Recognition

CA-14.9.1 As stated in Section CA-14.1, conventional bank licensees 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 conventional bank licensee'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 conventional bank licensees.

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 conventional bank licensee 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 conventional bank licensee 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 conventional bank licensee.

CA-14.9.3 The CBB may withdraw its approval granted for any conventional bank licensee's model if it believes that the conditions based on which the approval was granted are no longer valid or have changed significantly.

CA-14.10 Combination of Internal Models and the Standardised Methodology

CA-14.10.1 Unless a conventional bank licensee's exposure to a particular risk factor is insignificant, the internal models approach will, in principle, require conventional bank licensees 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, conventional bank licensees 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 conventional bank licensee 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 conventional bank licensee 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 conventional bank licensee.

CA-14.10.3 Notwithstanding the goal of moving to comprehensive internal models as set out in Paragraph CA-14.10.1 above, for conventional bank licensees 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 conventional bank licensee's different entities for the same type of risk (see, however, the transitional provisions in Section CA-A.4)[82];

(b) All of the criteria laid down in this chapter will apply to the models being used;

[82] 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.

CA-14.10 Combination of Internal Models and the Standardised Methodology (continued)

(c) Conventional bank licensees 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.

CA-14.11 Treatment of Specific Risk

CA-14.11.1 The conventional bank licensee is allowed to include its securitisation exposures and n-th-to-default credit derivatives in the trading book in its value-at-risk measure. Notwithstanding, it is still required to hold additional capital for these products according to the standardised measurement methodology.

CA-14.12 Model Validation Standards

CA-14.12.1 It is important that conventional bank licensees 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, conventional bank licensees 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 must use 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. Moreover, additional tests are required, which may include, for instance:

  (i) 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;

  (ii) 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;

  (iii) Testing carried out using confidence intervals other than the 99 percent interval required under the quantitative standards;

  (iv) Testing of portfolios below the overall bank level;

CA-14.12 Model Validation Standards (continued)

(c) The use of hypothetical portfolios to ensure that the model is able to account for particular structural features that may arise, for example:

(i) Where data histories for a particular instrument do not meet the quantitative standards and where the conventional bank licensee has to map these positions to proxies, then the conventional bank licensee must ensure that the proxies produce conservative results under relevant market scenarios;

(ii) Ensuring that material basis risks are adequately captured. This may include mismatches between long and short positions by maturity or by issuer;

(iii) Ensuring that the model captures concentration risk that may arise in an undiversified portfolio.

CA-14.13 Principles for Calculating the Incremental Risk Charge (IRC)

This section is to be deleted. The current version is in the Rulebook on the CBB website.

CA-15.1 Rationale and Objective

CA-15.1.1 The content of this Chapter will be consulted at a later date

CA-16.1 Prudent Valuation Guidance

CA-16.1.1 This Section provides conventional bank licensees with guidance on prudent valuation for positions that are accounted for at fair value, whether they are in the trading book or in the banking book. This guidance is especially important for positions without actual market prices or observable inputs to valuation, as well as less liquid positions which, although they will not be excluded from the trading book solely on grounds of lesser liquidity, raise supervisory concerns about prudent valuation. The valuation guidance set forth below is not intended to require conventional bank licensees to change valuation procedures for financial reporting purposes. The CBB will assess a conventional bank licensee's valuation procedures for consistency with this guidance. One factor in the CBB's assessment of whether a conventional bank licensee must take a valuation adjustment for regulatory purposes under Paragraphs CA-16.1.11A to CA-16.1.13 is the degree of consistency between the conventional bank licensee's valuation procedures and these guidelines.

CA-16.1.2 **A framework for prudent valuation practices must at a minimum include the following:**

Systems and Controls

CA-16.1.3 **Conventional bank licensees 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, guidelines for the use of unobservable inputs reflecting the conventional bank licensee's assumptions of what market participants would use in pricing position, 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.

CA-16.1 Prudent Valuation Guidance (Continued)

Valuation Methodologies

Marking to Market

CA-16.1.4 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-16.1.5 **Conventional bank licensees 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. Conventional bank licensees should maximise the use of relevant observable inputs and minimise the use of unobservable inputs when estimating fair value using a valuation technique. However, observable inputs or transactions may not be relevant, such as in a forced liquidation or distressed sale, or transactions may not be observable, such as when markets are inactive. In such cases, the observable data should be considered, but may not be determinative.**

Marking to Model

CA-16.1.6 **Only where marking-to-market is not possible should conventional bank licensees mark-to-model, but this must 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-16.1 Prudent Valuation Guidance (Continued)

CA-16.1.7 When marking to model, an extra degree of conservatism is appropriate. The 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 or of other fair-valued positions 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); and

(h) Valuation adjustments should be made as appropriate, for example, to cover the uncertainty of the model valuation (see also valuation adjustments in Paragraphs CA-16.1.10 to CA-16.1.13).

Independent Price Verification

CA-16.1.8 **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 must 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.**

CA-16.1 Prudent Valuation Guidance (continued)

CA-16.1.9 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

CA-16.1.10 **As part of their procedures for marking to market, conventional bank licensees must establish and maintain procedures for considering valuation adjustments. CBB expects conventional bank licensees using third-party valuations to consider whether valuation adjustments are necessary. Such considerations are also necessary when marking to model.**

CA-16.1.11 **The 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.**

Adjustment to the Current Valuation of Less Liquid Positions for Regulatory Capital Purposes

CA-16.1.11A **Conventional bank licensees must establish and maintain procedures for judging the necessity of and calculating an adjustment to the current valuation of less liquid positions for regulatory capital purposes. This adjustment may be in addition to any changes to the value of the position required for financial reporting purposes and should be designed to reflect the illiquidity of the position. The CBB expects conventional bank licensees to consider the need for an adjustment to a position's valuation to reflect current illiquidity whether the position is marked to market using market prices or observable inputs, third-party valuations or marked to model.**

CA-16.1.11B 'Less liquid positions' would generally involve positions in OTC financial instruments or commodities which are not listed or which are not traded through a central counterparties (such as NYSE Euronext or Chicago Mercantile Exchange) or which do not have readily available secondary market prices or observable inputs to valuation.

CA-16.1 Prudent Valuation Guidance (continued)

CA-16.1.12 Bearing in mind that the assumptions made about liquidity in the market risk capital charge may not be consistent with the conventional bank licensee's ability to sell or hedge out less liquid positions, where appropriate, conventional bank licensees must take an adjustment to the current valuation of these positions, and review their continued appropriateness on an on-going basis. Reduced liquidity may have arisen from market events. Additionally, close-out prices for concentrated positions and/or stale positions should be considered in establishing the adjustment. Conventional bank licensees must consider all relevant factors when determining the appropriateness of the adjustment 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 (including trading volumes during periods of market stress), market concentrations, the aging of positions, the extent to which valuation relies on marking-to-model, and the impact of other model risks not included in Paragraph CA-16.1.11A.

CA-16.1.12A For complex products including, but not limited to, securitisation exposures and n-th-to-default credit derivatives, conventional bank licensees must explicitly assess the need for valuation adjustments to reflect two forms of model risk: the model risk associated with using a possibly incorrect valuation methodology; and the risk associated with using unobservable (and possibly incorrect) calibration parameters in the valuation model.

CA-16.1.13 The adjustment to the current valuation of less liquid positions made under Paragraph CA-16.1.12 must impact Tier 1 regulatory capital and may exceed those valuation adjustments made under financial reporting standards and Paragraphs CA-16.1.10 and CA-16.1.11.