Guideline

Subject: Capital Adequacy Requirements (CAR)

Chapter 9 – Market Risk

Effective Date: November 2018 / January 2019[1]

The Capital Adequacy Requirements (CAR) for banks (including federal credit unions), bank holding companies, federally regulated trust companies, federally regulated loan companies and cooperative retail associations are set out in nine chapters, each of which has been issued as a separate document. This document, Chapter 9 – Market Risk, should be read in conjunction with the other CAR chapters which include:

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

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

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Chapter 9 – Market Risk

Eligibility requirements

1. This chapter is drawn from the Basel Committee on Banking Supervision (BCBS) Basel II framework, entitled: *International Convergence of Capital Measurement and Capital Standards - June 2006*), *Guidelines for computing capital for incremental risk in the trading book - July 2009*, and *Revisions to the Basel II Market Risk Framework - December 2010*. For reference, the Basel text paragraph numbers that are associated with the text appearing in this chapter are indicated in square brackets at the end of each paragraph.[2]

2. These requirements apply only to internationally active institutions.

3. OSFI retains the right to apply the framework to other institutions, on a case by case basis. All institutions designated by OSFI as domestic systemically important banks (D-SIBS) shall meet the requirements of this chapter (Chapter 9).

9.1. The Entity

4. The capital requirements for market risk are to apply on a consolidated basis. OSFI will permit financial entities in a group which is running a global consolidated book and whose capital is being assessed on a global basis to report short and long positions in exactly the same instrument (e.g., currencies, commodities, equities or bonds), on a net basis, no matter where they are booked. Nonetheless, there may be circumstances in which individual positions should be taken into the measurement system without any offsetting against positions in the remainder of the group. This may be needed, for example, where there are obstacles to the quick repatriation of profits from a foreign subsidiary or where there are legal and procedural difficulties in carrying out the timely management of risks on a consolidated basis. Institutions should document the rationale and procedures for determining when positions should be netted and not netted. These should be available for OSFI review. Moreover, OSFI will retain the right to monitor the market risks of individual entities on a non-consolidated basis to ensure that significant imbalances within a group do not escape supervision. [BCBS June 2006 par 683(v)]

9.2. Market Risk Framework

5. *Market risk* is the risk of losses in on- and off-balance sheet positions arising from movements in market prices. The risks pertaining to this requirement are:

- for instruments in the trading book:
    - interest rate position risk,
    - equity position risk.

[2] Following the format: [BCBS June 2006 par x].

- throughout the institution:
    - foreign exchange risk[3],
    - commodities risk.

[BCBS June 2006 par 683(i)]

6. A *trading book* consists of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book. To be eligible for trading book capital treatment, financial instruments must either be free of any restrictive covenants on their tradability or be able to be hedged completely. In addition, positions should be frequently and accurately valued, and the portfolio should be actively managed. Each institution should have a policy that specifies what items are allocated to the trading book. [BCBS June 2006 par 685]

7. 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. They may include, for example, proprietary positions, positions arising from client servicing (e.g. matched principal brokering) and market making. [BCBS June 2006 par 687]

9.3. Application

8. On-balance sheet assets held in the trading book are subject to only the market risk capital requirements. On-balance sheet assets held outside the trading book and funded by another currency and unhedged for foreign exchange exposure are subject to both the market risk (i.e., foreign exchange) and credit risk capital requirements.

9. Derivative, repurchase/reverse repurchase, securities lending and other transactions booked in the trading book are subject to both the market risk and the counterparty credit risk capital requirements. This is because they face the risk of loss due to market fluctuations in the value of the underlying instrument and due to the failure of the counterparty to the contract. The counterparty risk weights used to calculate the credit risk capital requirements for these transactions must be consistent with those used for calculating the capital requirements in the banking book. Thus, an institution using the standardized approach in the banking book must use the standardized approach risk weights in the trading book, and an institution using the IRB approach in the banking book must use the IRB risk weights in the trading book in a manner consistent with its banking book IRB roll out as described in Chapter 6 – Credit Risk – Internal Ratings Based Approach, section 6.2.3. IRB risk weights must be used for counterparties included in portfolios where the IRB approach is being used.

[3] Excluding structural positions as defined in section 9.10.3. – Foreign Exchange Position Risk. [BCBS June 2006 par 683(iv)]

9.4. Measurement Approaches

10. In measuring their market risks, institutions may choose between two broad methodologies: the standardized approach or internal models. [BCBS June 2006 par 701 (i)]

9.4.1 Standardized approach

11. The standardized methodology uses a "building-block" approach. The capital charge for each risk category is determined separately. Within the interest rate and equity position risk categories, separate capital charges for specific risk and the general market risk arising from debt and equity positions are calculated. Specific risk is defined as the risk of loss caused by an adverse price movement of a debt instrument or security due principally to factors related to the issuer. General market risk is defined as the risk of loss arising from adverse changes in market prices. For commodities and foreign exchange, there is only a general market risk capital requirement. Appendix 9-1 contains a summary of the capital charges by instrument. [BCBS June 2006 par 701(iii)]

12. The standardized approach is described in section 9.10. The first four parts of that section deal with interest rate, equity position, foreign exchange and commodities risk. The fifth part sets out two possible methods for measuring the market risk in options of all kinds. [BCBS June 2006 par 701(i)]

9.4.2 Internal models

13. The focus of most internal models is an institution's general market risk exposure, leaving specific risk to be measured through separate component measurement systems. Institutions using models are subject to capital charges for the specific risk not captured by their models.

14. Institutions using their own internal risk management models to calculate the capital charge(s) must meet seven sets of conditions, which are described in detail in section 9.11. The conditions include:

a. certain general criteria concerning the adequacy of the risk management system,

b. qualitative standards for internal oversight of the use of models, notably by management,

c. guidelines for specifying an appropriate set of market risk factors (i.e., the market rates and prices that affect the value of institutions' positions),

d. quantitative standards setting out the use of common minimum statistical parameters for measuring risk,

e. guidelines for stress testing and back testing,

f. validation procedures for external oversight of the use of models, and

g. rules for institutions that use a mixture of models and the standardized approach.

[BCBS June 2006 par 701(ii)]

15. Institutions with significant trading activities are encouraged to move towards a models approach. The need for the standardized approach will be reviewed in future when the industry's internal measurement systems are more refined. [BCBS June 2006 par 701(iv)]

9.5. Trading book

9.5.1 General criteria

16. Institutions 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 the trading book set forth in this section and taking into account the institution's risk management capabilities and practices. Compliance with these policies and procedures must be fully documented and be subject to periodic internal audit. [BCBS June 2006 par 687(i)]

17. These policies and procedures should, at a minimum, address the general considerations listed below. This list is not intended to provide a series of tests that a product or group of related products must pass to be eligible for inclusion in the trading book. Rather, the list provides a minimum set of key points that must be addressed by the policies and procedures for overall management of a firm's trading book:

- The activities the institution considers to be trading and as constituting part of the trading book for regulatory capital purposes;
- The extent to which an exposure can be marked-to-market daily by reference to an active, liquid two-way market;
- For exposures that are marked-to-model, the extent to which the institution can:
    a. Identify the material risks of the exposure;
    b. Hedge the material risks of the exposure and the extent to which hedging instruments would have an active, liquid two-way market;
    c. Derive reliable estimates for the key assumptions and parameters used in the model.
- The extent to which the institution can and is required to generate valuations for the exposure that can be validated externally in a consistent manner;
- The extent to which legal restrictions or other operational requirements would impede the institution's ability to effect an immediate liquidation of the exposure;
- The extent to which the institution is required to, and can, actively risk manage the exposure within its trading operations; and
- The extent to which the institution may transfer risk or exposures between the banking and the trading books and criteria for such transfers.

[BCBS June 2006 par 687(ii)]

18. The following are the basic requirements in order for positions to be eligible to receive trading book capital treatment:

- The trading strategy (including the expected holding period) for the position, instrument or portfolio must be clearly documented, and approved by senior management.
- There must be clearly defined policies and procedures for the active management of the position that establish, at a minimum, a structure for trading activities under which:
    - positions are managed at a trading desk,
    - position limits are set and monitored for appropriateness,
    - dealers have the autonomy to enter into or manage the position within agreed limits and according to the agreed strategy,
    - positions are marked to market at least daily (with the results reflected in the institution's earnings statement), and when marking to model the parameters are assessed on a daily basis,
    - positions are reported to senior management as an integral part of the institution's risk management process, and
    - the positions are actively monitored, using market information sources, with regard to their market liquidity, or with regard to the ability of the positions or the portfolio risk profile to be hedged. This includes assessments of the quality and availability of market inputs to the valuation process, the level of market turnover, and the sizes of positions traded in the market.
- There must be clearly defined policies and procedures to monitor the positions against the institution's trading strategy, including the monitoring of turnover and stale positions in the trading book.

[BCBS June 2006 par 688]

19. Notwithstanding these requirements for trading book, open equity investments in hedge funds, private equity investments, positions in a securitization warehouse and real estate holdings do not meet the definition of the trading book, owing to significant constraints on the ability of institutions to liquidate these positions and value them reliably on a daily basis. [BCBS June 2006 par 16 footnote 3, revised BCBS 31 December 2010 par 14]

20. Institutions should closely monitor securities, commodities, and foreign exchange transactions that have failed, starting the first day they fail. A capital charge for failed transactions should be calculated in accordance with Chapter 4 – Settlement and Counterparty Risk. With respect to unsettled securities, commodities, and foreign exchange transactions that are not processed through a delivery-versus-payment (DvP) or payment-versus-payment (PvP) mechanism, institutions should calculate a capital charge as set forth in Chapter 4 – Settlement and Counterparty Risk.

9.5.2 Criteria for Specific Instruments

Internal Hedges

21. When an institution hedges a banking book credit risk exposure using a credit derivative booked in the trading book (i.e. using an internal hedge), the banking book exposure is not deemed to be hedged for capital purposes unless the institution purchases, from an eligible third-party protection provider, a credit derivative meeting the requirements of Chapter 5 – Credit Risk Mitigation, section 5.2.5 vis-à-vis the banking book exposure. Where such third-party protection is purchased and is recognized 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. [BCBS June 2006 par 689(i)]

Regulatory Capital Instruments and Other TLAC Instruments

22. Positions in an institution's own eligible regulatory capital instruments and, if applicable, own Other TLAC Instruments are deducted from capital. Positions in other banks', securities firms', and other financial entities' eligible regulatory capital instruments and in G-SIBs' or D-SIBs' Other TLAC Instruments, as well as intangible assets, will receive the same treatment as stipulated under this guideline for such assets held in the banking book. Where an institution demonstrates that it is an active market maker, OSFI may establish a dealer exception for holdings of other banks', securities firms', and other financial entities' capital instruments in the trading book. In order to qualify for the dealer exception, the institution must have adequate systems and controls surrounding the trading of financial institutions' eligible regulatory capital instruments and Other TLAC Instruments. [BCBS June 2006 par 689(ii)]

OSFI Notes

23. This dealer exception applies only to positions in another FI's regulatory capital instruments and/or Other TLAC Instruments that do not exceed the 10% threshold or the 5% threshold on non-significant investments described in Chapter 2 – Definition of Capital, section 2.3. For the capital treatment of significant investments in capital and Other TLAC Instruments of banks, financial and insurance entities refer to Chapter 2 - Definition of Capital, section 2.3.

Repo-style Transactions

24. Term trading-related repo-style transactions that an institution accounts for in its banking book may be included in the institution'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 this section and for which both legs are in the form of either cash or securities eligible for inclusion in the trading book. Regardless of where they are booked, all repo-style transactions are subject to a banking book counterparty credit risk charge. [BCBS June 2006 par 689(iii)]

Funding Valuation Adjustments

25. OSFI expects all banks to include any market risk instrument, used for purposes of hedging funding valuation adjustment (FVA) risk, in the calculation of their capital requirements. Banks must not offset or reduce their capital charges by any measure intended to either represent or approximate their FVA risk.

9.6. Credit risk requirements for collateralized transactions

26. For collateralized OTC derivative transactions, the charge for counterparty credit risk should be calculated using the same methodology as used in the banking book. [BCBS June 2006 par 702]

27. The credit risk charge for repo-style transactions should be calculated using the comprehensive approach to credit risk mitigation, as described in Chapter 5 – Credit Risk Mitigation, sections 5.1.3(ii) and 5.2.4.[4] Where an institution has had a VaR model approved for repo-style transactions in the banking book, the same model may be used for transactions in the trading book, subject to the conditions set out in in Chapter 5 – Credit Risk Mitigation, section 5.2.4 and Chapter 4 – Settlement and Counterparty Risk. [BCBS June 2006 par 703]

28. If an institution is using supervisory or own-estimate haircuts under the comprehensive approach in the banking book, then collateral in the trading book that falls within the banking book definition of eligible collateral is subject to the same haircuts. Collateral in the trading book that does not meet the criteria for inclusion in the banking book as eligible collateral may still be considered in the credit risk charge calculation, but is subject to the following haircuts:

- If an institution is using supervisory haircuts in the banking book, then the collateral is subject to a haircut of 25%.
- If an institution is using its own estimates for collateral haircuts in the banking book, then it must calculate a haircut for each individual security comprising the collateral, using the same methodology as for instruments in the banking book. [BCBS June 2006 par 701(iii)]

9.7. Credit derivatives

29. All credit derivatives held in the trading book are subject to counterparty credit risk capital requirements, for credit derivatives that are used to hedge counterparty credit risk on other derivatives in the trading book refer to the capital treatment in Chapter 4, paragraph 9. Many credit derivative products are also subject to general market risk capital requirements and to the specific risk capital requirement of the reference asset. Unless otherwise stated, the specific risk associated with a credit derivative is equivalent to that associated with a cash position in the reference asset (i.e. a loan or bond).

[4] The firm-size adjustment for SMEs that is applicable under the IRB approach for corporate credits remains applicable in the trading book.

30. The trading book treatment of credit derivatives that reference loans raises issues that are not explicitly addressed in this guideline. Market risk capital requirements are premised on assumptions about accurate valuation and effective tradability that may not be appropriate for bank loans and loan-based credit derivatives. Accordingly, an institution that believes its unique circumstances justify booking loans or loan-based credit derivatives in its trading account should, in advance, provide its Relationship Manager with a detailed justification that addresses, among other things, the nature of the trading activity, the ability to fair value the instruments on a daily basis, and the availability of a history of price movements over a relevant time frame. Where such instruments are included in the trading book for capital purposes, OSFI may, based on its review of the justification provided, increase the institution's capital requirements for this activity if the determination of price or liquidity presents additional risks.

31. Institutions may use their internal models to determine the amount of capital required if such models meet OSFI's requirements and they have been approved for the credit derivatives portfolio. Questions on the use of models for credit derivatives should be directed to an institution's Relationship Manager.

9.8. Prudent valuation guidance

32. Institutions calculating the capital requirement for market risk must meet conditions for the prudent valuation of positions in the trading book set out below.

33. This section provides institutions with guidance on prudent valuation for positions that are accounted for at the 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 raise supervisory concerns about prudent valuation. The valuation guidance set forth below is not intended to require banks to change valuation procedures for financial reporting purposes. Supervisors should assess a bank's valuation procedures for consistency with this guidance. That assessment will determine whether a bank must take a valuation adjustment for regulatory purposes (as described in subsection 9.8.4). [BCBS June 2006 par 690, revised December 2010 par 718(c)]

34. A framework for prudent valuation practices should at a minimum include components described in subsections 9.8.1 – 9.8.3.). [BCBS June 2006 par 691, revised December 2010 par 718(ci)]

9.8.1 Systems and controls

35. Institutions must establish and maintain adequate systems and controls sufficient to give management and supervisors the confidence that their valuations 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:

- 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 bank's assumptions of what market participants would use in pricing the position, frequency of independent valuation, timing of closing prices, procedures for adjusting valuations, and end of the month and ad-hoc verification procedures; and

- Clear and independent (i.e. independent of the front office) reporting lines for the department accountable for the valuation process. The reporting line should ultimately be to a main board executive director. [BCBS June 2006 par 692, revised December 2010 par 718(cii)]

OSFI Notes

36. In Canada, "main board executive director" should be interpreted as the Chief Risk Officer, Chief Financial Officer or equivalent.

9.8.2 Valuation methodologies

Marking to market

37. 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. [BCBS June 2006 par 693, revised December 2010 par 718(ciii)]

38. Institutions must mark-to-market as much as possible. The more prudent side of the bid/offer should be used unless the institution is a significant market maker in a particular position type and it can close out at mid-market. Institutions 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. [BCBS June 2006 par 694, revised December 2010 par 718(civ)]

Marking to model

39. Only where marking-to-market is not possible should institutions 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. When marking to model, an extra degree of conservatism is appropriate. OSFI will consider the following in assessing whether a mark-to-model valuation is prudent:

- Senior management should be aware of the elements of the trading book or of other fair-valued positions that 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. 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.

- Where available, generally accepted valuation methodologies for particular products should be used as far as possible.
- 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.
- 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.
- Risk management should be aware of the weaknesses of the models used and how best to reflect these in the valuation output.
- 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 the P&L versus risk factors, and comparison of actual close out values to model outputs).
- Valuation adjustments should be made as appropriate, for example, to cover the uncertainty of the model valuation (see also *Valuation Adjustments*, below). [BCBS June 2006 par 695, revised December 2010 par 718(cv)]

Independent price verification

40. Independent price verification is distinct from daily mark-to-market. It is the process by which market prices or model inputs are regularly verified for accuracy. While daily marking-to-market may be performed by dealers, verification of market prices or model inputs should be performed by a unit independent of the dealing room, at least monthly (or, depending on the nature of the market/trading activity, more frequently). It need not be performed as frequently as daily mark-to-market, since the objective, i.e. independent, marking of positions, should reveal any error or bias in pricing, which should result in the elimination of inaccurate daily marks. [BCBS June 2006 par 696, revised December 2010 par 718(cvi)]

41. 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. [BCBS June 2006 par 697, revised December 2010 par 718(cvii)]

9.8.3 Valuation adjustments

42. As part of their procedures for marking to market, institutions must establish and maintain procedures for considering valuation adjustments. OSFI expects institutions using third-party valuations to consider whether valuation adjustments are necessary. Such considerations are also necessary when marking to model. [BCBS June 2006 par 698, revised December 2010 par 718(cviii)]

43. OSFI expects the following valuation adjustments/reserves to be formally considered at a minimum: unearned credit spreads (i.e., credit valuation adjustments), close-out costs, operational risks, early termination, investing and funding costs, and future administrative costs and, where appropriate, model risk. [BCBS June 2006 par 699, revised December 2010 par 718(cix)]

9.8.4 Adjustment to the current valuation of less liquid positions for regulatory capital purposes

44. Institutions 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. OSFI expects institutions 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. [BCBS December 2010 par 718(cx)]

45. Bearing in mind that the assumptions made about liquidity in the market risk capital charge may not be consistent with the institution's ability to sell or hedge out less liquid positions where appropriate, institutions 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. Institutions 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 the prior paragraph. [BCBS June 2006 par 700, revised December 2010 par 718(cxi)]

46. For complex products including, but not limited to, securitization exposures and n-th-to-default credit derivatives, institutions 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. [BCBS December 2010 par 718(xci-1-)]

47. The adjustments to the current valuation of less liquid positions made under the previous two paragraphs must impact Common Equity Tier 1 regulatory capital and may exceed those valuation adjustments made under financial reporting standards and those considered in Section 9.8.3. [BCBS June 2006 par 701, revised December 2010 par 718(cxii)]

9.9. Capital requirement

48. Each institution will be expected to monitor and report the level of risk against which a capital requirement is to be applied. The institution's total capital requirement for market risk will be:

a. the sum of the capital charges for market risks as determined using the standardized approach or

b. the measure of market risk derived from the models approach or

c. a mixture of (a) and (b) summed arithmetically.
[BCBS June 2006 par 701(v)]

49. All transactions, including forward sales and purchases, shall be included in the calculation of capital requirements on a trade date basis. Although regular reporting will take place only quarterly, institutions are expected to manage risks in such a way that the capital requirements are being met on a continuous basis, i.e., at the close of each business day. Institutions are also expected to maintain strict risk management systems to ensure that intra-day exposures are not excessive. [BCBS June 2006 par 701(vi)]

Appendix 9-1 - Summary of Capital Charges by Instrument

50. The following tables have been provided for illustrative purposes and are intended to give a broad indication of the capital charges that apply to selected instruments. Specific instruments may be subject to additional charges: For example, a debt instrument denominated in a foreign currency and held in the trading book would be subject to both the general market risk charge for interest rate position risk and foreign exchange risk. The same debt instrument held outside the trading book would be subject to a general market risk charge for foreign exchange and a credit default risk charge.

Instruments	**Specific Risk Charge**	**General Market Risk Charge**	**Options Risk Charge**	**Credit Default Risk Charge**[5]
Interest rate position risk				
Debt instruments[6]	X	X		
Debt forward contracts	X	X		X
Debt index forward contracts		X		X
Equity position risk				
Equity instruments	X	X		
Equity forward contracts	X	X		X

[5] Exchange traded contracts subject to daily margining requirements may be excluded from the capital calculation.

[6] This refers only to trading book instruments.

Instruments	Specific Risk Charge	General Market Risk Charge	Options Risk Charge	Credit Default Risk Charge[5]
Equity index forward contracts	X[7]	X		X
Foreign exchange position risk				
Foreign exchange spot		X		X
Foreign exchange forward		X		X
Commodities risk				
Gold spot		X		X
Gold forward contracts		X		X
Commodity spot		X		X
Commodity forward contracts		X		X

Instruments	Specific Risk Charge	General Market Risk Charge	Options Risk Charge	Credit Default Risk Charge
Options Portfolios				
Simplified Method				
Debt options purchased			X	X
Debt index options purchased			X	X
Equity options purchased			X	X
Equity index options purchased			X	X
Foreign exchange options purchased			X	X
Gold options purchased			X	X
Commodity options purchased			X	X
Scenario Method				
Debt options	X		X	X
Debt index options			X	X
Equity options	X		X	X
Equity index options	X[8]		X	X
Foreign exchange options			X	X

7 Diversified equity indices require a low specific risk charge of 2% to cover execution and tracking risks.
8 Diversified equity indices require a low specific risk charge of 2% (multiplied by the notional value of the underlying and the option's delta as set out on section 8.10.5) to cover execution and tracking risks.

Instruments	Specific Risk Charge	General Market Risk Charge	Options Risk Charge	Credit Default Risk Charge
Gold options			X	X
Commodity options			X	X

9.10. Standardized approach

9.10.1. Interest rate position risk

51. This section describes the way in which an institution will calculate its capital requirement for interest rate positions held in the trading book where that institution does not use an internal model that meets the criteria set out in section 9.11. The interest rate exposure captured includes exposures arising from interest-bearing and discounted financial instruments, derivatives based on the movement of interest rates and interest rate exposures embedded in derivatives based on non-interest related derivatives including foreign exchange forward contracts. The market risk capital charge for interest rate options in an institution's trading book is calculated separately in accordance with section 9.10.5.

52. Convertible bonds, i.e., debt instruments or preference shares that are convertible, at a stated price, into common shares of the issuer, will be treated as debt securities if they trade like debt securities and as equities if they trade like equities. [BCBS June 2006 par 709(i)] Convertible bonds must be treated as equities where:

a. the first date at which conversion may take place is less than three months ahead, or the next such date (where the first 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 mark to market value of the convertible less the mark to market value of the underlying equity, expressed as a percentage of the mark to market value of the underlying equity.

53. An institution's interest rate position risk requirement under the standardized approach is the sum of the capital required for *specific risk* and *general market risk* for each currency in which the institution has a trading book exposure. The specific risk capital charge depends on the type of product. [BCBS June 2006 par 709(ii)]

9.10.1.1 Specific risk

Non-tranched products

54. The treatment for products that are not covered under the securitization framework (as defined in Chapter 7 – Securitization, section 7.1), and that are not n-th-to-default products, is as follows:

55. The specific risk capital charge is calculated by multiplying the absolute market values of the net positions in the trading book by their respective risk factors. The risk factors, as set out below in Table I, correspond to the category of the obligor and the residual maturity of the instrument.

56. Net positions are arrived at by applying permitted offsets of long and short positions in identical issues (including certain derivative contracts – see sub-section in 9.10.1.1.). Even if the issuer is the same, no offsetting is permitted between different issues to arrive at a net holding since differences in currencies, coupon rates, liquidity, call features, etc., mean that prices may diverge in the short run. [BCBS June 2006 par 709(iii)]

TABLE I [BCBS June 2006 par 710]			
Specific Risk Categories and Weights			
Category	**External Credit Assessment**	**Residual Term to Final Maturity**	**Specific Risk Capital Charge**
Government	AAA to AA-	All	0%
	A+ to BBB-	6 months or less	0.25%
		Greater than 6 months but not exceeding 24 months	1.00%
		Greater than 24 months	1.60%
	BB+ to B-	All	8.00%
	Below B-	All	12.00%
	Unrated	All	8.00%
Qualifying	All	6 months or less	0.25%
		Greater than 6 months but not exceeding 24 months	1.00%
		Greater than 24 months	1.60%
Other	Similar to credit risk charges under the standardized approach for non-investment grade debt securities, e.g.:		
	BB+ to BB-	All	8.00%
	Below BB-	All	12.00%
	Unrated	All	8.00%

OSFI Notes

57. The treatment of a sovereign asset under the standardized approach to specific risk is based on its rating. Obligations of Canadian provinces are treated as obligations of the government of Canada for the purpose of specific risk factors in the framework.

58. A specific risk charge will apply to derivative contracts in the trading book only when they are based on an underlying instrument. For example, where an interest rate swap is based on an index of Bankers' Acceptance rates, there will not be a specific risk charge. However an

option based on a corporate bond will generate a specific risk charge. Appendix 9-V includes examples of derivatives in the trading book that require a specific risk charge and derivatives in the trading book that do not.

59. The specific risk charge for net positions in derivative contracts is calculated by multiplying:

- The market value of the effective notional amount of the debt instrument that underlies an interest rate swap, future or forward

  by

- the specific risk factors in Table I that correspond to the category and residual term of the underlying debt instrument.

Effective notional amount

60. The effective notional amount of a derivative net position is the (absolute) market value of a net position in a stated underlying debt instrument adjusted to reflect any multiplier applicable to the contract's reference rate(s) or, where there is no multiplier component, simply, the market value of the stated underlying debt instrument.

61. All over-the-counter derivative contracts are subject to the counterparty credit risk charges determined in accordance with Chapter 5 – Credit Risk Mitigation, even where a specific risk charge is required. A specific risk requirement would arise if the derivative position was based on an underlying instrument or security. For example, if the underlying security was a AAA rated corporate bond, the derivative will attract a specific risk requirement based on the underlying bond. However, where the derivative was based on an underlying exposure that was an index (e.g., interbank rates), no specific risk would arise.

Government

62. The *government* category includes all forms of debt instruments, including but not limited to bonds, treasury bills and other short-term instruments, that have been issued by, fully guaranteed by, or fully collateralized by securities issued by:

- the Government of Canada, or the government of a Canadian province or territory; or
- an agent of the federal government, or a provincial or territorial government in Canada whose debts are, by virtue of their enabling legislation, direct obligations of the parent government.

[BCBS June 2006 par 710(i)]

63. The government category also includes all forms of debt instruments that are issued by, or fully guaranteed by, central governments that:

- have been rated, and whose rating is reflective of the issuing country's creditworthiness;

  or

- are denominated in the local currency of the issuing government, and funded by liabilities booked in that currency.

[BCBS June 2006 par 711]

Qualifying

64. The *qualifying* category includes debt securities that are rated investment-grade and issued by or fully guaranteed by:

a. a public sector entity,

b. a multilateral development bank[9],

c. a bank where the instrument does not qualify as capital of the issuing institution[10], or

d. a regulated securities firm in a BCBS-member country or country that has implemented BCBS-equivalent standards.

[BCBS June 2006 par 711(i)]

OSFI Notes

65. OSFI expects the institution to conduct its own internal self-assessment as to whether a non-BCBS member country has implemented BCBS equivalent standards.

66. In addition, the *qualifying* category also includes any other debt securities issued by a non-government obligor that have been rated investment-grade[11] by at least two nationally recognized credit rating services, or rated investment-grade by one nationally recognized credit rating agency and not less than investment-grade by any other credit rating agency. [BCBS June 2006 par 711(ii)]

67. Furthermore, institutions using the IRB approach for a portfolio may include an unrated security in the qualifying category if the security meets both of the following conditions:

a. the security is rated equivalent to investment grade under the institution's internal rating system[12], which OSFI has confirmed complies with the requirements for the IRB approach, and

b. the issuer has securities listed on a recognized stock exchange.

[BCBS June 2006 par 712]

[9] Multilateral banks are defined in Chapter 3 – Credit Risk – Standardized Approach.

[10] Government-sponsored agencies, multilateral development banks, and banks are defined in Chapter 3 – Credit Risk – Standardized Approach. Instruments issued by banks should meet the ratings criteria listed in paragraph 65 and should originate from a BCBS-member country or country that has implemented BCBS-equivalent standards .

[11] See Table II below - e.g., rated Baa or higher by Moody's and BBB or higher by Standard and Poor's..

[12] Equivalent means that the debt security has a one-year PD less than or equal to the one year PD implied by the long-run average one-year PD of a security rated investment grade or better by a nationally recognized rating agency.

68. Nationally recognized credit rating agencies include but are not restricted to:

a. DBRS,

b. Moody's Investors Service (Moody's),

c. Standard & Poors (S&P),

d. Fitch Rating Services (Fitch),

e. Koll Bond Rating Agency (KBRA),

f. Japan Credit Rating Agency, LTD (JCR), and

g. Japan Rating and Investment Information (R&I).

Table II provides the minimum ratings constituting investment grade for the agencies listed above.

TABLE II		
Example Minimum Ratings Comprising Investment Grade		
	Minimum Ratings	
Rating Agency	**Securities**	**Money market**
DBRS	BBB low	A-3
Moody's	Baa3	P-3
S&P	BBB-	A-3
Fitch	BBB-	A-3
KBRA	BBB-	K3
JCR	BBB-	J-2
R&I	BBB-	a-3

Other

69. The *other* category is comprised of securities that do not meet the criteria for inclusion in the government or qualifying categories. Instruments in this category receive the same specific risk charge as do non-investment grade securities under the standardized approach to credit risk in this guideline. [BCBS June 2006 par 712(i)]

70. However, since this may in certain cases considerably underestimate the specific risk for debt instruments that have a high yield to redemption relative to government debt securities, OSFI will have the discretion:

- To apply a higher specific risk charge to such instruments; and/or
- To disallow offsetting for the purposes of defining the extent of general market risk between such instruments and any other debt instruments.

[BCBS December 2010 par 712(ii)]

Credit derivatives

71. This section describes the minimum capital required to cover specific risk for positions in credit derivatives in the trading book. Such positions are also subject to the capital requirements for counterparty credit risk.

For the purpose of calculating the capital requirement, credit derivatives transactions are broken down into constituent components as follows.

Total rate of return swaps are represented as two legs of a single transaction. The first leg is an effective notional position in the reference asset to which the corresponding general and specific risk charges apply. The second leg, representing interest payments under the swap, is recorded as a notional position in a government bond in the reference currency with the appropriate fixed or floating rate.

Credit default swaps/products for the guarantor are represented as an effective notional position in the reference asset but are subject only to a specific risk charge. For such products, there is no general market risk position created in the reference asset. If periodic premium or interest payments are required of the beneficiary under the swap, these cash flows are represented as a notional position in a government bond in the reference currency with the appropriate fixed or floating rate.

Credit-linked notes are treated as a position in the note itself, with an embedded credit default product. The credit-linked note has specific risk of the issuer and general market risk according to the coupon or interest rate of the note. The embedded credit default product creates an effective notional position in the specific risk of the reference asset.

72. In almost all credit derivatives (including total rate of return swaps, credit default products and credit-linked notes), specific risk is created in the reference asset. When the credit derivative is for a single reference asset, the beneficiary creates a short position in the reference asset, while the guarantor creates a long position in the reference asset. For some credit-linked note products, or other products in which the guarantor funds the beneficiary (posts cash or collateral), a long specific risk position in the note issuer, in the amount of the collateral, is also created.

Appendix 9-2 - Summary of Capital Charges for Credit Derivatives

73. The following table summarizes the application of capital charge components to the three forms of credit derivative contracts.

		Guarantor (variable payer)	**Beneficiary (fixed payer)**
Total Return Swap	General Market Risk	Long position in the reference asset and a short position in the notional bond (interest rate leg of contract)	Short position in the reference asset and a long position in the notional bond (interest rate leg of contract)
	Specific Risk	Long position(s) in the reference asset(s)	Short position(s) in the reference asset(s)
	Counterparty Credit Risk	Add-on factor	Add-on factor
Credit Default Swap	General Market Risk	Normally no risk from market movements	Normally no risk from market movements
	Specific Risk	Long position(s) in the reference asset(s)	Short position(s) in the reference asset(s)
	Counterparty Credit Risk	Counterparty risk depends on whether future payments are due from fixed payer. If so and add-on factor is required but is capped by unpaid premiums as described in section 9.7.1.	Add-on factor
Credit-Linked Note	General Market Risk	Long position in the note	No risk from market movements
	Specific Risk	Long position(s) in the reference asset(s) plus long position on the note issuer	Short position(s) in the reference asset(s)
	Counterparty Credit Risk	No counterparty risk	No counterparty risk

74. The specific risk capital charge is calculated by multiplying the absolute values of the derivative positions (mark-to-market) in the trading book by their respective risk factors, as outlined elsewhere in this guideline. Institutions will generally use the factors in the non-tranched products sub-section of 9.10.1.1.– Table I (Specific Risk Categories and Weights), taking into account the category (government, qualifying, or non-qualifying) and the residual maturity (six months to two years).

Limitation of the specific risk capital charge to the maximum possible loss

75. Institutions may limit the capital charge for an individual position in a credit derivative (or securitization instruments as described below in the tranched products sub-section of 9.10.1.1.) to the maximum possible loss. For a short risk position (beneficiary) this limit could be calculated as a change in value due to the underlying names immediately becoming default risk-free. For a long risk position (guarantor), the maximum possible loss could be calculated as the change in value in the event that all the underlying names were to default with zero recoveries. The maximum possible loss must be calculated for each individual position. [BCBS December 2010 par 712(viii)]

Netting

76. Netting of positions within the specific risk category is permitted under the conditions described below. Where a credit default product or credit-linked note is of shorter maturity than the reference asset, a specific risk offset is allowed between the long and short specific risk positions, but a forward position in the specific risk of the reference asset is recorded. The net result is a single specific risk charge for the longer maturity position in the reference asset.

77. No capital is required for specific risk for either side of a position in cases where the values of the two legs (i.e., long and short) always move in the opposite direction and broadly to the same extent. This occurs where:

a. the two legs consist of completely identical instruments[13], 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).

[BCBS June 2006 par 713]

78. A partial reduction in the specific risk charge is permitted when the values of two legs (i.e., long and short) always move in the opposite direction but not broadly to the same extent. This occurs where 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, the key features of the credit derivative contract (e.g., credit event definitions, settlement mechanisms) do not cause the price movement of the credit derivative to materially deviate from the price movements of the cash position.

79. To the extent that a transaction meeting the requirements of this paragraph transfers risk (i.e., taking account of restrictive payout provisions such as fixed payouts and materiality thresholds), the specific risk charge for the side of the transaction with the higher charge is reduced by 80%, while the specific risk charge for the other side of the transaction is zero.

[BCBS June 2006 par 714]

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

80. A partial reduction in the specific risk charge is also permitted when the values of two legs (i.e., long and short) usually move in the opposite direction. This occurs where:

- The position is captured under b) above, with the exception that there is an asset mismatch between the reference obligation and the underlying exposure. However, the reference obligation ranks pari passu with or is junior to the underlying obligation, the underlying and reference obligations share the same obligor (i.e., the same legal entity), and there are legally enforceable cross-default or cross-acceleration clauses in place.
- The position is captured under a) or paragraph 78above, with the exception that there is a currency or maturity mismatch[14] between the credit protection and the underlying asset.
- The position is captured under paragraph 78above, with the exception that 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.

[BCBS June 2006 par 715]

81. In each of the above cases, the specific risk charge for the side of the transaction with the higher charge remains the same, but the specific risk charge for the other side of the transaction is zero. [BCBS June 2006 par 716]

82. For all other cases not specifically mentioned above, the full specific risk capital charge applies to both sides of the position. [BCBS June 2006 par 717]

Tranched products

83. Tranched products include those covered under the securitization framework (as defined in Chapter 7 – Securitization, section 7.1) and n-th to default products (henceforth 'tranched products'). The specific risk charge for a tranched product depends on whether it is eligible for inclusion in a correlation trading portfolio. Notwithstanding this eligibility, the rules for permissible offsets as applied to non-tranched products (e.g., offsetting of long and short positions is permitted for tranched positions <u>only</u> in <u>identical</u> issues) apply here as well. The specific risk capital charge for a net position in a tranched product is calculated as the lesser of:

a. the product of the market value of the tranched product position and its respective charge[15] as determined by applying the capital approaches as outlined in Chapter 7 ;

   and

b. the maximum possible loss that could arise under that net position.

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

[15] The charge is determined as the product of the risk-weight as calculated under the applicable approach and the minimum total capital requirement of 8%)

OSFI Notes

84. Asset backed securities that do not involve "at least two different stratified risk positions or tranches reflecting different degrees of credit risk" but might involve other sorts of tranching associated with pre-payment, as an example, are not considered tranched products under this framework. As a consequence, such products can be treated as non-tranched positions for the purposes of specific risk capital requirements based on either the standardized framework or internal models.

Correlation trading portfolio products

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

a. The positions are neither securitization positions, nor derivatives of securitization exposures that do not provide a pro-rata share in the proceeds of a securitization tranche (this therefore excludes options on a securitization tranche, or a synthetically leveraged super-senior tranche <u>or any complex "double leverage" position that might not be captured by the definition of re-securitization and therefore excluded</u>.);

   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 standardized 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.[16] An institution may also include in the correlation trading portfolio positions that hedge the positions described above and which are neither securitization 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.

[BCBS December 2010 par 689(iv)]

[16] Specifically, a bank must exclude from the correlation trading portfolio any SPV-issued instrument backed, directly or indirectly, by a position that would itself be excluded if held by the bank directly. Thus, notes issued by an SPV holding residential or commercial mortgages would not be eligible for inclusion in the correlation trading portfolio. However, a cash CDO position could be included in the correlation trading portfolio if the assets underlying the CDO met all of the relevant criteria (eg the underlyings are single-name corporate bonds having liquid two-way markets).

86. The specific risk capital charge for the correlation trading portfolio is equal to the greater of:

a. the total specific risk capital charges that would apply only to the net long positions from the net long correlation trading exposures combined,

   or

b. the total specific risk capital charges that would apply only 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.[17]

[BCBS December 2010 par 709(ii)]

Non-correlation trading portfolio products

87. The specific risk capital charge for tranched products that are not eligible for inclusion in a correlation trading portfolio is calculated by multiplying the absolute values of the tranched positions in the trading book by their respective charges.

88. For this calculation, offsetting of long and short positions is permitted for tranched positions in identical issues with identical attachment and detachment points, and underlying reference names, etc..

89. Institutions must apply the hierarchy of approaches specified in Section 7.5.2 of Chapter 7.

a. The securitization Internal Ratings-Based Approach (SEC-IRBA) is to be applied if the institution has approval to apply the IRB credit approach for the underlying asset type and it has sufficient information to calculate the IRB capital requirements for the assets in the securitization[18].
b. If the institution does not fulfill these requirements and the securitization exposures are externally-rated, the securitization External Ratings Based Approach (SEC-ERBA) is to be used. The operational requirements for the recognition of external credit assessments outlined in Chapter 7 – Securitization, paragraph 109 must be met in order to apply the SEC-ERBA.
c. If neither the SEC-IRBA or the SEC-ERBA are available, the securitization Standardized Approach (SEC-SA) is to be used. Resecuritization exposures as defined in Chapter 7 – Securitization, must have the capital charge determined using the SEC-SA with specific adjustments and other limitations as outlined in section 7.6 of Chapter 7.
d. Institutions may recognize the alternative capital requirements as outlined in section 7.10 of Chapter 7 for securitizations exposures that are determined to be STC-compliant.[19]

[17] Note that the application of the maximum operator to net long positions and net short positions can be done after considering all permissible netting options (including those considered in section 8.10.1.1).

[18] Recognizing that sufficient information to calculate the IRB capital requirements may not be readily available for short-term trading book exposures, institutions may develop an internal policy to determine what is needed for the institution to have sufficient information to calculate IRB capital requirements for trading book exposures. This policy must be consistently applied.

[19] Recognizing that assessing the STC criteria may not be feasible for short-term trading book exposures, institutions may develop an internal policy that assigns STC compliance to securitization exposures in the trading book using a heuristic approach. The policy must be consistently applied, and assessed at least annually for bias.

[BCBS December 2010 par 712(v))]

90. A position subject to a 1250% Risk Weight (100% capital charge) according to the standardized approaches to interest rate specific risk for tranched products may be excluded from the calculation of the capital charge for general market risk whether the institution applies the standardized measurement method or the internal models method for the calculation of its general market risk capital charge. [BCBS December 2010 par 712(vii))]

N-th to default products

91. 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 an institution has a risk position in one of the reference credit instruments underlying a first-to-default credit derivative and this credit derivative hedges the institution's risk position, the institution 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 an institution 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 securitization risk weights as specified above for tranched products, as applicable.

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

[BCBS December 2010 par 718]

9.10.1.2 General market risk

Overview

92. An institution may measure its exposure to general market risk using the *maturity method,* which uses standardized risk weights that approximate the price sensitivity of various instruments. The maturity method uses a maturity-ladder that incorporates a series of "time-bands" that are divided into maturity "zones" for grouping together securities of similar maturities. These time bands and zones are designed to take into account differences in price sensitivities and interest rate volatilities across different maturities.

93. A separate maturity ladder must be constructed for each currency in which an institution has significant positions, and capital requirements must be calculated for each currency separately. No offsetting of positions is permitted between different currencies in which positions are significant. Positions in currencies that are not significant may be combined into a common maturity ladder, with the net long or short position of each currency entered in the applicable time band. The net positions are to be summed within each time band, irrespective of whether they are positive or negative, to arrive at the gross position. [BCBS June 2006 par 718(ii)]

94. Opposite positions of the same amount in the same issues (but not different issues by the same issuer), whether actual or notional, may be excluded from the interest rate maturity framework, as well as closely matched swaps, forwards, futures, and forward rate agreements (FRAs) that meet the conditions set out in the sub-section on interest rate derivatives in Appendix 9-III. [BCBS June 2006 par 718(iii)]

95. The capital requirement for general market risk, excluding options, is the sum of:

- Basis risk charge

Matched weighted positions in all time bands	x 10%

- Yield curve risk charge

Matched weighted positions in zone 1	x 40%
Matched weighted positions in zone 2	x 30%
Matched weighted positions in zone 3	x 30%
Matched weighted positions between zones 1 and 2	x 40%
Matched weighted positions between zones 2 and 3	x 40%
Matched weighted positions between zones 1 and 3	x 100%

- Net position charge

Residual unmatched weighted positions	x 100%

96. An example of the calculation of general market risk under the maturity method can be found in Appendix 9-III.

General market risk calculation

97. To calculate the *general market risk* charge, the institution distributes the long or short position (at current market value) of each debt instrument and other source of interest rate exposure, including derivatives, into the time-bands and three zones of the maturity ladder outlined in Table V. Once all long and short positions are placed into the appropriate time-bands, the long positions in each time-band are summed and the short positions in each time-band are summed.

98. The summed positions are multiplied by the appropriate risk-weight factor (reflecting the price sensitivity of the positions to changes in interest rates) to determine the risk-weighted long and short market risk positions for each time-band. [BCBS June 2006 par 718(iv)]

99. The risk weights for each time-band are:

TABLE V			
Maturity Method: Zones, Time-bands and Weights			
Zone	**Time-bands**	**Time-bands**	**Risk Weights**
	For Coupon 3% or more	**For Coupon less than 3% and zero coupon bonds**	**[%]**
1	up to 1 month	up to 1 month	0.00
	1 up to 3 months	1 up to 3 months	0.20
	3 up to 6 months	3 up to 6 months	0.40
	6 up to 12 months	6 up to 12 months	0.70
2	1 up to 2 years	1 up to 1.9 years	1.25
	2 up to 3 years	1.9 up to 2.8 years	1.75
	3 up to 4 years	2.8 up to 3.6 years	2.25
3	4 up to 5 years	3.6 up to 4.3 years	2.75
	5 up to 7 years	4.3 up to 5.7 years	3.25
	7 up to 10 years	5.7 up to 7.3 years	3.75
	10 up to 15 years	7.3 up to 9.3 years	4.50
	15 up to 20 years	9.3 up to 10.6 years	5.25
	over 20 years	10.6 up to 12 years	6.00
		12 up to 20 years	8.00
		over 20 years	12.50

100. A capital requirement is calculated for the matched weighted position in each time band to address basis risk. The capital requirement is 10% of the matched weighted position in each time band, that is, 10% of the smaller of the risk-weighted long or risk-weighted short position,

or if the positions are equal, 10% of either position.[20] If there is only a gross long or only a gross short position in the time band, a basis risk charge is not calculated. The remainder (i.e., the excess of the weighted long positions over the weighted short positions, or vice versa, within a time band) is called the unmatched weighted position for that time band. [BCBS June 2006 par 718(v)]

101. The basis risk charges for each time-band are absolute values, that is, neither long nor short. The charges for all time-bands in the maturity ladder are summed and included as an element of the general market risk capital requirement.

102. Capital requirements, referred to as the yield curve risk charge, are assessed to allow for the imperfect correlation of interest rates along the yield curve. There are two elements to the yield curve risk charge. The first element is a charge on the matched weighted positions in zones 1, 2 and 3. The second is a capital charge on the matched weighted positions between zones.

103. The matched weighted position in each zone is multiplied by the percentage risk factor corresponding to the relevant zone. The risk factors for zones 1, 2 and 3 are provided in Table VI. The matched and unmatched weighted positions for each zone are calculated as follows. Where a zone has both unmatched weighted long and short positions for various time bands within a zone, 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.

104. The matched weighted positions between zones are multiplied by the percentage risk factor corresponding to the relevant adjacent zones. The risk factors for adjacent offsetting zones are provided in Table VI. To arrive at the matched weighted positions between zones, the unmatched weighted positions of a zone may be offset against positions in other zones as follows.

a. The unmatched weighted long (short) position in zone 1 may offset the unmatched weighted short (long) position in zone 2. The extent to which unmatched weighted positions in zones 1 and 2 are offset is described as the matched weighted position between zones 1 and 2.

b. Then, any residual unmatched weighted long (short) positions in zone 2 may then be matched by offsetting unmatched weighted short (long) positions between zone 2 and zone 3.[21]

c. Then, any residual unmatched weighted long (short) positions in zone 1 may then be matched by offsetting unmatched weighted long (short) positions in zone 3. The extent to

[20] For example, if the sum of the weighted longs in a time-band is $100 million and the sum of the weighted shorts is $90 million, the basis risk charge for the time-band is 10% of $90 million, or $9 million.

[21] For example, if the unmatched weighted position for zone 1 was long $100 and for zone 2 was short ($200), the capital charge for the matched weighted position between zone 1 and 2 would be 40% of $100, or $40. The residual unmatched weighted position in zone 2 ($100) also could have been carried over to offset a long position in zone 3 and would have attracted a 40% charge.

which the unmatched positions in zones 1 and 3 are offsetting is described as the matched weighted positions between zones 1 and 3.

105. The yield curve risk charges, like the basis risk charges, are absolute values that are summed and included as an element of the general market risk capital requirement.

<table>
<tr><th colspan="5">TABLE VI</th></tr>
<tr><th colspan="5">Zonal Disallowances</th></tr>
<tr><th>Zone</th><th>Time-Band</th><th>Within the zone</th><th>Between adjacent zones</th><th>Between zones 1-3</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">1</td><td>0-1 month</td><td rowspan="4">40%</td><td rowspan="7">40%</td><td rowspan="13">100%</td></tr>
<tr><td>1-3 months</td></tr>
<tr><td>3-6 months</td></tr>
<tr><td>6-12 months</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td rowspan="3">2</td><td>1-2 years</td><td rowspan="3">30%</td></tr>
<tr><td>2-3 years</td></tr>
<tr><td>3-4 years</td><td rowspan="7">40%</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td rowspan="6">3</td><td>4-5 years</td><td rowspan="6">30%</td></tr>
<tr><td>5-7 years</td></tr>
<tr><td>7-10 years</td></tr>
<tr><td>10-15 years</td></tr>
<tr><td>15-20 years</td></tr>
<tr><td>over 20 years</td></tr>
</table>

106. The net position charge for interest rate position risk in a currency is the absolute value of the sum of the weighted net open positions in each time band. [BCBS June 2006 par 718(vi)]

Appendix 9-3 - Position Reporting for General Market Risk Calculations

Debt instruments

107. Fixed-rate instruments are allocated according to the remaining term to maturity and floating-rate instruments according to the next repricing date. A callable bond that has a market price above par is slotted according to its first call date, while a callable bond with a market price below par is slotted according to remaining maturity. Mortgage-backed securities are slotted according to their final maturity dates.

Interest rate derivatives

108. Debt derivatives and other off-balance sheet positions whose values are affected by changes in interest rates are included in the measurement system described above, except for options and the associated underlying instrument (the measurement system for options is described later). A summary of the treatment for debt derivatives is set out in the following table. [BCBS June 2006 par 718(ix)]

109. Derivatives are converted into positions in the relevant underlying instrument and are included in the calculation of specific and general market risk capital charges as described above. The amount to be included is the market value of the principal amount of the underlying instrument or of the notional underlying. For instruments where the apparent notional amount differs from the effective notional amount, an institution must use the effective notional amount. [BCBS June 2006 par 718(x)]

110. Futures and forward contracts (including FRAs) are broken down into a combination of a long position and short position in the notional security. The maturity of a future or a FRA is the period until delivery or exercise of the contract, plus the life of the underlying instrument.[22] Where a range of instruments may be delivered to fulfil the contract, the institution may choose which deliverable instrument goes into the maturity ladder as the notional underlying instrument. In the case of a future on a corporate bond index, positions are included at the market value of the notional underlying portfolio of securities. [BCBS June 2006 par 718(xi)]

111. Although an FRA is closely analogous to an interest rate future, the words "buyer" and "seller" when used in reference to FRAs have the opposite meaning to that used in the financial futures market. The "buyer" of an FRA is fixing the interest rate on a deposit that it will receive in the future. Hence, if interest rates rise, the buyer of an FRA receives the difference between the contracted rate and the new (higher) rate from the seller; that is the buyer makes a gain. Thus, an institution wishing to hedge against a rise in interest rates may buy an FRA or sell an interest rate future.

Position Reporting for the Maturity Method				
	First Reporting Leg		**Second Reporting Leg**	
Instrument Type	**Amount**	**Report According to:**	**Amount**	**Report According to:**
Interest Rate Swaps:				
Pay Fixed	- NP	Maturity Date	+ NP	Next Settlement Date: Pay
Receive Fixed	+ NP	Maturity Date	- NP	Next Settlement Date: Receive
Forward Rate Agreements:				
Buy (i.e., short)	- NP	Maturity Date	+ NP	Value Date
Sell (i.e., long)	+ NP	Maturity Date	- NP	Value Date

[22] For example, assuming an April 30 reporting date, a long position in a June three-month bankers acceptance future (BAX) is recorded as a long position maturing in five months and a short position maturing in two months. NP = Notional principal in relevant currency

Position Reporting for the Maturity Method				
	First Reporting Leg		**Second Reporting Leg**	
Instrument Type	**Amount**	**Report According to:**	**Amount**	**Report According to:**
3-month BAX Futures:				
Buy	+ NP	Maturity Date + 3 months	- NP	Maturity Date
Sell	- NP	Maturity Date + 3 months	+ NP	Maturity Date
Gov't Bonds and Notes	+ NP	Maturity Date		
Cross Currency Swaps:				
Received Floating	+ NP	Value Date + Frequency**		
Pay Floating	- NP	Value Date + Frequency**		
Receive Fixed	+ NP	Maturity Date		
Pay Fixed	- NP	Maturity Date		
FX Forwards	+ NP (Buy)	Value Date	- NP (Sell)	Value Date

112. Swaps are treated as two notional positions in the relevant instruments with appropriate maturities. The receiving side is treated as the long position and the paying side is treated as the short position.[23] The separate sides of cross-currency swaps or forward foreign exchange transactions are slotted in the relevant maturity ladders for the currencies concerned. For swaps that pay or receive a fixed or floating interest rate against some other reference price, for example, an equity index, the interest rate component is slotted into the appropriate repricing maturity category, with the long or short position attributable to the equity component being included in the equity framework set out above.[24] [BCBS June 2006 par 718(xii)]

113. An institution may offset long and short positions (both actual and notional) in identical derivative instruments with exactly the same issuer, coupon, currency, and maturity before

** Starting with the value date, move forward in intervals according to the frequency of payments (e.g., 3M, 6M, or 1YR)

[23] For example, an interest rate swap under which an institution is receiving floating-rate interest and paying fixed is treated as a long position in a floating rate instrument with a maturity equivalent to the period until the next interest reset date and a short position in a fixed-rate instrument with a maturity equivalent to the remaining life of the swap.

[24] An institution with a large swap book may, subject to review by OSFI, use alternative formulae to calculate the positions to be included in the maturity ladder. For example, an institution could first convert the payments required by the swap into present values. For that purpose, each payment would be discounted using zero coupon yields, and the payment's present value entered into the appropriate time-band using procedures that apply to zero (or low) coupon bonds. The net amounts would then be treated as bonds, and slotted into the general market risk framework. Such alternative treatments will, however, only be allowed if: (i) OSFI is fully satisfied with the accuracy of the system being used, (ii) the positions calculated fully reflect the sensitivity of the cash flows to interest rate changes; and (iii) the positions are denominated in the same currency.

slotting these positions into time-bands. A matched position in a future and its corresponding underlying may also be fully offset and, thus, excluded from the calculation, except when the future comprises a range of deliverable instruments. However, in cases where, among the range of deliverable instruments, there is a readily identifiable underlying instrument that is most profitable for the trader with a short position to deliver, positions in the futures contract and the instrument may be offset. No offsetting is allowed between positions in different currencies. [BCBS June 2006 par 718(xiii)]

114. Offsetting positions in the same category of instruments can, in certain circumstances, be regarded as matched and treated by the institution as a single net position that should be entered into the appropriate time-band. To qualify for this treatment, the positions must be based on the same underlying instrument, be of the same nominal value, and be denominated in the same currency. The separate sides of different swaps may also be "matched" subject to the same conditions. [BCBS June 2006 par 718(xiv)]

115. In addition:

a. For futures, offsetting positions in the notional or underlying instruments to which the futures contract relates must be for identical instruments and the instruments must mature within seven days of each other [BCBS June 2006 par 718(xiv)(i)];

b. For swaps and FRAs, the reference rate (for floating rate positions) must be identical and the coupon closely matched (i.e., within 15 basis points) [BCBS June 2006 par 718(xiv)(ii)]; and

c. For swaps, FRAs and forwards, the next interest reset date, or for fixed coupon positions or forwards, the remaining maturity must correspond within the following limits: If the reset (remaining maturity) dates occur within one month, then the reset dates must be on the same day; if the reset dates occur between one month and one year later, then the reset dates must occur within seven days of each other, or if the reset dates occur over one year later, then the reset dates must occur within thirty days of each other

[BCBS June 2006 par 718(xiv)(iii)].

116. Interest rate and currency swaps, FRAs, forward foreign exchange contracts and interest rate futures are not subject to a specific risk charge. This exemption also applies to futures on a short-term (e.g., 3-month Bankers Acceptance rate) interest rate index. However, in the case of futures contracts where the underlying is a debt security, or an index representing a basket of debt securities, a specific risk charge will apply according to the category of the issuer. [BCBS June 2006 par 718(xvi)]

Appendix 9-4 - Sample Steps in the Calculation of General Market Risk for Debt Instruments using the Maturity Method

117. A hypothetical institution has the following given positions designated as trading:

(a) Qualifying bond, $13.33 million market value, remaining maturity 8 years, coupon 8%.

(b) Government bond, $75 million market value, remaining maturity 2 months, coupon 7%.

(c) Interest rate swap, $150 million, institution receives floating rate interest and pays fixed, next interest reset after 12 months, remaining life of swap is 8 years (assumes the current interest rate is identical to the one the swap is based on).

(d) Long position in interest rate future, $50 million, delivery date after 6 months, life of underlying government security is 3.5 years (assumes the current interest rate is identical to the one on which the swap is based).

118. The institution would record these instruments as positions in a maturity ladder as shown below:

Zone	**Time-band**	**Position for Instruments: in $ millions**				**Risk Weights [%]**	**Risk Weighted Long Positions $ millions**	**Risk Weighted (Short) positions $ millions**
		A	**B**	**C**	**D**			
1	0-1 mth					0.00		
	1-3 mth		$75			0.20	0.15	
	3-6 mth				($50)	0.40		(0.20)
	6-12 mth			$150		0.70	1.05	
2	1-2 years					1.25		
	2-3 years					1.75		
	3-4 years				$50	2.25	1.125	
3	4-5 years					2.75		
	5-7 years					3.25		
	7-10 years	$13.33		($150)		3.75	0.50	(5.625)
	10-15 years					4.50		
	15-20 years					5.25		
	>20 years					6.00		

119. Each position would be multiplied by the risk weight corresponding to the time band in which it is recorded. The risk-weighted long and risk weighted short positions in each maturity band are the basis of calculating the general market risk capital charges.

120. The first step in the process of calculating general market risk is to calculate a 10% basis risk charge on the matched weighted position in each time band. In this example, there are partially offsetting long and short positions in the 7-10 year time-band, the matched portion of

which is equal to $500,000 (i.e., 0.50 million). Ten percent of this matched portion is equal to $50,000 [.10 x 0.50= 0.05 ($50,000)].

In $ millions					
Zone	**Time-band**	**Risk Weighted Long Positions**	**Risk Weighted (Short) Positions**	**Unmatched Weighted Position**	**Step 1** **10% Basis risk charge**
1	0-1 mth				
	1-3 mth	0.15		0.15	n/a
	3-6 mth		(0.20)	(0.20)	n/a
	6-12 mth	1.05		1.05	n/a
2	1-2 years				
	2-3 years				
	3-4 years	1.125		1.125	n/a
3	4-5 years				
	5-7 years				
	7-10 years	0.50	(5.625)	(5.125)	0.050
	10-15 years				
	15-20 years				
	>20 years				
TOTAL					**0.05**

121. Step 2 requires the calculation of the yield curve risk charge. The yield curve risk charge is calculated on the matched weighted position in each zone using the percentage risk factors in the table below . In this example, a charge would be calculated for zone 1 (step 2(a)). It would be 40 % of the total offsetting in the zone -- 40% x 0.20 = 0.08 ($80,000). No charge is required if offsetting does not occur within a zone.

Zone	Time-band	Unmatched Weighted Positions	Step 2(a) 30% to 40% of Matched weighted Zone position	Step 2(b) 40% to 100% Matched between Zones
1	0-1 mth			
	1-3 mth	0.15		
	3-6 mth	(0.20)		
	6-12 mth	1.05		
Zone 1 totals		long 1.20 short (0.20) unmatched 1.00	**0.08** =.20 x 40%	n/a [Zone 1 & 2 net totals are both long]
2	1-2 years			
	2-3 years			
	3-4 years	1.125		
Zone 2 totals		long 1.125	n/a	**0.45** = 40% x the lesser of 1.125 and 5.125 Charge on the offsetting between Zone 2 (long) and Zone 3 (short)]
3	4-5 years			
	5-7 years			
	7-10 years	(5.125)		
	10-15 years			
	15-20 years			
	>20 years			
Zone 3 total		short (5.125)	n/a	**1.0** = 100% x 1.00 [Charge on the offsetting between Zone 1 and Zone 3]

122. In step 2(b), the yield curve risk charges on matching between residual unmatched weighted positions in the three zones are calculated. Zone 1 and zone 2 are offset, if possible, reducing or eliminating the unmatched weighted positions in zone 1 and zone 2, as appropriate. Zone 2 and zone 3 are then offset, if possible, reducing or eliminating the unmatched weighted position in zone 2 or zone 3, as appropriate. Zone 3 and zone 1 are then offset, if possible, reducing or eliminating the unmatched weighted position in zone 3 and zone 1, as appropriate. A capital requirement is calculated as a percentage of the position eliminated by the inter-zone offsetting.

123. In the example, a charge would be calculated for adjacent zones 2 and 3 (step 3). It would be 40 % of the matched weighted positions between the zones -- 40% x 1.125 = 0.45 ($450,000). A charge would be calculated between zones 1 and 3 (step 3). It would be 100 % of the matched positions between the zones -- 100% x 1.00 = 1.00 ($1,000,000).

124. Step 3 calculates a net position charge equal to the residual unmatched weighted position. In this example this amounts to $3 million [being the absolute value of the sum of 0.15-.20+1.05+1.125-5.125 = -3.00] and would be included as the net position charge for general market risk.

125. The total capital requirement for general market risk for this portfolio would be:

1. Basis risk charge

∑	Matched weighted positions in all time bands	50,000

2. Yield curve risk charge

∑	Matched weighted positions in zone 1	80,000
∑	Matched weighted positions in zone 2	n/a
∑	Matched weighted positions in zone 3	n/a
∑	Matched weighted positions between zones 1 and 2	n/a
∑	Matched weighted positions between zones 2 and 3	450,000
∑	Matched weighted positions between zones 1 and 3	1,000,000

3. Net position charge

∑	Residual unmatched weighted positions	3,000,000

TOTAL GENERAL MARKET RISK	$4,580,000

Appendix 9-5 - Summary of Specific and General Market Risk Charges for Interest Rate Derivatives

[BCBS June 2006 par 718(xviii)]

INSTRUMENT	**SPECIFIC RISK CHARGE**[25] (Relating to the issuer of the instrument. There remains a separate capital requirement for counterparty credit risk.)	**GENERAL MARKET RISK CHARGE**
EXCHANGE-TRADED FUTURE		
Government security	Yes	Yes, as two positions
Corporate debt security	Yes	Yes, as two positions
Index on short-term interest rates (e.g., Bankers Acceptances)	No	Yes, as two positions
OTC FORWARD		
Government security	Yes	Yes, as two positions
Corporate debt security	Yes	Yes, as two positions
Index on short-term interest rates	No	Yes, as two positions
FRAs, Swaps	No	Yes, as two positions
Forward foreign exchange	No	Yes, as one position in each currency
Options		For each type of transaction, either:
Government security	Yes	Carve out together with the associated hedging positions
		- simplified approach
		- scenario analysis
		- internal models
Corporate debt security	Yes	Same as above
Index on short-term interest rates	No	Same as above

[25] Refer to Table I in section 9.10.1.1.

General market risk – credit derivatives

126. General market risk for credit derivatives is calculated using the same methodology as that used for cash market debt instruments as described in this guideline. As a result, the combinations for general market risk charges are more limited than those combinations relating to specific risk.

127. Most credit default products do not create a general market risk position for either the guarantor or the beneficiary, since they are written against one counterparty's potential default. There is no risk exposure to market movements.

128. Total rate of return products create a long or short position in the reference asset as well as a short or long position in the notional bond representing the interest rate related leg of the contract. These positions should be incorporated into a maturity ladder using standardized risk weights that approximate the price sensitivity of the instruments. Long or short positions in reference assets that are created on account of total rate of return products are eligible for netting using the same treatment as for other asset positions in the maturity ladder calculation.

129. Credit-linked note products create a long position in the note itself but the position is only applied to the note purchaser (i.e., the guarantor).

9.10.2. Equities risk

130. This section sets out the minimum capital associated with an institution's risk of holding or taking positions in equities within the trading book. An institution which holds equity positions (whether long or short) in the trading book is exposed to the risk that the value of individual equity positions relative to the market may move against the institution - specific risk- and that the equity market as a whole may move against it - general risk. The specific risk requirements recognize that individual equities are subject to issuer risk and liquidity risk, and that these risks may be reduced by portfolio diversification. The general risk requirements set out in this section recognize offsetting positions within national markets. A separate subsection for equity derivatives positions outlines the method for including them in the capital calculation.

131. Equity risk capital requirements will apply to positions and exposures in the trading book on the following instruments:

a. common shares,
b. convertible preference shares or securities,
c. convertible debt securities which convert into equity instruments and are trading as equities[26],
d. depository receipts,
e. any other instruments exhibiting equity characteristics, and
f. equity derivatives or derivatives based on above securities.

[26] See section 9.10.1. for the definition of when a convertible security is trading like an equity.

Non-convertible preference shares are to be excluded from these calculations, as they are covered by the interest rate risk requirements described in section 9.10.1. [BCBS June 2006 par 718(xix)]

132. Equity positions should be allocated to the country in which each equity is listed and the calculations outlined below applied to each country. Equity securities listed in more than one country must be allocated to either (i) the country where the issuer is incorporated and listed or, (ii) the country where the security was purchased or sold, but not both. Switching between countries is not permitted and any foreign exchange position resulting from a long or short position in an equity listed in a country other than Canada must be included in the calculation of the foreign exchange risk capital requirement. Conversion into the institution's reporting currency should be done at current spot foreign exchange rates. Matched positions in each identical equity or stock index in each country may be fully offset, resulting in a single net short or long position to which the specific and general market risk charges will apply. [BCBS June 2006 par 718(xxiv)]

9.10.2.1. Specific risk

133. The measurement of specific risk capital requirements is calculated on the basis of the institution's gross equity positions. The gross position is the sum of the absolute value of all short equity positions and all long equity positions, including positions arising from derivatives, calculated at the current market value. Long and short positions in the same share issue may be reported on a net basis. [BCBS June 2006 par 718(xx)]

134. The specific risk capital requirement for equity positions is 8% of this sum. [BCBS December 2010 par 718 (xxi)]

9.10.2.2. General market risk

135. To calculate general market risk, long and short positions in equity instruments are offset to arrive at a net position. Instruments are valued at current market and a net position must be separately calculated for each country in which the institution holds equity instruments. The capital requirement for general market risk is 8% of the net position for each country. [BCBS June 2006 par 718 (xxi)]

9.10.2.3. Equity derivatives

136. Equity derivatives and other off-balance sheet positions that are affected by changes in equity prices are included in the measurement system (except for equity options, equity index options, and the associated underlying).[27] This includes futures and swaps on both individual equities and on equity indices. Equity derivatives should be converted into notional equity

[27] Where equities are part of a forward contract (both equities to be received or to be delivered), any interest rate or foreign currency exposure from the other side of the contract should be included in the measurement systems in sections 9.10.1 or 9.10.2, as appropriate.

positions in the relevant underlying instrument. A summary of the rules for equity derivatives is set out in Appendix 9-VI. [BCBS June 2006 par 718(xxi)]

Calculation of positions

137. In order to calculate the specific and general market risk, positions in derivatives should be converted into notional equity positions as follows:

a. futures and forward contracts relating to individual equities should be reported at current market price of the underlying;

b. futures relating to stock indices should be reported as the marked-to-market value of the notional underlying equity portfolio;

c. equity swaps are to be treated as two notional positions; and

d. equity options should be carved out together with the associated underlyings and treated under section 9.10.5. [BCBS June 2006 par 718(xxiii)]

Risk in relation to an index

138. A specific risk capital charge of 2% applies to the net long or short position in a contract on an index listed in Table I below. This capital charge is intended to cover factors such as divergence from the general market level and execution risk. The 2% risk weight is to apply only to well diversified indices and not, for example, to sectoral indices. [BCBS June 2006 par 718(xxv)]

139. Positions in indices not listed in Table I must either be decomposed into their component shares, or be treated as a single position based on the sum of current market values of the underlying instruments; if treated as a single position, the specific risk requirement is the highest specific risk charge that would apply to any of the index's constituent shares. An institution's position in an index contract is also subject to an 8% general market risk charge.

TABLE I			
MARKET INDICES			
Australia	S&P/ASX 200	Netherlands	EOE 25
Austria	ATX	Spain	IBEX 35
Belgium	BEL 20	Sweden	OMX
Canada	S&P/TSX 60	Switzerland	SMI
France	CAC 40	United Kingdom	FTSE 100
Germany	DAX	United Kingdom	FTSE mid-250
Japan	Nikkei 25	United States	S&P 500

Futures arbitrage

140. In the case of futures-related arbitrage strategies, the 2% specific risk charge described above may be applied to only one index with the opposite position exempt from a capital charge (both the specific and general market risk capital charges). The strategies qualifying for this treatment are:

a. when the institution takes an opposite position in exactly the same index future at different dates; and

b. when the institution has an opposite position in different but similar indices at the same date, subject to supervisory oversight. [BCBS June 2006 par 718(xxvi)]

141. If an institution engages in a deliberate arbitrage strategy, in which a futures contract on a well-diversified[28] equity index matches a basket of securities, it may exclude both positions from their respective specific and general risk charges on condition that the trade has been deliberately entered into and separately controlled and the composition of the basket of stocks represents at least 90% of the market value of the index.

142. In such a case, there will be a minimum capital requirement of 4% (that is, 2% of the gross value of the positions on each side) to reflect risk associated with executing the transaction. This applies even if all of the securities comprising the index are held in identical proportions. Any excess value of the securities comprising the basket over the value of the futures contract or excess value of the futures contract over the value of the basket is treated as an open long or short position. [BCBS June 2006 par 718(xxvii)]

[28] A portfolio that is well-diversified is characterized by a limited sensitivity to price changes of any single equity issue or closely related group of equity issues held in the portfolio. The volatility of the portfolio's value should not be dominated by the volatility of any individual equity issue or by equity issues from any single industry or economic sector.

Appendix 9-6 - Summary of Treatment for Equity Derivatives
[BCBS June 2006 par 718(xxix)]

INSTRUMENT	**SPECIFIC RISK** (relating to the issuer of the instrument. There remains a separate capital requirement for counterparty credit risk)	**GENERAL MARKET RISK**
Futures, Swaps, & Similar OTC Contracts		
Individual equity Index	Yes 2.0%	Yes, as underlying Yes, as underlying
Options		
Individual equity Index	Yes 2.0%	Carve out from equity position risk framework together with the associated hedging positions and apply: • simplified approach; or • scenario approach; or • internal models.

9.10.3. Foreign exchange position risk

143. This section sets out a shorthand method for calculating the minimum capital required to cover the risk of holding or taking a position in foreign currencies including gold. [BCBS June 2006 par 718(xxx)]

144. Institutions with significant foreign exchange positions are encouraged to use internal models.

145. The capital requirement for foreign exchange risk is applied to the entire business, both the trading and non-trading books. Two steps are required to calculate the capital requirement for foreign exchange risk. The first is to measure the exposure in a single currency position. The second is to calculate the capital requirement for the portfolio of positions in different currencies. [BCBS June 2006 par 718(xxxi)]

146. In summary, the capital charge is 8% of the greater of the sum of (i) the net open long positions or (ii) the net open short positions in each currency, plus the net open position in gold, whatever the sign.[29] [BCBS June 2006 par 718(xli)]

[29] Gold is treated as a foreign exchange position rather than a commodity because its volatility is more in line with foreign currencies and institutions manage it in a manner similar to foreign currencies.

9.10.3.1. Measuring the exposure in a single currency

147. The net open position for each individual currency (and gold) is calculated by summing:

a. the net spot position (i.e., all asset items less all liability items, including accrued interest and accrued expenses, denominated in the currency in question),

b. the net forward position (i.e., all net amounts under forward foreign exchange transactions, including currency futures and the principal on currency swaps),

c. guarantees (and similar instruments) that are certain to be called and are likely to be irrecoverable,

d. net future income/expenses not yet accrued but already fully hedged (at the discretion of the reporting institution), and

e. any other item representing a profit or loss in foreign currencies. [BCBS June 2006 par 718(xxxii)]

Options on foreign exchange are treated separately; see section 9.10.5.

Treatment of immaterial operations

148. Foreign exchange risk is assessed on a consolidated basis. It may be technically impractical in the case of immaterial operations to include some currency positions. In such cases, the internal limit in each currency may be used as a proxy for the positions, provided there is adequate ex post monitoring of actual positions complying with such limits. In these circumstances, the limits should be added, regardless of sign, to the net open position in each currency. [BCBS June 2006 par 718(xli), footnote 139]

Measurement of forward currency positions

149. Forward currency positions should be valued at current spot market exchange rates. It would be inappropriate to use forward exchange rates since, to some extent they reflect current interest rate differentials. Institutions that 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 translated at current spot rates, for measuring their forward currency and gold positions. [BCBS June 2006 par 718(xxxvi)]

Accrued and unearned interest, income and expenses

150. Accrued interest, accrued income and accrued expenses should be treated as a position if they are subject to exchange rate fluctuations. Unearned but expected future interest, income or expenses may be included, provided the amounts are certain and have been fully hedged by forward foreign exchange contracts. Institutions must be consistent in their treatment of unearned interest, income and expenses and must have written policies covering the treatment. The selection of positions that are only beneficial to reducing the overall position will not be permitted. [BCBS June 2006 par 718(xxxv)]

Structural positions

151. Structural positions and related hedges will be exempt from the calculation of net open currency positions. Structural positions may include any of the following:

a. any position arising from an instrument that qualifies to be included in an institution's capital base,

b. any position entered into in relation to the net investment of a capital nature in foreign operation, the accounting consequence of which is to reduce or eliminate what would otherwise be a movement in the foreign currency translation reserved, and

c. investments in foreign operations that are fully deducted from an institution's capital for capital adequacy purposes. [BCBS June 2006 par 718(xxxviii)]

9.10.3.2. Calculating the capital requirement for the portfolio

152. The nominal amount (or net present value) of the net open position in each foreign currency (and gold) is converted at spot rates into Canadian dollars. The capital charge is 8% of the overall net open position calculated as the sum of:

a. the greater of the sum of the net open short positions or the sum of the net open long positions (absolute values), and

b. the net open position in gold, either long or short, regardless of sign.[BCBS June 2006 par 718(xli)]

9.10.3.3. Foreign exchange de minimus criteria

153. An institution doing negligible business in foreign currency, and that does not take foreign exchange positions for its own account, may be exempted from the capital requirement for foreign exchange risk provided that:

a. Its foreign currency business, defined as the greater of the sum of its gross long positions and the sum of its gross short positions in all foreign currencies, does not exceed 100% of eligible capital, and

b. Its overall net open foreign exchange position does not exceed 2% of its eligible capital. [BCBS June 2006 par 718(xlii)]

Appendix 9-7 - Example of the Shorthand Measure of Foreign Exchange Risk

154. Institution A has the following net currency positions. These open positions have been converted at spot rates to the reporting currency, in this case Canadian dollars, (+) signifies a long position and (-) signifies a short position.

Table I					
YEN	**Euro**	**GB£**	**CHF**	**US$**	**GOLD**
+50	+100	+150	-20	-180	-35
+300			-200		-35

155. In this example, the institution has three currencies in which it has long positions, these being the Japanese Yen, the Euro and the British Pound, and two currencies in which it has a short position, the Swiss Franc and the U.S. Dollar. The middle line of the above chart shows the net open positions in each of the currencies. The sum of the long positions is +300. The sum of the short positions is -200.

156. The foreign exchange market risk is calculated using the higher of the summed absolute values of either the net long or short positions, and the absolute value for the position in gold. The capital charge is 8%. In this example, the total long position (300) would be added to the gold position (35) to give an aggregate position of 335. The aggregated amount multiplied by 8% would result in a capital charge of $26.80.

9.10.4. Commodities risk

157. This section provides a minimum capital requirement to cover the market risk of holding or taking positions in commodities, including precious metals but excluding gold (gold is treated as a foreign currency). Institutions conducting a limited amount of commodities business may use the simplified measurement method that is comprised of a capital charge on the net and gross position in each category of commodity. This method is set out below. All other institutions must adopt an internal model system that conforms to criteria set out in section 9.11.

Net position requirement

158. Under the simplified method, each long and short commodity position (spot and forward) is expressed in terms of the standard unit of measurement (such as barrels, kilos, or grams). The open positions in each category[30] of commodities are then converted at current spot rates into Canadian dollars, with long and short positions offset to arrive at the net open position in each commodity. [BCBS June 2006 par 718(xlix)]

159. Positions in different categories of commodities may not be offset. The base capital requirement is 15% of the net open position, long or short, in each commodity.[31] [BCBS June 2006 par 718(liv)]

[30] Commodities that are deliverable against each other or that are close substitutes with a minimum correlation of ninety percent between price movements are considered to be part of the same category.

[31] When the funding of a commodity position opens an institution to interest rate or foreign exchange exposure, the relevant positions should be included in the measures of interest rate and foreign exchange risk described in sections 9.10.1. and 9.10.2. When a commodity is part of a forward contract, any interest or foreign currency exposure from the other side of the contract should be appropriately included in the measurement systems in sections 9.10.1. and 9.10.2.

Gross position requirement

160. To protect an institution against basis risk, interest rate risk, and forward gap risk, each category of commodity is also subject to a 3% capital requirement on the institution's gross positions, long plus short, in the particular commodity. [BCBS June 2006 par 718(lv)]

Calculation of positions

161. Commodity derivatives and other off-balance-sheet positions that are affected by changes in commodity prices are included in the measurement system (except for options and the associated underlying instrument - refer to section 9.10.5 and Appendix 9-VIII for a description of their treatment). Commodity derivatives are converted into notional commodity positions using the current spot price. [BCBS June 2006 par 718(liii)]

9.10.5. Options

162. Options contracts and related hedging positions in the associated underlying instrument, commodity or index, cash or forward, are subject to capital requirements as calculated in this section. The capital requirements calculated under this section should then be added to the capital requirements for debt securities, equities, foreign exchange, and commodities risk as appropriate. Two alternatives to measuring the market risk for options activities are available under the standardized approach:

a. institutions which solely use purchased options may use the *simplified method*
b. institutions which also write options must use the *scenario method*[32]

163. The more significant an institution's trading in options, the more sophisticated the approach an institution will be expected to use. Institutions doing business in certain classes of exotic options (e.g., barriers and digitals) may be required to use the internal models alternative as set out in section 9.11. [BCBS June 2006 par 718(lvi)]

164. Regardless of the method used, specific risk related to the issuer of an instrument still applies to options positions for equities, equity indices and corporate debt securities.

In addition to these market risk charges, purchased options remain subject to the credit risk capital requirements specified in Chapter 3 – Credit Risk – Standardized Approach.

9.10.5.1. Simplified method

165. An institution that has only a limited amount and range of purchased options may use the simplified method set out in Table I for individual options positions. These options positions are subject to the separate capital charges specified in Table I and are not included in the standardized calculation of specific and general market risk specified in the preceding sections. A charge must be calculated for each individual option in which the institution has a position.

[32] Unless all their written option positions are hedged by perfectly matched long positions in exactly the same options, in which case there is no capital requirement for market risk.

166. As an example of how the calculation in Table I would work, if a holder of 100 shares currently valued at $10 each has an equivalent put option with a strike price of $11, the capital charge would be: $1,000 x 16.0% (e.g., 8.0% specific plus 8.0% general market risk) = $160, less the amount the option is in the money ($11 - $10) x 100 = $100, i.e., the capital charge would be $60. A similar methodology applies for options whose underlying is a foreign currency, a debt security or a commodity. However, in the case of options on foreign exchange and options on commodities, only the risk factor for general market risk will be applied to the relevant options position. [BCBS June 2006 par 718(lviii)]

Table I	
Simplified Method: Capital Charges	
Position	**Treatment**
Long the underlying and Long the put Or Short the underlying and Long the call	The capital charge will be the market value of the underlying instrument[33] multiplied by the sum of specific and general market risk charges[34] specified in the preceding sections for the underlying less the amount the option is in the money (if any) bounded at zero[35]
Long call Or Long put	The capital charge will be the lesser of: (i) the market value of the underlying instrument multiplied by the sum of specific and general market risk charges (refer to footnote 29) for the underlying (ii) the market value of the option[36]

9.10.5.2. Scenario method

167. Under the scenario method, an institution is required to make separate calculations of the specific risk and general market risk of options and their related hedging positions. Specific risk charges must be calculated on each issue in which the institution has a net option position that is subject to interest rate risk or to equity risk. General risk charges are calculated on portfolios of options (groupings are set out below).

[33] 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 that 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 and swaptions, etc.

[34] To determine the appropriate specific risk and general market risk factors, refer to the preceding sections on interest rate positions risk, equity risk, foreign exchange risk and commodity risk. Some options (e.g., where the underlying is an interest rate, a currency or a commodity) bear no specific risk but specific risk will be present in the case of options on certain interest rate related instruments (e.g., options on a corporate debt security or corporate bond index) and for options on equities and stock indices (see the section on equity position risk). Accordingly, the combined charge under this measure for currency options will be 8% and for options on commodities, 15% (the additional 3% charge is not added because options are not netted).

[35] For options with a residual maturity of more than six months, the strike price should be compared with the forward, not current, price. An institution unable to do this must take the in the money amount to be zero.

[36] Where the position does not fall within the trading book (i.e., options on certain foreign exchange or commodities positions not belonging to the trading book), it may be acceptable to use the book value instead.

168. The scenario method uses simulation techniques to calculate changes in the value of an options portfolio for changes in the level and volatility of the prices of its associated underlying instruments. Under this approach, the general market risk charge is determined by the scenario "matrix" (i.e., the specified combination of underlying and volatility changes) that produces the largest loss. The total general market risk capital requirement for all option portfolios is the sum of the largest losses of individual option portfolios. [BCBS June 2006 par 718(lxiii)]

169. In addition to the general market risk of its interest rate and equity options portfolios, institutions using the scenario method are required to calculate the specific risk of these options using the same basic methodology in the preceding sections on interest rate position risk and equity risk.

Calculating the general market risk

170. An institution constructs a two-dimensional matrix for each of its options portfolios. Options portfolios include options and any related hedging positions grouped together as follows:

a. for interest rates, options on underlying instruments whose residual maturity is bounded by one of at least six groups of time bands from Table II of this section where no more than three contiguous time bands are grouped together [BCBS June 2006 par 718(lxiii)],
b. for equities and equity indices, each national market,
c. for foreign currencies and gold, each currency pair and gold, and
d. for commodities, each individual commodity.

171. The first dimension of each matrix requires the institution to evaluate the portfolio over a specified range above and below the current value of the underlying instrument, commodity, or index.

172. For interest rates the range is consistent with the assumed changes in yield for the time bands in Table II. Institutions should use the highest of the assumed changes in yield applicable to the time bands that it groups together. The time bands and assumed changes in yield are:

Table II			
Time band	**Assumed changes in yield**	**Time band**	**Assumed changes in yield**
up to 1 month	1.00	3 up to 4 years	0.75
1 up to 3 months	1.00	4 up to 5 years	0.75
3 up to 6 months	1.00	5 up to 7 years	0.70
6 up to 12 months	1.00	7 up to 10 years	0.65
1 up to 2 years	0.90	10 up to 15 years	0.60

2 up to 3 years	0.80	15 up to 20 years	0.60
		over 20 years	0.60

173. The other ranges are ±8% for equities, ±8% for foreign exchange and gold, and ±15% for commodities.

174. For all option portfolios, at least seven observations (including the current observation) should be used to divide the range into equally spaced intervals. [BCBS June 2006 par 718(lxiv)]

175. The second dimension of the matrix entails a change in the volatility of the underlying rate or price equal to ± 25% of the current volatility.[37] [BCBS June 2006 par 718(lxv)]

176. The application of the scenario method, particularly regarding the precise way the analysis is constructed, will be subject to review by OSFI. An institution using the scenario method should meet the appropriate qualitative standards set forth in the section on the internal models approach. [BCBS June 2006 par 718(lxvii)]

Calculating the specific risk of options on debt and equity securities

177. The specific risk charge for options on debt securities is calculated by multiplying the market value of the effective notional amount of the debt instrument that underlies an option by:

- the option's delta; and
- by the specific risk factors in Table I of section 9.10.1.1 that correspond to the category and residual term of the underlying debt instrument.

178. The specific risk charge for options on equity securities and options on an equity index is calculated by multiplying the market value of the effective notional amount of the equity instrument or equity index that underlies an option by:

- the option's delta; and

then by:

- 8%, **or**
- 2% if the option is based on an index of equities.

179. The effective notional amount of an option is the market value of the stated underlying debt or equity instrument or equity index adjusted to reflect any multiplier applicable to the contract's reference rate(s) or, where there is no multiplier component, simply, the market value of the stated underlying debt or equity instrument or the notional amount underlying an option on an equity index. [BCBS June 2006 par 718(lvii)]

[37] For example, if the underlying of an equity instrument has a current market value of $100 and a volatility of 20%, the first dimension of the grid would range from $92 to $108, divided into eight intervals of $2.00 and the second dimension would assume volatility stays at 20%, increases to 25% (20% + (.20 x .25)) and decreases to 15% (20% - (.20 x .25)).

Appendix 9-8 - Example of Options Scenario Matrices

180. A hypothetical institution has purchased and sold options on Canadian interest rates, and options to purchase and sell U.S. dollars with Canadian funds. The institution might use the scenario approach to calculate the general market risk of these options portfolios by calculating the following matrices.

1) Options on instruments maturing up to 3 months

Yield	- 100 basis points	- 66 basis points	- 33 basis points	Current Yield	+ 33 basis points	+ 66 basis points	+ 100 basis points
Volatility							
+ 25%	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss
Current % Volatility	gain/loss	gain/loss	gain/loss	market value	gain/loss	gain/loss	gain/loss
- 25%	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss

Repeat the interest rate matrix above for each of the following:

Group of maturity bands	**Assumed yield changes in basis points**
2) 3 up to 6 months	100
3) 6 up to 12 months	100
4) 1 up to 4 years	90
5) 4 up to 10 years	75
6) 10 years and over	60

7) Options on Canada/U.S. dollar exchange rate

Exchange Rate	-8 %	-5.33%	-2.67%	Current Exchange Rate	+2.67%	+5.33%	+8%
Volatility							
+ 25%	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss
Current % Volatility	gain/loss	gain/loss	gain/loss	market value	gain/loss	gain/loss	gain/loss
- 25%	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss	gain/loss

9.11. Models

9.11.1. General criteria

181. The use of an internal model will be conditional upon the explicit approval of OSFI. [BCBS June 2006 par 718(lxx)]

182. OSFI will only give its approval if at a minimum:

a. It is satisfied that the institution's risk management system is conceptually sound and is implemented with integrity,

b. The institution has 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 if necessary, back office areas,

c. The institution's models have in OSFI's judgement a proven track record of reasonable accuracy in measuring risk, and

d. The institution regularly conducts stress tests along the lines indicated in section 9.11.7. BCBS June 2006 par 718(lxxi)]

183. The institution must be able to satisfy OSFI that the period of initial monitoring and live testing of its internal model is satisfactory before the model can be used for capital purposes. [BCBS June 2006 par 718(lxxii)]

184. Institutions using internal models for capital purposes will be subject to the requirements detailed in sections 9.11.2. to 9.11.9. [BCBS June 2006 par 718(lxxiii)]

9.11.2. Qualitative standards

185. Institutions must ensure that the models they are using are supported by market risk management systems that are conceptually sound and implemented with integrity. Set out below are qualitative criteria that institutions would have to meet before they are permitted to use a models-based approach. Only those institutions whose models are in full compliance with the qualitative criteria will be eligible for application of the minimum multiplication factor (see section 9.11.4.). The qualitative criteria include [BCBS June 2006 par 718(lxxiv)(a-i)]:

- The institution should have an independent risk control unit that is responsible for the design and implementation of the institution's risk management system. The unit should produce and analyze daily reports on the output of the institution's risk measurement model, including an evaluation of the relationship between measures of risk exposure and trading limits. This unit must be independent from business trading units and should report directly to senior management of the institution.
- The unit must conduct a regular back-testing program, i.e., an ex post comparison of the risk measure generated by the model against daily changes in portfolio value of static positions over longer periods of time. Where backtesting is based on comparisons against static positions, institutions should still track daily portfolio profits and losses to

assure a strong understanding of the link between calculated measures of risk and trading outcomes. The back-testing program should be applied as appropriate to the aggregate risks measured by the models as well as on an individual book level that corresponds to the structure of VaR limits and disaggregated profit and loss information.

- The unit should also conduct the initial and on-going validation of the internal model, as described in sections 9.11.6 and 9.11.8.
- Board of directors and senior management should be actively involved in the risk control process and must regard risk control as an essential aspect of its business to which significant resources need to be devoted. In this regard, the daily reports prepared by the independent risk control 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 institution's overall risk exposure.
- The institution's internal risk measurement model must be closely integrated into the day-to-day risk management process of the institution. Its output should accordingly be an integral part of the process of planning, monitoring and controlling the institution's market risk profile.
- The risk measurement system should be used in conjunction with internal trading and exposure limits. While trading limits for individual dealers do not need to be explicitly stated in terms of value-at-risk, trading limits should be related to the institution's risk measurement model in a manner that is consistent over time and that is well understood by both traders and senior management.
- A routine and rigorous program of stress testing should be in place as a supplement to the risk analysis based on the day-to-day output of the institution's risk measurement model. The results of stress testing should be reviewed periodically by senior management, used in the internal assessment of capital adequacy, and 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, reducing the size of the institution’s exposures, or increasing capital).
- Institutions should have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the risk measurement system. The institution'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.
- An independent review of the risk measurement system should be carried out regularly in the institution's own internal auditing process. This review should include both the activities of the business trading units and of the independent risk control unit. A review of the overall risk management process should take place at regular intervals (ideally not less than once a year) and should specifically address, at a minimum:
    - the adequacy of the documentation of the risk management system and process,
    - the organization of the risk control 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 change 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 factor calculations, and
- the verification of the model's accuracy through frequent back-testing as described above and in the accompanying document: *Supervisory framework for the use of backtesting in conjunction with the internal models approach to market risk capital requirements*.

[BCBS June 2006 par 718(lxxiv)(i)]

OSFI Notes

186. The institution is expected to develop and implement a rigorous system that fully documents, all instances where there has been an effective challenge to the model owners and/or developers by either the vetting & validation or the internal audit functions.

9.11.3. Specification of market risk factors

187. An important part of an institution'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 institution's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in the institution's portfolio of on- and off-balance sheet trading positions. In specifying the risk factors for their internal models, institutions should meet the guidelines set out below. [BCBS June 2006 par 718(lxxv)]

188. 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, an institution must justify this omission to the satisfaction of OSFI. 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, OSFI must be satisfied that proxies are used that show a good track record for the actual position held (i.e. an equity index for a position in an individual stock). [BCBS December 2010 par 718(lxxv)(a)]

OSFI Notes

189. The institution is expected to develop an internal process that describes minimum conditions under which a proxy has a good track record; a methodology for assessing proxies against those conditions (including independent validation); and steps to address the use of proxies that fail to meet that standard.

190. *Interest rates* [BCBS June 2006 par 718(lxxv)(a), revised December 2010 par 718(lxxv)(b)]

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

b. 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, institutions must model the yield curve using a minimum of six risk factors. However, the number of risk factors used should ultimately be driven by the nature of the institution's trading strategies. For instance, an institution with a portfolio of various types of securities across many points of the yield curve and that engages in complex arbitrage strategies would require a greater number of risk factors to capture interest rate risk accurately.

c. 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.

191. *Exchange rates* [BCBS June 2006 par 718(lxxv)(b), revised December 2010 par 718(lxxv)(c)]

a. The risk measurement system should incorporate risk factors corresponding to the individual foreign currencies in which the institution's positions are denominated. Since the value-at-risk figure calculated by the risk measurement system will be expressed in the institution's domestic currency, any net position denominated in a foreign currency will introduce a foreign exchange risk. Thus, there must be risk factors corresponding to the exchange rate between the domestic currency and each foreign currency in which the institution has a significant exposure.

192. *Equity prices* [BCBS June 2006 par 718(lxxv)(c), revised December 2010 par 718(lxxv)(d)]

a. There should be risk factors corresponding to each of the equity markets in which the institution holds significant positions.

b. 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 could be expressed in "beta-equivalents"[38] relative to this market-wide index.

c. 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.

d. The most extensive approach would be to have risk factors corresponding to the volatility of individual equity issues.

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

193. *Commodity prices* [BCBS June 2006 par 718(lxxv)(d), revised December 2010 par 718(lxxv)(e)]

a. There should be risk factors corresponding to each of the commodity markets in which the institution holds significant positions.

b. For institutions with relatively limited positions in commodity-based instruments, a straightforward specification of risk factors would be acceptable. Such a specification would likely entail one risk factor for each commodity price to which the institution is exposed. In cases where the aggregate positions are quite small, it might be acceptable to use a single risk factor for a relatively broad class of commodities (for instance, a single risk factor for all types of oil).

c. For more active trading, the model should encompass:

- directional risk, to capture the exposure from changes in spot prices arising from net open positions,
- forward gap and interest rate risk, to capture the exposure to changes in forward prices arising from maturity mismatches,
- basis risk, to capture the exposure to changes in the price relationships between two similar, but not identical, commodities, and

[38] A "beta-equivalent" position would be calculated from a market model of equity price returns (such as the CAPM model) by regressing the return on the individual stock or sector index on the risk-free rate of return and the return on the market index.

- the model must also take account of variation in the "convenience yield"[39] between derivatives positions, such as forwards and swaps, and cash positions in the commodity.

9.11.4. Quantitative standards

194. Institutions will have flexibility in devising the precise nature of their models, but the following minimum standards will apply for the purpose of calculating their capital charge:

a. "Value at risk" should be computed on a daily basis. [BCBS June 2006 par 718(lxxvi)(a)]

b. In calculating the value-at-risk, a 99th percentile, one-tailed confidence interval is to be used. [BCBS June 2006 par 718(lxxvi)(b)]

c. In calculating value-at-risk, the minimum holding period will be ten trading days. For positions that display linear price characteristics, institutions may use value-at-risk numbers calculated according to shorter holding periods scaled up to ten days by, for example, the square root of time. An institution using this approach must periodically justify the reasonableness of its approach to the satisfaction of OSFI. (Options are an example of instruments that do not display linear price characteristics; the treatment of these positions is covered in a separate bullet below). [BCBS June 2006 par 718(lxxvi)(c), revised December 2010 par 718(lxxvi)(c)]

d. The historical observation period (sample period) for calculating value-at-risk will be constrained to a minimum length of one year. For institutions that use a weighting scheme or other methods for the historical observation period, the "effective" observation period must be at least one year (that is, the weighted average duration of all daily time series data should be no less than 6 months). An institution may calculate the value-at-risk estimate using a different weighting scheme provided that the method results in a capital charge at least as conservative as that calculated using an "effective" observation period of at least one year. [BCBS June 2006 par 718(lxxvi)(d)]

199.d OSFI Notes
No observational weighting scheme should be used for the determination of stressed value-at-risk.

e. Institutions must update their data sets no less frequently than once every month and should also reassess them whenever market prices are subject to material changes. This updating process must be flexible enough to allow for more frequent updates. OSFI may also require an institution to calculate its value-at-risk using a shorter observation period if, in OSFI's judgement, this is justified by a significant upsurge in price volatility. [BCBS December 2010 par 718(lxxvi)(e)]

f. No particular type of model is prescribed. So long as each model used captures all the material risks run by the institution as set out in section 9.11.3., institutions will be free to

[39] The convenience yield reflects the benefits from direct ownership of the physical commodity (for example, the ability to profit from temporary market shortages), and is affected both by market conditions and by factors such as physical storage costs.

use models based on variance-covariance matrices, historical simulations, or Monte Carlo simulations. [BCBS June 2006 par 718(lxxvi)(f)]

g. Institutions will have discretion to recognize empirical correlations within broad risk categories (e.g., interest rates, exchange rates, equity prices and commodity prices, including related options volatilities in each risk factor category). OSFI may also recognize empirical correlations across broad risk factor categories, provided OSFI is satisfied that the institution's system for measuring correlations is sound and implemented with integrity. [BCBS June 2006 par 718(lxxvi)(g)]

h. Institutions' models must accurately capture the unique risks associated with options within each of the broad risk categories. The following criteria apply to the measurement of options risks:

- Institutions' models must capture the non-linear price characteristics of options positions;
- Institutions 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, OSFI will accept estimates of less than a 10 day price shock that are adjusted to an equivalent 10 day price shock using a square root of time adjustment; and
- Each institution's risk measurement system must have a set of risk factors that captures the volatilities of the rates and prices underlying option positions, i.e., vega risk. Institutions with relatively large and/or complex options portfolios should have detailed specifications of the relevant volatilities. This means that institutions should measure the volatilities of the options positions broken down by different maturities. [BCBS June 2006 par 718(lxxvi)(h)]

i. In addition, an institution 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 institution's current portfolio if the relevant market forces experienced 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 institution's portfolio. The period used must be approved by the OSFI and regularly reviewed. As an example, for many portfolios, a 12-month period relating to significant losses in 2007/08 would adequately reflect a period of such stress; although other periods relevant to the current portfolio must be considered by the institution. [BCBS December 2010 par 718(lxxvi)(i)]

199.i. OSFI Notes

In a selection among candidate <u>12-month stress periods, banks must maintain sufficient observational data to always re-consider prior selection choices. In doing so no observational data is dropped due to passage of time.</u>

j. As no particular model is prescribed for measuring value-at-risk above, different techniques might need to be used to translate the current model used for value-at-risk into

one that delivers a stressed value-at-risk. For example, institutions should consider applying anti-thetic[40] 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. [BCBS December 2010 par 718(lxxvi)(j)]

k. Each institution must meet, on a daily basis, a capital requirement expressed as the sum of:

- The higher of (1) the 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 (sVaR_{t-1}); and (2) an average of the stressed value-at-risk numbers over the preceding sixty business days (sVaR_{avg}), multiplied by a multiplication factor (m_s).

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

$$\mathrm{c} = \max\{\mathrm{VaR}_{t-1};\ \mathrm{m}_c \cdot \mathrm{VaR}_{avg}\} + \max\{\mathrm{sVaR}_{t-1};\ \mathrm{m}_s \cdot \mathrm{sVaR}_{avg}\}$$

[BCBS December 2010 par 718(lxxvi)(k)]

l. The multiplication factors m_c and m_s will be set by OSFI on the basis of its assessment of the quality of the institution's risk management system, subject to an absolute minimum of 3. Institutions will be required to add to these factors 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 factors can exceed 1 depending on the outcome of so-called "backtesting." The backtesting results applicable for calculating the plus factors are based on value-at-risk only and not stressed value-at-risk. If the backtesting results are satisfactory and the institution meets all of the qualitative standards set out below in section 9.11.5 the plus factors could be zero. Institutions must perform backtesting on hypothetical outcomes (i.e. using changes in the portfolio value that would occur were end-of-day positions to remain unchanged). [BCBS December 2010 par 718(lxxvi)(l)]

[40] Institutions should consider modelling valuation changes that are based on the magnitude of historic price movements, applied in both directions – irrespective of the direction of the historic movement. For example, if a time series included a significant upward spike in equity prices, the model could apply significant movements in equity prices both upwards and downwards. This might be particularly relevant if a bank's portfolio is the "right way" to a period of financial stress (ie is long equities in a period of stock market surge); the model used should reflect that open risk positions (in either direction) are vulnerable to stressed variables.

199.l. OSFI Notes

Stressed VaR multipliers will never be lower than VaR multipliers.

Plus factors will only exceed 1 when a model modification has resulted in a material change in measured capital requirements.

m. Institutions using models will also be subject to a separate capital charge to cover the specific risk of interest rate related instruments and equity securities[41], as defined sections 9.10.1. and 9.10.2., to the extent that this risk is not incorporated into their models. The options for calculating the specific risk capital charge are set out in section 9.11.5. [BCBS June 2006 par 718(lxxvi)(k), revised December 2010 par 718(lxxvi)(m)]

9.11.5. Specific risk calculation

195. Institutions using an internal VaR model may calculate their specific risk capital charge for equity risk positions using modelled estimates if they meet all of the qualitative and quantitative requirements for general risk models as well as the additional criteria and requirements set out in sections 9.11.5.1 (criteria) and 9.11.6 (backtesting) below. Such institutions are not required to subject their equity positions to the capital charge according to the standardized measurement method as specified section 9.10.2. [BCBS December 2010 par 718(lxxxvii)]

196. For interest rate risk positions other than securitization exposures and n-th-to-default credit derivatives, an institution will not be required to subject these positions to the standardized capital charge for specific risk, as specified in non-tranched sub-sections of 9.10.1.1, when all of the following conditions hold: [BCBS December 2010 par 718(lxxxvii-1-)]

a. The institution has a value-at-risk measure that incorporates specific risk and meets all the qualitative and quantitative requirements for general market risk models, as well as the additional criteria and requirements set out in sections 9.11.5.1 (criteria) and 9.11.6 (backtesting); [BCBS December 2010 par 718(lxxxvii-1-)(a)],

   and

b. OSFI is satisfied that the institution's internally developed approach adequately captures incremental default and migration risks for positions subject to specific interest rate risk according to the standards laid out in Appendix 9-IX below. [BCBS December 2010 par 718(lxxxvii-1-)(b)]

197. In the criteria below, event risk is defined as the risk of loss in the value of claims against a borrower or security issuer when that issuer experiences an event other than default or rating migration which so greatly modifies net worth or future earnings prospects of the issuer that the market value of the securities is sharply affected. Default risk is narrowly defined as the risk of loss in the value of claims against a borrower or security issuer when that borrower has insufficient assets to meet its obligations or is otherwise prevented from meeting its obligations in a timely manner.

[41] Including the additional requirements set out in section 9.10.2 for equity indices.

OSFI Notes

198. Banks with permission to use value-at-risk measures for specific risk must also incorporate a stressed value-at-risk measure into their capital requirements.

199. The institution is allowed to include its securitization exposures and n-th-to-default credit derivatives in its value-at-risk measure. Notwithstanding, it is still required to hold additional capital for these products according to the standardized measurement methodology, with the exceptions noted section 9.11.5.2 under the comprehensive risk measure below. [BCBS December 2010 par 718(lxxxvii-1-)]

9.11.5.1 Criteria

200. Modelled estimates of specific risk must capture all material components of price risk[42] and be responsive to changes in market conditions and compositions of portfolios. In particular, the model must:

a. explain the historical price variation in the portfolio[43],

b. demonstrably capture concentrations (magnitude and changes in composition)[44],

c. signal rising risk in an adverse environment[45],

d. capture name-related basis risk[46],

e. capture event risk[47], and

[42] Institutions need not capture default and migration risks for positions subject to the incremental risk capital charge referred to in Appendix 9-IX.

[43] The key ex ante measures of model quality are "goodness-of-fit" measures that address the question of how much of the historical variation in price value is explained by the risk factors included within the model. One measure of this type that can often be used is an R-squared measure from regression methodology. If this measure is to be used, the risk factors included in an institution's model would be expected to be able to explain a high percentage, such as 90%, of the historical price variation or the model should explicitly include estimates of the residual variability not captured in the factors included in this regression. For some types of models, it may not be feasible to calculate a goodness-of-fit measure. In such instances, an institution will be expected to work with OSFI to define an acceptable alternative measure that meets this regulatory objective.

[44] The institution would be expected to demonstrate that the model is sensitive to changes in portfolio construction and that higher capital charges are estimated for portfolios that have increasing concentrations in particular names or sectors.

[45] This could be achieved by incorporating in the historical estimation period of the model at least one full credit cycle and ensuring that the model would not have been inaccurate in the downward portion of the cycle. Another approach for demonstrating this is through simulation of historical or plausible worst-case environments.

[46] Institutions should be able to demonstrate that the model is sensitive to material idiosyncratic differences between similar but not identical positions, for example debt positions with different levels of subordination, maturity mismatches, or credit derivatives with different default events.

[47] For debt positions, this should include migration risk. For equity positions, events that are reflected in large changes or jumps in prices must be captured, e.g. merger break-ups/takeovers. In particular, firms must consider issues related to survivorship bias.

f. be validated through backtesting aimed at assessing whether specific risk, as well as general market risk, is being adequately captured.

[BCBS December 2010 par 718(lxxxviii)]

201. As techniques and best practices evolve, institutions should incorporate these advances into their models. [BCBS June 2006 par 718(xci)]

202. The institution's model must conservatively assess the risk arising from less liquid positions and/or positions with limited price transparency under realistic market scenarios. In addition, the model must meet minimum data standards. Proxies may be used only where available data is insufficient or is not reflective of the true volatility of a position or portfolio, and only where they are appropriately conservative. [BCBS June 2006 par 718(xc)]

OSFI Notes

203. Banks should include all sovereign debt in their interest rate specific risk value-at-risk models. Exclusions are permitted to the extent that they represent obligations issued in the domestic currency and would already be captured in the construction of a benchmark general market interest rate curve.

204. An institution must have an approach in place to capture in its regulatory capital default and migration risks in positions subject to a capital charge for specific interest rate risk, with the exception of securitization exposures and n-th-to-default credit derivatives, that are incremental to the risks captured by the VaR-based modeled estimate for specific risk ("incremental risks"). No specific approach for capturing the incremental risks is prescribed Appendix 9-IX presents guidelines around positions and risks that are covered by this incremental risk capital charge.

[BCBS December 2010 par 718(xcii)]

205. The institution must demonstrate that the approach used to capture incremental risks meets a soundness standard comparable to that of the internal-ratings based approach for credit risk as set forth in this guideline, under the assumption of a constant level of risk, and adjusted where appropriate to reflect the impact of liquidity, concentrations, hedging and optionality. An institution that does not capture incremental risks through an internally developed approach must use the specific risk capital charges under the standardized measurement method as set out in section 9.10.1.1. [BCBS December 2010 par 718(xciii)]

9.11.5.2 Comprehensive risk measure

206. Subject to OSFI approval, an institution may incorporate its correlation trading portfolio in an internally developed approach that adequately captures not only incremental default and migration risks, but all price risks ("comprehensive risk measure"). The value of such products is subject in particular to the following risks that must be adequately captured:

- the cumulative risk arising from multiple defaults, including the ordering of defaults, in tranched products;
- credit spread risk, including the gamma and cross-gamma effects;

- volatility of implied correlations, including the cross effect between spread and correlations;
- basis risk, including both
  - the basis between the spread of an index and those of its constituent single names; and
  - the basis between the implied correlation of an index and that of bespoke portfolios;
- recovery rate volatility, as it relates to the propensity for recovery rates to affect tranche prices; and
- to the extent the comprehensive risk measure incorporates benefits from dynamic hedging, the risk of hedging slippage and the potential costs of rebalancing such hedges.

[BCBS December 2010 par 718(xcv)]

In principle an integrated modelling approach is desirable. For the present, banks may adopt approaches that capitalise different risks differently (eg via an add-on approach), provided that this can be undertaken conservatively and it does not undermine the strength of risk management. However, the capital charges calculated with the different models would have to be added using a simple sum and banks are encouraged to develop an integrated approach over time. Note that Banks are allowed to enhance the IRC model to comply with the requirements for the comprehensive risk measure. However, they are not allowed to perform a single calculation covering exposures subject to the IRC charge and exposures subject to the comprehensive risk capital charge. Disallowing a single calculation has the effect of not allowing any diversification between the portfolios.

207. The approach must meet all of the requirements specified in section 9.11.5.1 and Appendix 9-IX. This exception only applies to institutions that are active in buying and selling these products. For the exposures that the institution does incorporate in its internally developed approach, the institution will be required to subject them to a capital charge equal to the higher of the capital charge according to this internally developed approach and 8% of the capital charge for specific risk according to the standardized measurement method. It will not be required to subject these exposures to the treatment according section 9.11.5.1 (i.e., it must incorporate them in both the value-at-risk and stressed value-at-risk measures).[48] [BCBS December 2010 par 718(xcv)]

208. For an institution applying this exception, it must

- Have sufficient market data to ensure that it fully captures the salient risks of these exposures in its comprehensive risk measure in accordance with the standards set forth above;
- Demonstrate (for example, through backtesting) that its risk measures can appropriately explain the historical price variation of these products; and
- Ensure that it can separate the positions for which it holds approval to incorporate them in its comprehensive risk measure from those positions for which it does not hold this approval.

[48] Institutions must still include correlation trading portfolio products in VaR and stressed VaR models for general market risk and interest rate specific risk.

[BCBS December 2010 par 718(xcvi)]

209. In addition to these data and modelling criteria, for an institution to apply this exception it must regularly apply a set of specific, predetermined stress scenarios to the portfolio that receives internal model regulatory capital treatment (i.e., the 'correlation trading portfolio'). These stress scenarios will examine the implications of stresses to (i) default rates, (ii) recovery rates, (iii) credit spreads, and (iv) correlations on the correlation trading desk's profit and loss. The institution must apply these stress scenarios at least weekly and report the results, including comparisons with the capital charges implied by the institutions' internal model for estimating comprehensive risks, at least quarterly. Any instances where the stress tests indicate a material shortfall of the comprehensive risk measure must be reported to OSFI in a timely manner. Based on these stress testing results, OSFI may impose a supplemental capital charge against the correlation trading portfolio, to be added to the institution's internally modelled capital requirement. For further detail refer to Appendix 9-X: Stress testing guidance for the correlation trading portfolio. [BCBS December 2010 par 718(xcvii)]

210. An institution must calculate this incremental risk measure and comprehensive risk measure at least weekly, or more frequently if directed by OSFI. The capital charge for incremental risk is given by a scaling factor of 1.0 times the maximum of (i) the average of the incremental risk measures over 12 weeks; and (ii) the most recent incremental risk measure. Likewise, the capital charge for comprehensive risk is given by a scaling factor of 1.0 times the maximum of (i) the average of the comprehensive risk measures over 12 weeks; and (ii) the most recent comprehensive risk measure. Both capital charges are added up. There will be no adjustment for double counting between the comprehensive risk measure and any other risk measures. [BCBS December 2010 par 718(xcviii)]

9.11.6. Backtesting

211. Institutions that apply modelled estimates of specific risk are required to conduct backtesting aimed at assessing whether specific risk is being accurately captured. The methodology an institution should use for validating its specific risk estimates is to perform separate backtests on sub-portfolios using daily data on sub-portfolios subject to specific risk. The key sub-portfolios for this purpose are traded-debt and equity positions. However, if an institution breaks down its trading portfolio into finer categories (e.g. emerging markets, traded corporate debt, etc.), it is appropriate to keep these distinctions for sub-portfolio backtesting purposes. An institution is required to commit to a sub-portfolio structure and adhere to it unless it can demonstrate to OSFI that it would be appropriate to change the structure. [BCBS June 2006 par 718(xcvii), revised December 2010 par 718(xci-1-)]

212. Institutions must have in place a process to analyze exceptions identified through the backtesting of sub-portfolios of specific risk. This process is intended to serve as the fundamental way in which institutions correct their models of specific risk in the event they become inaccurate. There will be a presumption that models that incorporate specific risk are "unacceptable" if the results at the sub-portfolio level produce a number of exceptions commensurate with the *Red Zone* as defined in the document, *Supervisory framework for the use of backtesting in conjunction with the internal models approach to market risk capital*

requirements, issued by the Basel Committee on Banking Supervision in April 1996. Institutions with "unacceptable" specific risk models are expected to take immediate action to correct the problem in the model and to ensure that there is a sufficient capital buffer to absorb those risks that backtests identify as being inadequately captured. [BCBS June 2006 par 718(xcviii), revised December 2010 par 718(xci-2-)]

9.11.7. Stress testing

213. Institutions that use the internal models approach for meeting market risk capital requirements must have in place a rigorous and comprehensive stress testing program. Stress testing to identify events or influences that could greatly impact institutions is a key component of an institution's assessment of its capital position. [BCBS June 2006 par 718(lxxvii)]

214. Institutions' stress scenarios need to cover a range of factors that can create extraordinary losses or gains in trading books, or make the control of risk in those books 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 price characteristics (i.e., options and instruments that have options-like characteristics). [BCBS June 2006 par 718(lxxviii)]

215. Institutions' 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 institutions could be exposed. Qualitative criteria should emphasize that two major goals of stress testing are to evaluate the capacity of the institution's capital to absorb potential large losses and to identify steps the institution can take to reduce its risk and conserve capital. This assessment is integral to setting and evaluating the institution's management strategy and the results of stress testing should be routinely communicated to senior management and, periodically, to the institution's board of directors. [BCBS June 2006 par 718(lxxix)]

216. Institutions should combine the use of supervisory stress scenarios with stress tests developed by institutions themselves to reflect their specific risk characteristics. OSFI may ask institutions to provide information on stress testing in three broad areas: [BCBS June 2006 par 718(lxxx)]

a. Supervisory scenarios requiring no simulations by the institution

   Institutions should have information on the largest losses experienced during the reporting period available for supervisory review. This loss information could be compared to the level of capital that results from an institution's internal measurement system. For example, it could provide OSFI with the coverage ratio of reported VaR capital to the maximum one day loss during the reporting period. [BCBS June 2006 par 718(lxxxi)]

b. Scenarios requiring a simulation by the institution

   Institutions should subject their portfolios to a series of simulated stress scenarios and provide OSFI with the results quarterly. These scenarios could include testing the current

portfolio against past periods of significant disturbance, for example the 1987 equity crash, the Exchange Rate Mechanism crises of 1992 and 1993,the fall in 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 institution'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 institution'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 or -1 for several days at the height of the disturbance. [BCBS June 2006 par 718(lxxxii)]

c. Scenarios developed by the institution itself to capture the specific characteristics of its portfolio

   In addition to the scenarios prescribed by OSFI under (a) and (b) above, an institution should also develop its own stress tests which it identifies as most adverse based on the characteristics of its portfolio (e.g., problems in a key region of the world combined with a sharp move in oil prices). Institutions should provide OSFI 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 scenarios. [BCBS June 2006 par 718(lxxxiii)]

217. The results should be reviewed periodically by senior management and should be 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, OSFI would expect the institution to take prompt steps to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of its exposures). [BCBS June 2006 par 718(lxxxiv)]

9.11.8. Model validation

218. It is important that institutions have processes in place to ensure that their internal models have been adequately validated by suitably qualified parties independent of the development process and 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 when there have been any significant structural changes in the market or changes to the composition of the portfolio that might lead to the model being no longer adequate. More extensive model validation is particularly important when specific risk is modelled and the model is required to meet the additional criteria in section 9.11.5. As techniques and best practices evolve, institutions should avail themselves of these advances. Model validation should not be limited to backtesting, but should, at a minimum, also include the following: [BCBS June 2006 par 718(xcix)]

a. Tests to demonstrate that any assumptions made within the internal model are appropriate and do not underestimate risk. These 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, the use of extrapolation or interpolation techniques, and the use of pricing models. [BCBS June 2006 par 718(xcix)(a)]

b. Further to regulatory backtesting programs, testing for model validation must use hypothetical changes in portfolio value that would occur were end-of-day positions to remain unchanged. [revised BCBS December 2010 par 718(xcix)(b)] Such tests would therefore exclude fees, commissions, bid-ask spreads, net interest income and intra-day trading. Moreover, additional tests are required which may include, for instance:

- Testing carried out for periods that are longer than required for the regular backtesting program (e.g. 3 years). The longer time period would generally improve the power of the backtesting, but a longer time period may not be desirable if the VaR model or market conditions have changed to the extent that historical data is no longer relevant.
- Testing carried out using confidence intervals other than the 99 percent interval required under the quantitative standards.
- Testing of portfolios below the overall bank level.

[BCBS June 2006 par 718(xcix)(b)]

c. The use of hypothetical portfolios to ensure that the model is able to account for and adequately capture particular structural features that may arise, for example:

- When data histories for a particular instrument do not meet the quantitative standards in section 9.11.4 and the institution has to map these positions to proxies. In such a situation the institution must ensure that the proxies produce conservative results under relevant market scenarios.
- When material basis risks are present, which may include mismatches between long and short positions either by maturity or by issuer.
- When concentration risk (as would occur in an undiversified portfolio) is present.

[BCBS June 2006 par 718(xcix)(c)]

219. In addition, in reviewing an institution's internal model OSFI will require assurance that:

- The internal validation processes described in section 9.11.2. are operating in a satisfactory manner.
- 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.
- The structure of internal models is adequate with respect to the institution's activities and geographical coverage.
- The results of the institutions' back-testing of its internal measurement system (i.e., comparing value-at-risk estimates with actual profits and losses) ensure that the model provides a reliable measure of potential losses over time. The results as well as the underlying inputs to their value-at-risk calculations should be available to OSFI and external auditors on request.

- Data flows and processes associated with the risk measurement system are transparent and accessible. In particular, it is necessary that auditors or OSFI are in a position to have easy access, whenever they judge it necessary and under appropriate procedures, to the models' specifications and parameters.

[BCBS June 2006 par 718(lxxxv)]

9.11.9. Combination of internal models and the standardized methodology

220. Unless an institution's exposure to a particular risk factor, such as commodity prices, is insignificant, the internal measurement system will, in principle, require institutions to have an integrated risk measurement system that captures the broad risk factor categories (i.e., interest rates, exchange rates, equity prices and commodity prices, with related options volatilities being included in each risk factor category). Thus, institutions that start to use models for one or more risk factor categories will, over time, be expected to extend the models to all their market risks. An institution that has developed one or more models will no longer be able to revert to measuring the risk measured by those models according to the standardized methodology (unless OSFI withdraws approval for those models). However, pending further experience regarding the process of changing to a models-based approach, no specific time limit will be set for institutions which use a combination of internal models and the standardized methodology to move to a comprehensive model.

221. The following conditions apply to institutions using such combinations:

a. Subject to transitional arrangements, each broad risk factor category must be assessed using a single approach (either internal models or the standardized approach), i.e., no combination of the two methods will be permitted within a risk category or across the institutions' different entities for the same type of risk.[49]

b. All criteria in chapter 9 will apply to the models being used.

c. Institutions may not switch from a model to the standardized approach unless OSFI rescinds permission to use the model for capital adequacy purposes.

d. No element of market risk may escape measurement, i.e., the exposure for all the various risk factors, whether calculated according to the standardized approach or internal models, would have to be captured.

e. The capital charges assessed under the standardized approach and under the models approach are to be aggregated according to the simple sum method.

[BCBS June 2006 par 718(lxxxvi)]

222. On a case-by-case basis, OSFI may permit short term transitional arrangements for using a combination of internal models and the standardized approach for any risk across all of an institution's operations. Approval of these temporary arrangements will be subject to:

[49] However, institutions may incur risks in positions which are not captured by their models, for example, in remote locations, in minor currencies or in negligible business areas. Such risks should be measured according to the standardized methodology.

a. the institution providing adequate internal controls that prevent switching of business between legal entities to achieve the most advantageous capital charge,

b. the Superintendent imposing an additional capital requirement which may be amended periodically depending on the circumstances of the transitional arrangements. The additional requirement will terminate once the risk category is fully assessed under the internal models approach, and

c. the institution entering into a formal undertaking to comply with the conditions of the temporary arrangement and to expand the internal model on or before a specific date to those operations initially using the standardized approach.

[BCBS June 2006 par 708(i)]

Appendix 9-9 - The Incremental Risk Charge

223. The incremental risk charge (IRC) set forth below is intended to complement additional standards being applied to the value-at-risk modelling framework. As described in more detail below, the IRC represents an estimate of the default and migration risks of non-tranched products, with exposure to interest rate risk, over a one-year capital horizon at a 99.9 percent confidence level, taking into account the liquidity horizons of individual positions or sets of positions. This appendix provides guidelines on how an IRC model should be developed by institutions for calculating the IRC for these positions. It also contains guidance on how OSFI will evaluate institutions' IRC models. [BCBS July 2009 – Guidelines for computing capital for incremental risk in the trading book (henceforth BCBS July 2009 IRC) par (2)].

224. An institution has to meet the guidelines for calculating the IRC that are laid out in this Appendix to the extent that it seeks to model incremental risks, as part of its interest rate specific risk VaR model, section 9.11.5.1 or comprehensive risks according to section 9.11.5.2. [BCBS July 2009 IRC par (3)]

II. Principles for calculating the IRC

A. IRC-covered positions and risks

225. The IRC encompasses all positions subject to a capital charge for specific interest rate risk according to the internal models approach to specific market risk but not subject to the treatment outlined in sections 9.10.1.1 for tranched products, regardless of their perceived liquidity. [BCBS July 2009 IRC par (8)]

OSFI Notes

226. Banks should include all sovereign debt positions in their IRC models.

227. With OSFI approval, a bank can choose consistently to include all listed equity and derivatives positions based on listed equity of a desk in its incremental risk model. [BCBS July 2009 IRC par (9)]

OSFI Notes

228. At this time the OSFI is not confident in the ability of firms to model migration and default risk in equities. In time, as modelling standards evolve the OSFI will revisit this policy. In the context of convertible bonds, a bank could achieve partial hedge recognition by including the embedded warrant component of this hybrid instrument in its equity general market risk VaR and equity specific risk VaR models. If a bank elects to do this, at a minimum the remainder of the decomposed convertible bond is still subject to default and migration risk, which should either be captured in an IRC model or through the application of the standardized framework for convertible bonds (see Sections 9.10.1 and 9.10.2).

229. Additionally, an institution is not permitted to incorporate into its IRC model any securitization positions, even when securitization positions are viewed as hedging underlying credit instruments held in the trading account. [BCBS July 2009 IRC par (10)]

230. For IRC-covered positions, the IRC captures

- Default risk. This means the potential for direct loss due to an obligor's default as well as the potential for indirect losses that may arise from a default event;
- Credit migration risk. This means the potential for direct loss due to an internal/external rating downgrade or upgrade as well as the potential for indirect losses that may arise from a credit migration event. [BCBS July 2009 IRC par (11)]

B. Key supervisory parameters for computing IRC

1. Soundness standard comparable to IRB

231. One of the underlying objectives of IRC is to achieve broad consistency between capital charges for similar positions (adjusted for illiquidity) held in the banking and trading books. Since the Basel II Framework reflects a 99.9 percent soundness standard over a one-year capital horizon, the IRC is also described in these terms. [BCBS July 2009 IRC par (12)]

232. Specifically, for all IRC-covered positions, an institution's IRC model must measure losses due to default and migration at the 99.9 percent confidence interval over a capital horizon of one year, taking into account the liquidity horizons applicable to individual trading positions or sets of positions. Losses caused by broader market-wide events affecting multiple issues/issuers are encompassed by this definition. [BCBS July 2009 IRC par (13)]

233. As described immediately below, for each IRC-covered position the model should also capture the impact of rebalancing positions at the end of their liquidity horizons so as to achieve a constant level of risk over a one-year capital horizon. The model may incorporate correlation effects among the modelled risk factors, subject to validation standards set forth in Section III. The trading portfolio's IRC equals the IRC model's estimate of losses at the 99.9 percent confidence level. [BCBS July 2009 IRC par (14)]

2. Constant level of risk over one-year capital horizon

234. An IRC model should be based on the assumption of a constant level of risk over the one-year capital horizon.[50] [BCBS July 2009 IRC par (15)]

235. This constant level of risk assumption implies that an institution rebalances, or rolls over, its trading positions over the one-year capital horizon in a manner that maintains the initial risk level, as indicated by a metric such as VaR or the profile of exposure by credit rating and concentration. This means incorporating the effect of replacing positions whose credit characteristics have improved or deteriorated over the liquidity horizon with positions that have risk characteristics equivalent to those that the original position had at the start of the liquidity horizon. The frequency of the assumed rebalancing must be governed by the liquidity horizon for a given position. [BCBS July 2009 IRC par (16)]

236. Rebalancing positions does not imply, as the IRB approach for the banking book does, that the same positions will be maintained throughout the capital horizon. Particularly for more liquid and more highly rated positions, this provides a benefit relative to the treatment under the IRB framework. However, an institution may elect to use a one-year constant position assumption, as long as it does so consistently across all portfolios. [BCBS July 2009 IRC par (17)]

3. Liquidity horizon

237. Stressed credit market events have shown that institutions cannot assume that markets remain liquid under those conditions. Banks experienced significant illiquidity in a wide range of credit products held in the trading book, including leveraged loans. Under these circumstances, liquidity in many parts of the securitization markets dried up, forcing banks to retain exposures in securitization pipelines for prolonged periods of time. Institutions must pay particular attention to the appropriate liquidity horizon assumptions within their IRC models. [BCBS July 2009 IRC par (18)]

238. The liquidity horizon represents the time required to sell the position or to hedge all material risks covered by the IRC model in a stressed market. The liquidity horizon must be measured under conservative assumptions and should be sufficiently long that the act of selling or hedging, in itself, does not materially affect market prices. The determination of the

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[50] This assumption is consistent with the capital computations in the Basel II Framework. In all cases (loans, derivatives and repos), the Basel II Framework defines EAD in a way that reflects a roll-over of existing exposures when they mature.

The combination of the constant level of risk assumption and the one-year capital horizon reflects supervisors' assessment of the appropriate capital needed to support the risk in the trading portfolio. It also reflects the importance to the financial markets of banks having the capital capacity to continue providing liquidity to the financial markets in spite of trading losses. Consistent with a "going concern" view of a bank, this assumption is appropriate because a bank must continue to take risks to support its income-producing activities. For regulatory capital adequacy purposes, it is not appropriate to assume that a bank would reduce its VaR to zero at a short-term horizon in reaction to large trading losses. It also is not appropriate to rely on the prospect that a bank could raise additional Tier 1 capital during stressed market conditions.

appropriate liquidity horizon for a position or set of positions may take into account an institution's internal policies relating to, for example, prudent valuation (as per the prudent valuation guidance of the Basel II Framework), valuation adjustments[51] and the management of stale positions. [BCBS July 2009 IRC par (19)]

239. The liquidity horizon for a position or set of positions has a floor of three months. [BCBS July 2009 IRC par (20)]

240. In general, within a given product type a non-investment-grade position is expected to have a longer assumed liquidity horizon than an investment-grade position. Conservative assumptions regarding the liquidity horizon for non-investment-grade positions are warranted until further evidence is gained regarding the market's liquidity during systematic and idiosyncratic stress situations. Firms also need to apply conservative liquidity horizon assumptions for products, regardless of rating, where secondary market liquidity is not deep, particularly during periods of financial market volatility and investor risk aversion. The application of prudent liquidity assumptions is particularly important for rapidly growing product classes that have not been tested in a downturn. [BCBS July 2009 IRC par (21)]

241. An institution can assess liquidity by position or on an aggregated basis ("buckets"). If an aggregated basis is used (e.g. investment-grade European corporate exposures not part of a core CDS index), the aggregation criteria would be defined in a way that meaningfully reflect differences in liquidity. [BCBS July 2009 IRC par (22)]

242. The liquidity horizon is expected to be greater for positions that are concentrated, reflecting the longer period needed to liquidate such positions. This longer liquidity horizon for concentrated positions is necessary to provide adequate capital against two types of concentration: issuer concentration and market concentration. [BCBS July 2009 IRC par (23)]

4. Correlations and diversification

(a) Correlations between defaults and migrations

243. Economic and financial dependence among obligors causes a clustering of default and migration events. Accordingly, the IRC charge includes the impact of correlations between default and migration events among obligors and an institution's IRC model must include the impact of such clustering of default and migration events. [BCBS July 2009 IRC par (24)]

(b) Correlations between default or migration risks and other market factors

244. The impact of diversification between default or migration risks in the trading book and other risks in the trading book is not currently well understood. Therefore, for the time being, the impact of diversification between default or migration events and other market variables would not be reflected in the computation of capital for incremental risk. This is consistent with the Basel II Framework, which does not allow for the benefit of diversification when combining

[51] For establishing prudent valuation adjustments, see sections 9.8.3 and 9.8.4.

capital requirements for credit risk and market risk. Accordingly, the capital charge for incremental default and migration losses is added to the VaR-based capital charge for market risk. [BCBS July 2009 IRC par (25)]

5. Concentration

245. An institution's IRC model must appropriately reflect issuer and market concentrations. Thus, other things being equal, a concentrated portfolio should attract a higher capital charge than a more granular portfolio (see also paragraph 243). Concentrations that can arise within and across product classes under stressed conditions must also be reflected. [BCBS July 2009 IRC par (26)]

6. Risk mitigation and diversification effects

246. Within the IRC model, exposure amounts may be netted only when long and short positions refer to the same financial instrument. Otherwise, exposure amounts must be captured (and modelled separately) on a gross (i.e. non-netted) basis in order to reflect basis risk in the model. Thus, hedging or diversification effects associated with long and short positions involving different instruments or different securities of the same obligor ("intra-obligor hedges"), as well as long and short positions in different issuers ("interobligor hedges"), may not be recognised through netting of exposure amounts. Rather, such effects may only be recognised by capturing and modelling separately the gross long and short positions in the different instruments or securities. [BCBS July 2009 IRC par (27)]

247. Significant basis risks by product, seniority in the capital structure, internal or external rating, maturity, vintage for offsetting positions as well as differences between offsetting instruments, such as different payout triggers and procedures, should be reflected in the IRC model. [BCBS July 2009 IRC par (28)]

248. If an instrument has a shorter maturity than the liquidity horizon or a maturity longer than the liquidity horizon is not contractually assured, the IRC must, where material, include the impact of potential risks that could occur during the interval between the maturity of the instrument and the liquidity horizon. [BCBS July 2009 IRC par (29)]

249. For trading book risk positions that are typically hedged via dynamic hedging strategies, a rebalancing of the hedge within the liquidity horizon of the hedged position may also be recognised. Such recognition is only admissible if the institution:

a. chooses to model rebalancing of the hedge consistently over the relevant set of trading book risk positions,

b. demonstrates that the inclusion of rebalancing results in a better risk measurement, and

c. demonstrates that the markets for the instruments serving as hedge are liquid enough to allow for this kind of rebalancing even during periods of stress.

250. Any residual risks resulting from dynamic hedging strategies must be reflected in the capital charge. An institution should validate its approach to capture such residual risks to the satisfaction of OSFI. [BCBS July 2009 IRC par (30)]

7. Optionality

251. The IRC model must reflect the impact of optionality. Accordingly, institutions' models should include the nonlinear impact of options and other positions with material nonlinear behaviour with respect to price changes. The institution should also have due regard to the amount of model risk inherent in the valuation and estimation of price risks associated with such products. [BCBS July 2009 IRC par (31)]

III. Validation

252. Institutions should apply the validation principles described in the Basel II Framework in designing, testing and maintaining their IRC models. This includes evaluating conceptual soundness, ongoing monitoring that includes process verification and benchmarking, and outcomes analysis. Some factors that should be considered in the validation process include:

- Liquidity horizons should reflect actual practice and experience during periods of both systematic and idiosyncratic stresses.
- The IRC model for measuring default and migration risks over the liquidity horizon should take into account objective data over the relevant horizon and include a comparison of risk estimates for a rebalanced portfolio with that of a portfolio with fixed positions.
- Correlation assumptions must be supported by analysis of objective data in a conceptually sound framework. If an institution uses a multi-period model to compute incremental risk, it should evaluate the implied annual correlations to ensure they are reasonable and in line with observed annual correlations. An institution must validate that its modelling approach for correlations is appropriate for its portfolio, including the choice and weights of its systematic risk factors. An institution must document its modelling approach so that its correlation and other modelling assumptions are transparent to supervisors.
- Owing to the high confidence standard and long capital horizon of the IRC, robust direct validation of the IRC model through standard backtesting methods at the 99.9%/one-year soundness standard will not be possible. Accordingly, validation of an IRC model necessarily must rely more heavily on indirect methods including but not limited to stress tests, sensitivity analyses and scenario analyses, to assess its qualitative and quantitative reasonableness, particularly with regard to the model's treatment of concentrations. Given the nature of the IRC soundness standard such tests must not be limited to the range of events experienced historically. The validation of an IRC model represents an ongoing process in which supervisors and firms jointly determine the exact set of validation procedures to be employed.

- Firms should strive to develop relevant internal modelling benchmarks to assess the overall accuracy of their IRC models.

[BCBS July 2009 IRC par (32)]

IV. Use of internal risk measurement models to compute the IRC

253. As noted above, these guidelines do not prescribe any specific modelling approach for capturing incremental risk. Because a consensus does not yet exist with respect to measuring risk for potentially illiquid trading positions, it is anticipated that institutions will develop different IRC modelling approaches. [BCBS July 2009 IRC par (33)]

254. The approach that an institution uses to measure the IRC is subject to the "use test". Specifically, the approach must be consistent with the institution's internal risk management methodologies for identifying, measuring, and managing trading risks. [BCBS July 2009 IRC par (34)]

255. Ideally, the supervisory principles set forth in this Appendix would be incorporated within an institution's internal models for measuring trading book risks and assigning an internal capital charge to these risks. However, in practice an institution's internal approach for measuring trading book risks may not map directly into the above supervisory principles in terms of capital horizon, constant level of risk, rollover assumptions or other factors. In this case, the institution must demonstrate that the resulting internal capital charge would deliver a charge at least as high as the charge produced by a model that directly applies the supervisory principles.

[BCBS July 2009 IRC par (35)]

Appendix 9-10 - Stress testing guidance for the correlation trading portfolio

1. Introduction

256. The *Revisions to the Basel II market risk framework* permit banks meeting certain conditions to calculate specific risk capital charges for the correlation trading portfolio (CTP) using a comprehensive risk modelling (CRM) approach. One of these conditions is that an institution using the CRM approach must conduct, at least weekly, a set of pre-determined stress tests for the CTP encompassing shocks to default rates, recovery rates, credit spreads, and correlations. This Appendix provides guidance on the stress testing that should be undertaken to satisfy this requirement. [BCBS December 2010 Annex par (1)]

2. Overview

257. The goal of the stress testing standards described below is to provide estimates of the mark-to-market (MTM) changes that would be experienced by the current CTP in the event of credit-related shocks. The standards encompass both prescribed regulatory stress scenarios and high-level principles governing an institution's internal stress testing. The prescribed scenarios are not intended to capture all potential sources of stress. Rather, their primary focus is on valuation changes involving large, broad-based movements in spreads for single name bonds and credit default swaps (CDS), such as could accompany major systemic financial or macroeconomic shocks, and associated spillovers to prices for index and bespoke tranches and other complex correlation positions. In addition to the prescribed scenarios, an institution is expected to implement a rigorous internal stress testing process to address other potential correlation trading risks, including institution-specific risks related to its underlying business model and hedging strategies. [BCBS December 2010 Annex par (2)]

3. Prescribed stress tests

258. The prescribed stress scenarios below are framed in terms of risk factor movements affecting credit spreads over specific historical reference periods. The term 'risk factor' encompasses any parameter or input within the pricing model that can vary over time. Examples include, but are not limited to:

- single-name risk-neutral default rates/intensities;
- recovery rates;
- market-implied correlations for index tranches;
- parameters used to infer market-implied correlations for bespoke tranches from those for index tranches;
- index-single name basis risks; and
- index-tranche basis risks.

[BCBS December 2010 Annex par (3)]

3.1 Historical reference periods

259. The prescribed stress tests refer to specific historical reference periods. These periods correspond to historical intervals of three-months or less over which spreads for single-name and tranched credit products have exhibited very large, broad-based increases or decreases. As described more fully in subsequent sections of this Appendix, for each stress test the historical reference period is used to calibrate the sizes of the assumed shocks to credit-related risk factors. This approach to calibrating the sizes of shocks is intended to accommodate the wide range of pricing models observed in practice. [BCBS December 2010 Annex par (4)]

260. The specific historical reference periods are as follows:

- Periods of sharply rising credit spreads
  - 4 June 2007 through 30 July 2007;
  - 10 December 2007 through 10 March 2008;
  - 8 September 2008 through 5 December 2008.
- Periods of sharply falling credit spreads
  - 14 March 2008 through 13 June 2008;
  - 12 March 2009 through 11 June 2009.

[BCBS December 2010 Annex par (5)]

261. In the future, OSFI may modify the above historical reference periods in coordination with supervisors on the BCBS, or specify additional reference periods, as it deems appropriate in light of developments in correlation trading markets. In addition, at their discretion, OSFI may require institutions to perform stress tests based on additional reference periods, or may require additional stress tests based on methodologies different from those described herein. [BCBS December 2010 Annex par (6)]

3.2 Historical stress tests

262. For each historical reference period, several stress tests are to be undertaken. Each stress scenario involves replicating historical movements in all credit-related risk factors over the reference period. In these exercises, only credit-related risk factors are shocked; for example, non-credit-related risk factors driving default-free term structures of interest rates and foreign exchange rates should be fixed at current levels. [BCBS December 2010 Annex par (7)]

263. This description presumes that the institution's pricing model can be used to decompose historical movements in credit spreads into changes in risk factors. If the pricing model does not take this form explicitly, the institution will need to translate the stress scenarios into equivalent risk factor representations that are compatible with the structure of its pricing model. As with all aspects of the standards set forth in this Appendix, such translations should be made in consultation with supervisors and are subject to supervisory approval. [BCBS December 2010 Annex par (8)]

3.3 Jumps to default

264. The preceding stress scenarios encompass changes in credit spreads, but abstract from defaults of individual firms. The final set of stress tests incorporates assumptions of actual defaults into the sector shock scenarios. For each historical scenario in (7), four jump-to-default (JTD) stress tests should be performed. In the first, the institution should assume an instantaneous JTD with zero recovery of that corporate name in the current CTP having the largest JTD01 measure. In the second stress test the institution should assume JTDs with zero recovery of the two corporate names having the largest JTD01 measures. Similarly, in the third (fourth) stress test, the institution should assume JTDs with zero recovery of the three (four) corporate names having the largest JTD01 measures. (JTD01 is defined as the estimated decline in the MTM value of the CTP portfolio associated with a JTD of that entity, assuming a zero recovery rate for the entity's liabilities.) [BCBS December 2010 Annex par (9)]

OSFI Notes:

265. Institutions should also include exposures to sovereign names when determining the four largest JTD01 measures.

3.4 Additional technical guidance

266. Below, a given historical reference period is identified by its start date (t) and end date (t+M). [BCBS December 2010 Annex par (10)]

267. When calculating movements in risk factors over the historical reference period, the values of risk factors on dates t and t+M should be calibrated to be consistent with the institution's current pricing model and with actual market prices on those days. [BCBS December 2010 Annex par (11)]

268. In carrying out the stress tests, the institution's methodology should reflect the current credit quality of specific names, rather than the name's credit quality during the historical reference period. For example, if the current credit quality of a particular firm is worse than during the historical reference period, the shocks to risk factors for that firm should be consistent with those for similar quality firms over the reference period. Subject to OSFI approval, proxies for credit quality may be based on external ratings, implied ratings from credit spreads, or possibly other methods. [BCBS December 2010 Annex par (12)]

269. The current CTP's stressed MTM loss should be calculated as the difference between its current MTM value and its stressed MTM value. [BCBS December 2010 Annex par (13)]

270. MTM values should be based on full portfolio revaluation (e.g., no delta approximations). [BCBS December 2010 Annex par (14)]

271. Stress tests should be performed under the following assumptions:

a. Portfolio positions are held static at their current levels (e.g., no recognition of dynamic hedging within the period).

b. All credit-related risk factors are instantaneously shocked.

c. Risk factors not directly related to credit risk (e.g., foreign exchange rates, commodity prices, risk-free term structures of interest rates, etc.) are fixed at current levels.

d. In general, within the prescribed stress tests, the difference between the shocked value and the current value of each risk factor should be set equal to its absolute (as opposed to relative) change between dates t and t+M. Exceptions are to be approved by the supervisor.

272. This treatment presumes that each stress scenario generates price effects that are internally consistent (e.g., positive spreads, no arbitrage opportunities). If this is not the case, a simple rescaling of certain risk factors may address the issue (e.g., a re-parameterisation to ensure that implied correlations and risk-neutral default rates and recoveries remain bounded between zero and one). [BCBS December 2010 Annex par (15)]

273. In cases where the historical value of a risk factor at date t or t+M is not known (perhaps because the current pricing model differs from that used over the interval t to t+M), the risk factor value will need to be 'backfilled'. Subject to OSFI approval, the backfilling method used by the institution should be consistent with the current pricing model and observed historical prices at t and t+M. [BCBS December 2010 Annex par (16)]

4. Internal stress testing

274. In addition to the prescribed stress tests set forth above, institutions applying the CRM approach are expected to implement a rigorous internal stress testing process for the CTP. Subject to supervisory review, an institution's internal stress testing for the CTP should identify stress scenarios and then assess the effects of the scenarios on the MTM value of the CTP. [BCBS December 2010 Annex par (17)]

275. The framework is intended to be flexible. Scenarios may be historical, hypothetical, or model-based, and may be deterministic or stochastic. Key variables specified in a scenario may include, for example, default rates, recovery rates, credit spreads, and correlations, or they might focus directly on price changes for CTP positions. An institution may choose to have scenarios apply to the entire CTP, or it may identify scenarios specific to sub-portfolios of the CTP.

276. The internal stress tests should be economically meaningful, taking into account the current composition of the CTP, the institution's business model for this desk, and the nature of its hedging activities. The form and severity of the stress scenarios should be developed with an eye toward their applicability to the unique characteristics (and vulnerabilities) of the current CTP including, but not limited to, concentration risks associated with particular geographic regions, economic sectors, and individual corporate names. [BCBS December 2010 Annex par (18)]

277. Taking into account the specific nature of the institution's CTP, the internal stress tests should not be limited to the historical reference periods used for the prescribed stress tests described in Section 3. The institution should consider relevant historical experience over other time intervals, as well, including periods within, around, or subsequent to the historical reference periods specified above. [BCBS December 2010 Annex par (19)]

Glossary

Basis risk	The risk that the relationship between the prices of two similar, but not identical, instruments will change. Thus, even if maturities are perfectly matched, basis risk could remain.
Basket	A set of related instruments whose prices or rates are used to create a synthetic (composite) instrument.
Beneficiary, Protection buyer, Fixed payer	Terms that are used interchangeably when describing the counterparty that owns the asset and benefits from the protection provided by the credit derivative by paying a fixed amount to the protection provider.
Building-block approach	A method for measuring price risk which disaggregates risk specific to a security/issuer and general market risk
Convertible bond	A bond which gives either the investor or issuer the option to switch into equity at a fixed conversion price.
Credit Event	Credit default products are structured so that a payout occurs only when a pre-defined credit event (or one of several such events) occurs. Credit events will normally include bankruptcy, liquidation and any payment default on the reference asset, but may also include lesser events such as rescheduling or rating downgrades. In some contracts a pre-determined materiality (or loss) threshold may also trigger payment.
Delta	The expected change of an option's price as a proportion of a small change in the price of the underlying instrument. An option whose price changes by $1 for every $2 change in the price of the underlying has a delta of 0.5. The delta approaches 1.0 or -1.0 for options that are deep in-the-money and approaches 0 for options that are deep out-of-the-money.
Duration	A measure of the price sensitivity of debt securities to small parallel changes in interest rates. It is the weighted average maturity of all payments of a security, coupons plus principal, where the weights are the discounted present values of the payments. Modified duration is duration divided by a factor of one plus the interest rate.
Exercise price also Strike price	The fixed price at which an option holder has the right to buy, in the case of a call option, or to sell, in the case of a put option, the financial instrument covered by the option.
Financial instrument	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.
Forward rate agreement (FRA)	A contract in which two counterparties agree on the interest rate to be paid on a notional deposit of specified maturity at a specific future time. Normally, no principal exchanges are involved, and the differences between the contracted rate and the prevailing rate is settled in cash.
Guarantor, Protection seller/provider, Variable payer[52]	Terms that are used interchangeably when describing the counterparty who is providing the protection against a potential default or taking on the risk of an asset they do not own by agreeing to make payment upon a credit event.
Holding period	The length of time that a financial institution is assumed to hold a given financial instrument for the purpose of calculating price volatility.
Interest rate risk	The risk that changes in market interest rates might adversely affect an institution's financial condition.
Interest rate swap	A transaction in which two counterparties exchange interest payment streams of differing character based on an underlying notional principal amount. The three main types are coupon swaps (fixed rate to floating rate in the same currency), basis swaps (one floating rate index to another floating rate index in the same currency) and cross-currency interest rate swaps (fixed rate in one currency to floating rate in another).
Investment grade	Securities which are rated at or above Baa by Moody's Investors Services or BBB by Standard & Poor's Corporation.
Long option position	The position of a trader who has purchased an option regardless of whether it is a put or a call.
Long position	The position of the holder or buyer of a security or other instrument, or a position that appreciates in value when market prices increase.

[52] The word "guarantor" is used in connection with derivatives and similar instruments to describe the economic result that the protection provider/variable payer, in accordance with the term of such instrument, takes on a portion of the risk arising from the underlying reference asset (and conversely, that the protection beneficiary/fixed payer has mitigated such risk) and is not intended to imply that such a protection provider/variable payer is for legal or other purposes acting as a guarantor.

Marking-to-market	The process of revaluing a portfolio on the basis of prevailing market prices.
Matched weighted position	The smaller of the sum of the risk weighted long positions or the sum of the risk weighted short positions within a time band or a zone or between zones.
Observation period	The period over which it is judged appropriate to review historical data in setting a capital requirement. For example, the requirement might be set according to observed price changes over the past five years.
Recovery value	The reference asset will normally retain some value after a credit event has triggered the settlement of a contract. Where payment under the contract is based on the recovery value.
Reference asset	The asset or assets whose credit risk is transferred. This may be a loan, security or other obligation, or a basket containing obligations of a single borrower or several borrowers that are named in the credit derivative contract.
Settlement	The completion of a transaction, wherein the seller transfers securities or financial instruments to the buyer and the buyer transfers money to the seller.
Short option position	The position of a trader who has sold or written an option. The writer's maximum potential profit is the premium received.
Short position	A position whereby an investor incurs rights and obligations that mirror the characteristics of another counterparty's asset position, or a position that appreciates in value when the underlying market price decreases.
Simulation	A mathematical technique for measuring the likely performance of a given portfolio for changes in certain parameters such as market interest rates or foreign exchange rates.
Swap	A financial transaction in which two counterparties agree to exchange streams of payments over time according to a predetermined rule.
Underlying asset	The credit derivative may be used to hedge another position in an asset that is the same or similar to the reference asset. The position that the institution is attempting to hedge is referred to as the underlying asset.
Volatility	A measure of the variability of the price of an asset, usually defined as the standard deviation of observed changes in the natural logarithm of the asset price.
Writer	The party that sells an option. The writer is required to carry out the terms of the option at the choice of the holder.

Zero coupon bonds	Securities which do not make periodic interest payments and are redeemed at face value at a specified maturity date. These securities are sold at a deep discount, and the return accrues to the buyer as the security gradually appreciates.