BANK OF MAURITIUS

Guideline on Measurement and Management of Market Risk

July 2009

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INTRODUCTION

Under the New Capital Adequacy Framework commonly known as Basel II Framework, the Basel Committee on Banking Supervision (BCBS) identifies two broad methodologies that may be adopted by banks for computation of the capital charge for market risk. The first methodology namely the Standardised Measurement Method (SMM) provides a framework for measuring the different categories of market risks in a standardized manner. The alternative advanced methodology which is subject to fulfillment of specific conditions and to the explicit approval of the supervisory authority allows banks to apply risk measures derived from their own internal risk management models.

Purpose

This Guideline is issued in sequel of and as a final document to the *Proposal Paper on Measurement and Management of Market Risk* that was forwarded to banks in January 2007. The Bank of Mauritius (hereinafter referred to as the 'Bank'), through the Guideline, sets out the basic principles to be endorsed by banks for establishing an adequate and effective market risk management system, and outlines a standardized methodology along the lines of the SMM for computation of capital charge pertaining to the different categories of market risk.

Authority

The Guideline draws authority from Section 50 of the Bank of Mauritius Act 2004 and Section 100 of the Banking Act 2004.

Scope of Application

The Guideline applies to all banks licensed under the Banking Act 2004 and is issued as an integral part of the Standardised Approaches that are being implemented under the Basel II framework.

Structure of the Guideline

The Guideline is divided into five parts:

Part I   —   Market Risk Management & Measurement Framework

Part II   —   Interest Rate Risk - Banking Book & Trading Book

Part III   —   Foreign Exchange Risk

Part IV   —   The Standardised Measurement Method

Part V   —   Treatment of Options

PART I - MARKET RISK MANAGEMENT & MEASUREMENT FRAMEWORK

Definition of Market Risk

1.   In the document *Amendment to the Capital Accord to Incorporate Market Risks*[1], the BCBS specifies the following:

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

- the risks pertaining to *interest rate related instruments* and *equities* in the trading book;
- *foreign exchange risk* and *commodities risk* throughout the bank.

The BCBS postulates that internationally active banks are required to measure and apply capital charges in respect of each of the abovementioned components of market risk.

Market Risk Management Framework: Principles and Policies

2.   Every bank shall establish a written policy on market risk management that appropriately defines interest rate risk, equity risk, foreign exchange risk and commodity risk and which sets out the principles for identifying, assessing and monitoring these risks as specified.

3.   Broad principles should be adopted by the bank for the implementation of a sound risk management process that will form the basis for an adequate assessment of regulatory capital charge, together with an internal capital buffer, as necessary, that shall be commensurate with the level of market risk proportionate to the scale and complexity of activities of the institution.

Board of Directors Oversight

4.   The board of directors of the bank shall approve a broad risk management policy that pertains to risks arising from adverse movements in market prices. In this regard, the board bears responsibility for the establishment of an adequate management framework that is consistent with the policies and strategies as defined in the market risk management policy.

5.   The board of directors shall supervise the executive body and, at the minimum, undertake to ensure the following:

- The establishment of an adequate management structure that delegates clear the lines of responsibility, accountability and reporting. In this regard, the lines of authority shall be properly defined, given an understanding that sufficient resources are made available for the evaluation, monitoring and control of the different sources of market risk.

- Senior management of the bank takes the necessary steps to monitor and control all market risk components. Senior management shall set in place an adequate system for measuring the different components of market risk and alongside, a comprehensive risk management review process has to be

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[1]Originally issued in January 1996, this document has subsequently been amended, and the latest update of November 2005 incorporated in the *International Convergence of Capital Measurement and Capital Standards (Comprehensive Version June 2006)* produced by the BCBS.

established that incorporates operating standards for evaluating positions and measuring performance.

- An adequate and formal information system be implemented that generates accurate and timely reporting to senior management and to the board on a regular basis. Reporting of market risk measures that are being undertaken, together with comparisons with current exposures to policy limits, as appropriate, should be made available to the relevant levels of management within the institution.

- A periodical review be carried out on the established framework on the basis of timely and relevant information on market risk exposure that is to be provided to the board of directors, and in the light of changing market development and business development strategy.

- The market risk management framework is subject to effective and comprehensive internal audit that shall be conducted by independent and appropriately trained staff. A fundamental component of the internal control system shall involve the conduct of regular independent reviews, with a view to ensuring the integrity of the market risk management process of the institution. Procedures to be implemented by senior management shall therefore incorporate an internal audit function which will be responsible for validating adherence to the established market risk management framework.

Scope and Coverage of Capital Charges for Market Risk

6. Every bank shall ensure that it holds capital commensurate with the level of market risk in its books. For the purpose of this Guideline, the market risk management policy of the bank shall incorporate an internal definition and clear-cut distinction between its *Banking Book* and *Trading Book*, the latter incorporating all financial instruments held for 'trading activities'.

7. A bank having a significant trading book shall be required to hold capital in accordance with the framework as set out in Part IV of the Guideline. Alternatively, a bank with an insignificant trading book should have processes in place to ensure the adequacy of capital against such risks, but without the requirement to hold regulatory capital for the risk.

8. With regard to interest rate risk in the banking book as defined in Part II, the Bank shall encourage all banks to hold a capital buffer that adequately covers the interest rate risk exposures arising from non-trading activities

Level of Significance

9. In the context of section 7 above, the Bank has presently set a ratio of five percent (5%) of Total Assets (on balance sheet) as the minimum level of significance for the trading book position eligible for regulatory capital treatment. Therefore, a bank holding an overall position in trading book activities that exceeds five percent (5%) or more of its Total Assets, will be considered to have crossed the prescribed level of significance and consequently, the Standardised Measurement Method prescribed under Basel II and its methodology set out in Part IV of the Guideline shall apply for the computation of a regulatory capital charge for the bank.

The Trading Book

10.   According to the definition set by BCBS in the *International Convergence of Capital Measurement and Capital Standards - Comprehensive Version June 2006*, a trading book consists of positions in financial instruments or commodities held either with a trading intent or in order to hedge other elements of the trading book. To be eligible for trading book capital treatment, financial instruments must either be free of any restrictive covenants on their tradability or able to be hedged completely.

11.   For the purpose of calculating its regulatory capital, every bank is required to establish a clearly defined and well documented **Trading Book Statement** for determining which exposures will be eligible for inclusion in the trading book.

Trading Book Statement

12.   The trading book statement shall be drawn along the following broad principles:

(i)   Criteria for classifying instruments in the trading book.

(ii)   Trading strategies, including trading horizons, approved by senior management.

(iii)   Clearly defined policies and procedures for the active management of trading book positions, including

- Management of positions on a trading desk;

- Setting and monitoring of position limits;

- Assignment of limits within which dealers have the autonomy to enter into/manage the position according to established strategies;

- Regular reporting requirements to senior management; and

- Active monitoring of trading book positions with reference to market information sources.

(iv)   Clearly defined policy and procedures for monitoring positions in the trading book against the bank's established trading strategy including the monitoring of turnover and stale positions in the bank's trading book.

(v)   Procedures to ensure that the criteria by which items are allocated to the trading book are adhered to on a consistent basis. These would include delegation of responsibility for monitoring adherence to the trading book policy statement, the frequency and methodology adopted for the verification procedures, and confirmation of the ongoing appropriateness of allocations.

(vi)   Any expected circumstances under which instruments may be transferred from the trading book to the banking book, and the controls set in place to ensure that there is no occurrence of inappropriate switching of positions between these books. Such controls would include responsibility for approval of transfers and the accounting treatment of such transfers.

(vii)   A list of the financial instruments to be included within the trading book and the proposed risk measurement methodology to be adopted for each instrument.

(viii) Systems and controls for the valuation of positions in the trading book, including:

- Valuation methodology to be adopted for each of these instruments - for example, whether mark-to-market or mark-to-model accounting is to be adopted; and the sources of rates and the treatment of illiquid instruments. Valuation methods should normally be the same for computation of capital for the bank's financial accounts, including a statement to this effect - or alternatively, an explanation if this does not occur.

- Documented policies and procedures for the process of valuation - for example, there must be clearly defined responsibilities of the various areas involved in the determination of the calculation, sources of market information and review of their appropriateness, timing of closing prices and procedures for adjusting valuations.

- Clear and independent reporting lines for the department accountable for the valuation process. The latter must be independent of the front office and the reporting lines should ultimately lead to a principal board executive director.

Reporting Requirement

13. In terms of the reporting for capital adequacy as per the Standardised Approaches of Basel II being adopted by the Bank as from March 2009, foreign currency risk throughout the bank shall be duly assessed by every bank as specified in Part III of the Guideline and shall be reported to the Bank as per the format prescribed at Annexure 2.

14. While having regard to the other components of market risk that are not being captured under the current reporting, it is deemed necessary by the Bank to establish a standardised methodology applicable to every bank for an assessment of capital adequacy that incorporates the maintenance of internal capital which shall be commensurate with the overall risk profile of the individual bank.

15. Subject to section 14, every bank shall submit a quarterly return as per *Annexure 1* that shall include the computation of internal capital, by taking into account the net capital held after deduction of mandatory capital requirement. In terms of monitoring of activities of the trading book, every bank shall further provide data on the main components of market risk held in their trading book, and information submitted shall be classified under the following items:

- *Instruments bearing interest rate risk (net of Banking Book position):* This item shall comprise all interest rate positions in respect of debt securities; and debt instruments such as non-convertible preference shares and convertible bonds which are traded like debt securities. It shall also include interest rate derivatives (forward, futures and swaps and interest rate options).

- *Foreign exchange exposures related to instruments in trading book:* This heading shall group items like spot transactions; guarantees; swaps; cross currency swaps; and positions in gold.

- *Investments in securities held for trading*: Common stocks whether with voting or non-voting rights; equity link instruments; equity link convertible securities; commitments to buy or sell equity securities; depository receipts; equity derivatives; and stock indices.

- *Commodities/stock positions held for trading*: This item shall include holdings of precious metal and other minerals; and value stocks of agricultural products.

The Banking Book

16. The banking book refers to positions that are not assigned to the trading book. Financial instruments classified in the banking book are not actively traded by the institution but are meant to be held in the books of the financial institution until maturity.

PART II - INTEREST RATE RISK - BANKING BOOK & TRADING BOOK

Measurement of Interest Rate Risk

17. Every bank shall devise and implement an interest rate risk measurement system that captures all material sources of interest rate risk, and which may assess the effect of interest rate changes in a manner that is consistent with the scope of its activities. The assumptions underlying the system should be clearly understood by the management and the respective risk managers.

18. The interest rate risk measurement system shall:

   ▪ Assess all material interest rate risk associated with a bank's assets, liabilities, and off-balance sheet positions;

   ▪ Utilise generally accepted financial concepts and risk measurement techniques;

   ▪ Incorporate interest rate risk exposures arising from the full scope of a bank's activities, including both trading and banking book sources;

   ▪ Address all material sources of interest rate risk including re-pricing, yield curve, basis, and option risk exposures; and

   ▪ Have well-documented assumptions and parameters.

19. Every bank shall establish an internal boundary between its banking book and trading book. In this regard, the bank shall set up a system to evaluate and monitor the risk arising from potential changes in interest rates as they affect the bank's non-trading activities. Concurrently, all financial instruments held for trading purposes shall be duly identified as being part of the financial institution's trading activities.

20. Every bank shall establish an adequate system of internal control that pertains to its interest rate risk management process. In this regard, the bank shall apply a set of operating limits that maintain the interest rate risk exposures within the levels that are consistent with its internal policy.

21. Changes in interest rates can have adverse effects both on a bank's earnings and its economic value. The interest rate risk exposure of a bank can be assessed via two separate perspectives namely the Earnings perspective and the Economic Value perspective. In proportionate with the complexity and range of activities of the bank, the interest rate risk measurement system shall include an assessment of the effects of changes on both earnings and economic value of the bank.

Earnings Perspective

22. Under this perspective, the focus of analysis is the impact of changes in interest rates on accrual or reported earnings. A change in interest rate - either upward or downward movement - may reduce earnings or it may lead to losses that can threaten the financial stability of an institution by undermining its capital and by reducing market confidence.

Framework for Assessing the Potential Impact on Earnings

23. From the earnings perspective, every bank shall compute the impact of interest rate changes on its net interest income and net non-interest income of the bank

over a period of 365 days. A one-year holding period has been selected both for practical purposes and in recognition that within a one-year period, most financial institutions have the ability to restructure or hedge their positions to mitigate further losses in economic value in the case where rates appear to be exceptionally volatile.

The following methodology shall apply:

(i)   Impact analysis shall assume a minimum of two scenarios, namely:

- An upward parallel rate shock appropriate for the currency; and
- A downward parallel rate shock appropriate for the currency.

    The impact reflecting the worst case scenario should be considered in determining whether the capital is commensurate with the level of interest rate risk in the banking book.

(ii)   The impact on the earnings will be based on the maturity/re-pricing schedule of a bank. The maturity/re-pricing schedule distributes interest sensitive assets, liabilities and of-balance sheet positions into time-bands.

(iii) Instruments shall be allocated to the maturity/re-pricing schedule as follows:

- Fixed rated-instrument using the time remaining to maturity; and
- Floating-rate instrument using the time remaining to next re-pricing date.

(iv)   Separate maturity/repricing schedules shall be prepared for each currency accounting for 5% or more of a bank's banking book total assets or liabilities.

(v)   For the computation of the impact on earnings:

- Total liabilities in each time-band shall be subtracted from total assets in the corresponding time-band to obtain a re-pricing gap (or net position) for each time-band.

- The re-pricing gap for each time-band shall be multiplied by the assumed rate changes and the following time period - as per Table 1 below - to produce the impact on earnings for the re-pricing gap of each time-band.

Table 1: Time Period Applicable to Re-Pricing Gap	
Time-Band	**Time Period during which New Price is Applicable**
Up to 30 days	365
31 days to 90 days	335
91 days to 180 days	275
181 days to 365 days	185
1 year to 2 years	Included in the re-pricing gap but not in the computation of the impact on earnings.
2 years to 3 years	
3 years to 4 years	
4 years to 5 years	
5 years to 7 years	
7 years to 10 years	
10 years to 15 years	
15 years to 20 years	
Over 20 years	

- The impact on earnings for the re-pricing gap of each time-band shall be aggregated to give the potential impact on the overall earnings of the bank over the one year period.

(vi) Instruments which are non-interest sensitive will not be impacted by changes in rates. Similarly, instruments maturing/re-pricing beyond the one-year time horizon will not impact the earnings for the one-year time horizon.

Economic Value Perspective

24. It is underlined that while focus from the earnings perspective is laid on changes in near-term earnings, this approach may not provide an accurate indication of the impact of interest rate movements on the bank's overall position. Alternatively, the economic value perspective considers the potential impact of interest rate changes on the present value of all future cash flows and therefore represents a comprehensive view of the potential long-term effects of changes in interest rates.

25. The economic value of an instrument represents an assessment of the present value of its expected net cash flows, discounted to reflect market rates. By extension, the economic value of a bank can be viewed as the present value of the bank's expected net cash flows, defined as the expected cash flows on assets minus the expected cash flows on liabilities plus the expected net cash flows on off-balance sheet positions. In this sense, the economic value perspective reflects one view of the sensitivity of the net worth of the bank to fluctuations in interest rates.

26. Under the economic value perspective, banks shall analyse the impact of changes in interest rate on the economic value of a bank's assets, liabilities, and off-balance sheet positions.

Reporting Requirement

27. The proposed framework presently applicable to both the banking book and the trading book requires a bank to apply an interest rate shock of 200 basis points to the net on-balance sheet and off-balance sheet positions – the interest rate gap - held in its books. In terms of the reporting requirement, data submitted by the bank shall reflect the impact of an adverse movement in interest rate from both the earnings perspective and the economic value perspective. The earnings perspective shall indicate the reduced earnings or outright losses that can threaten the financial stability of an institution by undermining its capital adequacy and by reducing market confidence. The economic value perspective shall evaluate the impact of the interest rate shock on the interest rate gap reported by the bank.

28. Banks are required to submit a return on a quarterly basis showing both their on-balance sheet and off-balance sheet positions that have absorbed the potential movements in interest rates on the institutions' earnings and economic value. Data to be computed on an individual basis for each significant currency have to be submitted to the Bank as per the reporting format provided at *Annexure 2*.

PART III - FOREIGN EXCHANGE RISK

29. Every bank has to maintain mandatory capital for foreign exchange risk as a cushion against the risk that movements in currency exchange rates may adversely affect the value of their foreign exchange positions. Foreign exchange risk incurs general market risk and the capital charge for foreign exchange risk shall include exposures held in the books of the bank for positions in gold[2].

30. The capital adequacy reporting under Basel I incorporated a capital charge for foreign exchange risk arising in both the banking book and the trading book. In terms of adoption of the Standardised Approaches under Basel II as prescribed by the Bank as from the quarter ended 31 March 2009, the computation of capital charge for foreign exchange risk will be as per the framework that was proposed under section 13 of Guidance Notes - Risk Weighted Capital Adequacy Ratio of Basel I previously submitted on a quarterly basis to the Bank, a format of which is provided at **Annexure 3**.

Reporting on Foreign Exchange Exposure

31. The return shall be set out to produce equivalent values in Mauritius rupees (MUR 000's) of all foreign currency assets and liabilities and of the contracted foreign currency amounts of all forward transactions. Positive or negative (in brackets) entries should be carried out as appropriate and as per the format.

    Outstanding spot and forward liabilities and assets in foreign currencies should all be translated into rupees at the closing middle market spot rate of the day of the report.

Arithmetic Relationships

The methodology for calculating the foreign exchange exposure is set out below:

(i)   for each row, column 1 less column 2 equals column 3;

(ii)   for each row, the sum of columns 3 and 4 equals column 5;

(iii)   the aggregate net short open foreign exchange position in column 5 should equal the sum of all the bracketed (i.e., negative) figures in the column.

Completion of the Return

(i)   Gross spot claims - column 1

Enter in column 1 all spot claims in foreign currencies. All the entries should be positive.

(ii)   Gross spot liabilities - column 2

Enter in column 2 all spot liabilities in foreign currencies. Entries in the currency rows of this column should not be in brackets.

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[2] Gold is dealt with as a foreign exchange position rather than a commodity because its volatility is more in line with foreign currencies and banks tend to manage it in a similar manner to currencies.

(iii)   Net spot claims (liabilities) - column 3

The entries in this column should equal the entries in column 1 less those in column 2.

(iv)   Net forward purchases (sales) - column 4

Enter in this column net forward and un-matured spot purchases and sales of foreign currency. Where one side of such a transaction is denominated in rupees, the rupee amount will not appear in this column.

(v)   Net overall long (short) position - column 5

Banks should report in column 5 the net overall position which should be calculated by summing the entries in columns 3 and 4.

(vi)   Rupee balancing item

The entry against the rupee balancing item should be the figure that is necessary in order that the total of the net overall long and short positions, in all currencies taken together, equals zero. In other words, it should be equal and opposite to the sum of the entries in column 5 above it.

(vii)   Aggregate net short open foreign exchange position

The aggregate net short open foreign exchange position should be the sum of all net short (i.e., bracketed) entries in the rows for individually specified foreign currencies and for foreign currencies not separately specified, in column 5, as well as the entry for the rupee balancing item if it is negative.

This aggregate net short open foreign exchange position should be included in the calculation of the risk asset ratio weighted at 100%. An adjustment should be made to the aggregate net short position to take account of items which have already been deducted from a bank's capital base.

Part IV - THE STANDARDISED MEASUREMENT METHOD

32. For the assessment of capital adequacy of individual banks, the Bank is presently endorsing the Standardised Approaches under the Basel II Framework, and in this regard, banks will be required to adopt the Standardised Measurement Method (SMM) for the computation of capital charges pertaining to the respective components of market risk.

33. In line with its respective internal market risk management policy, every bank is required to review and distinguish all assets and liabilities entries that have to be classified either in the trading book or in its banking book. The methodology proposed under the SMM shall therefore become applicable for every bank that holds trading book position exceeding 5% or more of its total assets.

The Trading Book

34. The trading book comprises positions held by the bank for the intent of trading. These positions are assumed to be liquid enough such that market prices are deemed reliable and these portfolios are held intentionally as follows:

   - for short-term resale;

   - with the intent of benefiting from actual or expected short-term price movements; and expected differences between the buying and selling prices of financial instruments, or alternatively from other price or interest rate variations;

   - to lock in arbitrage profits and may include, for example, proprietary positions, and positions arising from client servicing and market making.

35. Positions may be considered to be held with a trading intent if:

   - they are marked to market on a regular basis as a part of internal risk management processes;

   - transactions in the marketable instruments are categorized in a systematic manner and within predetermined limits

   - all other relevant criteria are applied by the bank to the composition of its trading book on a consistent basis.

36. Under the Standardised Measurement Method (SMM) for market risk, every bank which holds a significant trading book shall determine a capital charge for each component of market risk held in its book. The broad methodology under the SMM shall be based as indicated below:

		Interest Rate Risk	Equity Risk	Foreign Exchange Risk	Commodity Risk
Trading Book	General Market Risk	✔	✔	✔	✔
	Specific Risk	✔	✔	✗	✗

- The sum of individually calculated exposures in interest rate risk, equity risk, foreign exchange risk, commodities risk and option (where applicable) arising from **General Market Risk**;

- For interest rate and equity positions, an additional capital charge for **Specific Risk** is applied.

Interest Rate Risk

37. Interest rate risk (IRR) is the risk that movements in interest rates will have a negative effect on the value of on-balance sheet and off-balance sheet positions. Instruments covered under this approach for interest rate risk include all fixed and floating interest related instruments such as debt securities, swaps, forwards, futures and options having an interest rate related instrument as underlying.

   The capital charge for IRR is the sum of two separately calculated charges, one applying to the '*Specific Risk* of each security and the other to the interest rate risk in the portfolio termed as '*General Market Risk*'.

Specific Risk

38. The capital charge for specific risk is designed to protect against an adverse movement in the price of an individual security owing mainly to factors related to the creditworthiness of the individual issuer. While taking into account the nature of these issuers, the respective specific risk has been classified into four major categories namely:

(a) Specific Risk Capital Charges for Issuer Risk

Table 2 provides the specific risk capital charges for "Government'', "Qualifying", and "Other" categories:

Table 2: Specific Risk Capital Charges - Issuer Risk		
Categories	**External Credit Assessment**	**Specific Risk Capital Charge**
Government	AAA to AA- A+ to BBB-	0% 0.25% (residual term to final maturity 6 months or less) 1.0% (residual term to final maturity greater than 6 and up to and including 24 months 1.60% (residual term to final maturity exceeding 24 months)
	BB+ to B- Below B- Unrated	8.00% 12.00% 8.0%
Qualifying		0.25% (residual term to final maturity 6 months or less) 1.00% (residual term to final maturity greater than 6 and up to and including 24 months) 1.60% (residual term to final maturity exceeding 24 months)
Other	BB+ to BB- Below BB- Unrated	8.00% 12.00% 8.00%

(b)   *Specific Risk Rules for Un-Rated Debt Securities*

Unrated securities may be included in the "Qualifying" category, upon the specified condition that these shares are of comparable investment quality by the reporting bank, and that the issuer has securities listed on a recognised stock exchange. However, prior approval of the Bank is required for unrated securities to be included in the "Qualifying" category. Securities to be included in this category are as follows:

(i)   securities issued by public sector entities and multilateral development banks;

(ii)   securities that are rated investment grade by at least two credit rating agencies approved by the Bank;

(iii)   securities that are of comparable investment quality by the bank, and that the issuer has securities listed on a recognized stock exchange, subject to the approval of the Bank.

(c)   *Specific Risk Rules for Non-qualifying Issuers (Other)*

Such Instruments will receive the same specific risk charge as a non-investment grade corporate borrower under the Standardised Approach for credit risk.

(d)   *Specific Risk Charges for Positions Hedged by Credit Derivatives*

Full allowance will be recognised when the values of two legs (i.e. long and short) always move in the opposite direction and broadly to the same extent. This would be the case in the following situations:

(i)   the two legs consist of completely identical instruments, or

(ii)   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).

In these cases, no specific risk capital requirement is applied to both sides of the position.

Offsetting under Specific Risk

39.   When measuring capital charge for specific risk, offsetting rules will be as follows:

(i)   Offsetting is only permitted for matched positions in an identical issue; and

(ii)   Offsetting will **not** be permitted among different issues of the same issuer because differences in coupon rates, call features and liquidity etc. may cause the prices to diverge in the short run.

The Bank has discretion to apply higher specific risk charge to such instruments and disallow offsetting for the purposes of defining the extent of general market risk between such instruments and any other debt instrument.

General Market Risk

40.   In order to capture risks of loss that may arise from changes in market interest rates, banks will be required to maintain capital for general market risk. For this purpose, a choice between two principal methods of measuring the risk is permitted , namely:

▪ Maturity Method; and

▪ Duration Method.

41. Under each method, the capital charge is the sum of the following four components:

(i) the overall net short or long position in the entire trading book;

(ii) a small proportion of the matched positions[3] in each time-band (the "vertical disallowance");

The vertical disallowance charge accounts for basis risk and gap risk, which can arise because each time-band includes different instruments with different maturities.

The charge is levied on the matched position in each of the time-band as per the following:

- 10% if the bank uses Maturity Method; and

- 5% if the bank uses Duration Method.

(iii) a larger proportion of the matched position across different time-bands (the "horizontal disallowance"); and

(iv) a net charge for positions in options as appropriate.

Horizontal disallowance will be the same for maturity and duration methods.

Separate time maturity ladders should be constructed for each currency in which business is significant (5% or more of a bank's total assets) and a single maturity ladder will be required for those currencies in which business is insignificant.

Capital charge for each currency is calculated separately and then summed with no offsetting between positions of opposite sign.

Maturity Method

42. Long or short positions in debt securities and other sources of interest rate exposures including derivative instruments are slotted into a maturity ladder comprising thirteen time-bands, with the maturity time-bands and weight given in Table 3 below:

Table 3: Maturity Method - Time-bands and Weights		
Coupon 3% or more	Coupon less than 3%	Risk Weight (%)
1 month or less	1 month or less	0.00
1 to 3 months	1 to 3 months	0.20
3 to 6 months	3 to 6 months	0.40
6 to 12 months	6 to 12 months	0.70
1 to 2 years	1.0 to 1.9 years	1.25
2 to 3 years	1.9 to 2.8 years	1.75
3 to 4 years	2.8 to 3.6 years	2.25
4 to 5 years	3.6 to 4.3 years	2.75
5 to 7 years	4.3 to 5.7 years	3.25
7 to 10 years	5.7 to 7.3 years	3.75
10 to 15 years	7.3 to 9.3 years	4.50
15 to 20 years	9.3 to 10.6 years	5.25
Over 20 years	10.6 to 12 years	6.00
	12 to 20 years	8.00
	Over 20 years	12.50

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[3] The matched position is the value of the offset position. It is the smaller absolute value of the long and short positions. For example, if there is a long position of 1,200 and a short position of 700, the short position can be offset against the long position. The matched position is 700 and the net open position is long 500.

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43. Fixed rate instruments shall be slotted in the appropriate time-bands based on the residual term to maturity. Floating rate instruments shall be slotted in the appropriate time-band according to the residual term to the next re-pricing date. Within each currency, two maturity ladders will be constructed depending on the coupon rate as follows:

- A maturity ladder comprising 15 time-bands for instruments with coupon less than 3%;

- A maturity ladder comprising 13 time-bands for instruments with coupon 3% or more.

Computation of Capital Charge for General Market Risk - Maturity Method

44. The computation of the capital charge for general market interest rate risk will involve slotting each position in their respective maturity ladder. The following six steps shall then be carried out:

Step 1

Risk weight the aggregate positions in each bucket, for instruments with coupon of less than 3% and coupon of 3% or more, by the corresponding factor specified in the third column of Table 3 above.

Step 2

The weighted long or short position in each time-band will be determined.

Step 3

The net weighted positions for all time-band are added up to produce an overall net long or short position. A capital charge of 100% is applied to the overall net position.

Step 4

A vertical disallowance for each time-band will be computed by levying a 10% capital charge, to reflect basis and gap risk, on the smaller of the offsetting positions, whether long or short, within each time-band. The vertical disallowance will have neither a positive nor a negative sign.

Thus, if the sum of the weighted long positions in a time-band is MUR100 million and the sum of the weighted short positions is MUR90 million, the so-called vertical disallowance for that time-band would be 10% of MUR90 million (i.e. MUR9.0 million).

Step 5

The maturity ladder is then divided into three zones for calculating horizontal disallowance:

- *Zone 1*   -   zero to one year;

- *Zone 2*   -   one year to four years; and

- *Zone 3*   -   four years and over.

Time-bands are grouped into three zones and there are three rounds of horizontal disallowance as shown in Table 4.

Table 4: Horizontal Disallowances				
Zones	Time-band	Round 1 – Within the Zone	Round 2 - Between Adjacent Zones	Round 3 - Between Zones 1 and 3
Zone 1	0 – 1 month 1 – 3 months 3 – 6 months 6 – 12 months	40 %	40%	100%
Zone 2	1 – 2 years 2 – 3 years 3 – 4 years	30 %		
Zone 3	4 – 5 years 5 – 7 years 7 – 10 years 10 – 15 years 15 – 20 years Over 20 years	30 %	40%	

The three rounds of horizontal disallowances shall be conducted as follows:

Round 1:   Horizontal disallowances within each individual zone

Round 2:   Horizontal disallowances between adjacent zones

Round 3:   Horizontal disallowance between zones 1 and 3

Step 6

For each currency, add up the capital charges to produce the overall charge for general market risk. Table 5 provides an outline of the general market risk capital requirement for the maturity ladder. A worked example of the maturity method of general market risk is given under Annexure 4 and the capital charge as per the Worked Example is given in Column 5.

Table 5: General Market Risk Capital Requirement				
Steps (1)	Rounds (2)	Weighted Position (3)	Risk Weight (4)	Capital Charge (5)
Net Position (Step 3)		Net Short or Long Weighted Positions	100%	3.00
Vertical Disallowances (Step 4)		Matched Weighted Positions in all Maturity Bands	10%	0.05
Horizontal Disallowances (Step 5)	Round 1	Matched Weighted Positions within Zone 1	40%	0.08
		Matched Weighted Positions within Zone 2	30%	-
		Matched Weighted Positions within Zone 3	30%	-
	Round 2	Matched Weighted Positions Between Zones 1 & 2	40%	-
		Matched Weighted Positions Between Zones 2 & 3	40%	0.45
	Round 3	Matched Weighted Positions Between Zones 1 & 3	100%	1.00
Total charge				4.58

Duration Method

45. Subject to approval from the Bank, banks which have the necessary capability may use duration method for measuring their general market interest rate risk by calculating the price sensitivity separately for each position of each instrument.

Computation of Capital Charge for General Market Risk - Duration Method

46. The steps for computing capital charge for general market interest rate risk under the duration method are fairly similar to that of the maturity method, except for two differences that arise in selecting the risk weight and the percentage for vertical disallowance. While taking into account that separate duration ladders have to be constructed for every currency that is significant (commonly determined at 5 per cent of total volume) in the bank's portfolio, the position of each instrument is slotted in its respective duration band as given in Table 6 below:

Table 6: Duration Method - Time-bands and Assumed Changes in Yield		
Duration Band	**Zones**	**Assumed Changes in Yield (%)**
1 month or less Over 1 and up to 3 months Over 3 and up to 6 months Over 6 and up to 12 months	Zone 1	1.00 1.00 1.00 1.00
Over 1.0 and up to 1.9 years Over 1.9 and up to 2.8 years Over 2.8 and up to 3.6 years	Zone 2	0.90 0.80 0.75
Over 3.6 and up to 4.3 years Over 4.3 and up to 5.7 years Over 5.7 and up to 7.3 years Over 7.3 and up to 9.3 years Over 9.3 and up to 10.6 years Over 10.6 and up to 12 years Over 12 and up to 20 years Over 20 years	Zone 3	0.75 0.70 0.65 0.60 0.60 0.60 0.60 0.60

The assumed change in price, measured as the risk weight, is determined as a product of the duration of the position and the assumed change in yield. Given a vertical disallowance ratio of 5%, the capital charge is subsequently determined as per the following steps:

Step 1

Calculate the price sensitivity of each instrument in terms of a change in interest rates of between 0.6 and 1.0 percentage points depending on the maturity of the instrument.

Step 2

Slot the resulting sensitivity measures into a duration-based ladder with the fifteen time-bands set out in Table 5.

Step 3

Subject long and short positions in each time-band to a 5% vertical disallowance designed to capture basis risk.

Step 4

> Carry forward the net positions in each time-band for horizontal offsetting subject to the disallowances set out in Table 4.

Interest Rate Risk Derivatives

47. Interest rate derivatives include forward rate agreements (FRAs) other forward contracts, bond futures, interest rate swaps, cross currency swaps, forward foreign exchange positions and interest rate options. The interest rate risk measurement system shall include all interest rate derivatives and off-balance sheet instruments assigned to the trading book that are sensitive to changes in interest rates. Table 7 provides a summary of the rules for dealing with interest rate derivatives:

Table 7: Treatment of Interest Rate Derivatives under the Standardised Measurement Method		
Instrument	**Specific Risk Charge**	**General Market Risk Charge**
Exchange-Traded Future		
- Government debt security	No	Yes, as two positions
- Corporate debt security	Yes	Yes, as two positions
- Index on interest rates (e.g., LIBOR)	No	Yes, as two positions
OTC Forward		
- Government debt security	No	Yes, as two positions
- Corporate debt security	Yes	Yes, as two positions
- Index on interest rates	No	Yes, as two positions
FRAs, Swaps	No	Yes, as two positions
Forward Foreign Exchange	No	Yes, as one position in each currency
Options		*Either*
- Government debt security	No	(a) Carve out together with the associated hedging positions - simplified approach - scenario analysis - internal models
- Corporate debt security	Yes	(b) General market risk charge according to the delta-plus method (gamma and vega should receive separate capital charges)
- Index on interest rates	No	
- FRAs, Swaps	No	

Calculation of Positions

48. The derivatives shall be converted into positions in the relevant underlying. These positions are subject to the general market risk charges and, where applicable, the specific market risk charges for interest rate risk. The amounts reported shall be the market value of the principal amount of the underlying or notional underlying.

Equity Position Risk

49. Equity risk is the risk that movements in equity prices will negatively affect the value of equity positions. Every bank shall be required to hold capital to cover the risk of taking long or short positions, or both, in equities or equity-like instruments, with the exception of non-convertible preference shares (covered under interest rate risk), in their trading book. Equity includes instruments like common stocks whether voting and non-voting; equity-like convertible securities; commitments to buy or sell equity securities; depository receipts; equity derivatives; stock indices; index arbitrage; and any other on-balance sheet or off-balance sheet positions which are affected by changes in equity prices.

50. The capital charge for equity risk is the sum of the charges for general and specific market risk. Banks shall compute capital charges for each of these risks separately as follows:

   ▪ **A general market risk** charge of 10% is applied to the net overall position.

   ▪ **A specific market risk** charge of 10% is applied to the gross equity position.

   Since banks may hold equities in different national markets, separate calculations for general and specific risk must be carried out for each of these markets.

Offsetting

51. Long and short positions in the same issue can be fully offset, resulting in a single net long or short position. A worked example of the calculation of capital charge is given in *Annexure 5*.

Equity Derivatives

52. A capital charge shall be calculated for equity derivatives and off-balance sheet positions which are affected by changes in equity prices. Positions in these equity derivatives shall be converted into notional positions in the relevant underlying stock or portfolio of stocks. As an example, stock index futures will be reported as the mark-to-market value of the notional underlying equity portfolio.

Calculation of Positions

53. In order to calculate the specific and general market risk capital charges, positions in derivatives shall be converted into notional equity positions:

   (i)   futures and forward contracts relating to individual equities should in principle be reported at current market prices;

   (ii) Futures relating to stock indices should be reported as the mark-to-market value of the notional underlying equity portfolio; and

   (iii) Equity swaps are to be treated as two notional positions[4];

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[4] For example, an equity swap in which a bank is receiving an amount based on the change in value of one particular equity or stock index and paying a different index will be treated as a long position in the former and a short position in the latter.

<div align="center">**Commodities Risk**</div>

54. This section sets out the minimum capital standards to cover the risk of holding or taking positions in commodities. A commodity is defined as a physical product, which is or can be traded on a secondary market. Commodities covered in this section include:

  - precious metals other than gold;

  - agricultural products; and

  - minerals (including oil).

55. Positions in commodities resulting from derivatives contracts or off-balance instruments are also included in this measurement framework. Commodities risk should be captured throughout the trading book and banking book.

56. There are two alternative approaches for measuring commodities position risk namely:

  - Simplified Approach; or

  - Maturity Ladder Approach;

Simplified Approach

57. The methodology for computing the capital standards for commodities risk is set out below.

Step 1

Express each commodity position (spot plus forward) in terms of the standard unit of measurement (barrels, kilos, grams, etc) including commodity derivatives and off-balance sheet positions, which are affected by changes in commodity prices.

Step 2

Convert each position in step 1 at current spot rates into the reporting currency (Mauritian Rupee).

Step 3

Compute the net long or short position in each commodity.

Step 4

Compute a capital charge of 15% on the overall net open position.

Step 5

Compute the gross position in each commodity.

Step 6

Compute a capital charge of 3% of the sum of the bank's gross positions, i.e., the sum of the absolute values of the long and short positions in each commodity.

Step 7

The capital charge for this commodity is the sum of the 15% and the 3% capital charges.
Two capital charges will have to be computed for each commodity namely:

(i)   A capital charge equal to 15% of the overall net long or short position in each commodity; and

(ii)   A capital charge equal to 3% of the sum of the bank's gross positions in each commodity. The capital charge of 3% will protect the bank against basis risk, interest rate risk and forward gap risk.

The total capital charge will be the sum of the capital charges computed under (i) and (ii) above.

Offsetting

58.   When risk is measured for commodities, offsetting between positions is restricted.
- Offsetting is allowed between long and short positions in each commodity to calculate open positions.

- In general, offsetting is not allowed between positions in different commodities.
A worked example of the Simplified Approach is given in **Annexure 6**.

Maturity Ladder Approach

59.   Every bank shall construct separate maturity ladders for each commodity. For each commodity the following 7 steps have to be followed.

Step 1

Express each commodity position (spot plus forward) in terms of the standard unit of measurement (barrels, kilos, grams, etc) and convert in the reporting currency (Mauritian rupee) at the current spot price.

Step 2

Each position shall be allocated into the respective time-bands in the maturity ladder according to the remaining maturity.

The time-band to be used for the maturity ladder is given in Table 8 below:

Table 8: Maturity Ladder - Time-bands
0-1 month
>1-3 months
>3-6 months
>6-12 months
> 1-2 years
> 2-3 years
Over 3 years

Step 3

Compute a capital charge for the matched long and short positions in each time-band, i.e., multiply the sum of the matched short and long positions in each time-band by 1.5% to capture spread risk.

Step 4

Carry forward the unmatched position to the next relevant time-band and apply a capital charge of 0.6% to this residual net position multiplied by the number of time-bands it has been carried forward.

Step 5

Repeat step 3 and step 4 for each time-band.

Step 6

Apply a capital charge of 15% to the overall net open position.

Step 7

Derive the total capital charge by summing the charges for spread risk, for positions carried forward and for the overall net open position.

A worked example of the Maturity Ladder Approach is given in *Annexure 7*.

The resulting capital charges from the two approaches of the worked example presented at Annexure 7 are shown below:

Approach	Capital Charge (MUR)
Simplified Approach	5,760
Maturity Ladder Approach	3,802

It is observed that the capital charge for this commodity under the maturity ladder approach is much less than the simplified approach.

60. Banks adopting any one of the two approaches are expected to be consistent in the method used. They will not be permitted to switch from one approach to the other without the approval of the Bank.

Commodity Derivatives

61. All commodity derivatives and off-balance sheet positions affected by changes in commodity prices shall be included in the commodities risk measurement framework.

To calculate the market risk, commodity derivatives shall be converted into notional commodities positions and assigned to maturities as follows:

(i) Futures and forward contracts relating to individual commodities should be incorporated as notional amounts of barrels, kilos etc., and assigned a maturity with reference to expiry date.

(ii)   Commodity swaps - where one leg is a fixed price and the other is the current market price - should be incorporated as two positions. Each position should be equal to the notional amount of the contract, with a position corresponding to each payment on the swap and slotted into the maturity ladder accordingly. The positions are long positions if the bank is paying fixed and receiving floating, and short positions if the bank is receiving fixed and paying floating.

(iii) Commodity swaps where the legs are in different commodities should be incorporated in the relevant maturity ladder. Offsetting shall be allowed only if the commodities belongs to the same sub-category.

PART V - TREATMENT OF OPTIONS

62.   The market risk capital charge for options can be computed using one of the following:

- Simplified Approach
- Intermediate Approach

Banks that are dealing solely in purchased options shall use the Simplified Approach for measuring price risk for options. As shown in Table 9, banks that write options shall be expected to utilize a comprehensive risk management model incorporating the Intermediate approaches such as the (a) Delta-plus Approach or (b) the Scenario Approach which are part of the Standardized Methodology[5]. Under the delta plus approach, the delta equivalent position of each option becomes part of the Standardised Methodology, with the delta equivalent amount being subject to the applicable general market risk charges. Alternatively, the Scenario approach uses simulation techniques to calculate changes in the value of an option portfolio for changes in the level and volatility of its associated underlyings.

Table 9: Computation of Capital Charge - Treatment of Options			
	Simplified Approach	**Intermediate Approach**	
		Delta-plus Method	**Scenario Approach**
Bank uses purchased options only	v	v	v
Bank writes options	?	v	v

Simplified Approach

63.   Option positions and their associated underlying - being either cash or forward - are 'carved out' from the standardized methodology. They are subject to separately calculated capital charges that incorporate both general market risk and specific risk. These charges are then added to the capital charges for the relevant risk categories: interest rate risk, equities risk, foreign exchange risk or commodities risk.

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[5] Further information on the Standardised Methodology is available in the BCBS Paper *Amendment to the Capital Accord to incorporate market risks, (Updated November 2005)* on page 30: **Part A.5 Treatment of Options**.' Institutions using this methodology shall stand guided by the Methodology provided in the above BCBS Paper.

64. The capital charges under the Simplified Approach are given in Table 10 as follows:

Table 10: Simplified Approach - Capital Charges	
Position	**Treatment**
Long cash[6] and Long put *or* Short cash and Long Call	The capital charge will be: the market value of the underlying security multiplied by the sum of specific and general market risk charges for the underlying less the amount the option is in-the-money (if any) bounded at zero.
Long call *or* Long put	The capital charge will be the lesser of: (i) the market value of the underlying security multiplied by the sum of specific and general market risk charges for the underlying; and (ii) the market value of the option.

A worked example of capital computation where the underlying is equity is given under *Annexure 8*.

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[6] A cash instrument is an instrument whose value is determined directly by markets. Stocks, commodities, currencies and bonds are all cash instruments.

Part 6 (A) - Capital Adequacy Assessment

Bank Name	

Reporting Period	

Reporting Currency and Units	**Rupees thousands / USD thousands**

CAPITAL BASE

Net core capital	**A**		
Total supplementary capital	**B**		
Capital base	**C = A + B**		

MANDATORY CAPITAL

		Amount	**% to capital base**
Capital charge for credit risk	**D**		
Capital charge for operational risk	**E**		
Capital charge for foreign exchange exposure	**F**		
Total mandatory capital	**G = D + E + F**		

INTERNAL CAPITAL

Excess over mandatory capital	**H = C - G**		
Interest rate risk - Earnings perspective *	**I**		
Capital excess / (shortfall)	**K=H - I**		
Effect of interest rate risk: Economic value perspective			

TRADING BOOK ACTIVITIES

		Amount (000)
Instruments bearing interest rate risk (net of Banking book position)	**L**	
Foreign exchange exposures related to instruments in Trading book	**M**	
Investments in equities held for trading	**N**	
Commodities/stock positions held for trading	**O**	
Total Assets held in Trading Book	**P = L + M+ N +O**	
Total Assets (on balance sheet)	**Q**	
Ratio of Trading book assets to Total Assets	**P/Q**	
* Overall position in Banking book & Trading book		

Interest Rate Risk: Banking Book & Trading Book

Currency (MUR,USD,GBP,EUR, Others, etc):   **Figures in reporting currency (000's)**

Time-band		Number of days	Assumed rate change (Basis Point) Upward 2%	Downward -2%	Impact on Earnings — Impact of upward movement — Total	On-Balance Sheet	Off Balance Sheet	Impact of downward movement — Total	On-Balance Sheet	Off Balance Sheet	Impact on Economic Value — Weighting factor for standardised interest rate shock	Impact on economic value if interest rate rise by 200 BP	Interest Rate Gap (Net Positions) — Total	On-Balance Sheet	Off Balance Sheet	Interest Sensitive — Assets — Total	On-Balance Sheet	Off Balance Sheet	Liabilities — Total	On-Balance Sheet	Off Balance Sheet
		1	2	3	4 (5+6)	5 (1×2×13/365)	6 (1×2×14/365)	7 (8+9)	8 (1×3×13/365)	9 (1×3×14/365)	10	11 (10×12)	12 (13+14)	13 (16-19)	14 (17-20)	15 (16+17)	16	17	18 (19+20)	19	20
Up to 30 days	1	365	200	200	-	-	-	-	-	-	0.08%		-	-	-	-	-	-	-	-	-
31 to 90 days	2	335	200	200	-	-	-	-	-	-	0.32%		-	-	-	-	-	-	-	-	-
91 to 180 days	3	275	200	200	-	-	-	-	-	-	0.72%		-	-	-	-	-	-	-	-	-
181 to 365 days	4	185	200	200	-	-	-	-	-	-	1.43%		-	-	-	-	-	-	-	-	-
1 year to 2 years	5										2.77%		-	-	-	-	-	-	-	-	-
2 to 3 years	6										4.49%		-	-	-	-	-	-	-	-	-
3 to 4 years	7										6.14%		-	-	-	-	-	-	-	-	-
4 to 5 years	8										7.71%		-	-	-	-	-	-	-	-	-
5 to 7 years	9				Included in the re-pricing gap but not in the computation of the impact on earnings						10.15%		-	-	-	-	-	-	-	-	-
7 to 10 years	10										13.26%		-	-	-	-	-	-	-	-	-
10 to 15 years	11										17.84%		-	-	-	-	-	-	-	-	-
15 to 20 years	12										22.43%		-	-	-	-	-	-	-	-	-
More than 20 years	13										26.03%		-	-	-	-	-	-	-	-	-
Total	*Total (1 to 13)*				-	-	-	-	-	-			-	-	-	-	-	-	-	-	-

Foreign Currency Exposure

Foreign Currency Exposure as on _____

Currency	Gross Spot Claims	Gross Spot Liabilities	Net Spot Claims (Liabilities) (Liabilities)	Net Forward Purchases (Sales)	Net Overall Long (Short) Position (=column 3 plus column 4)
	(1)	(2)	(3) = (1) minus (2)	(4)	(5) = (3) plus (4)
Pound Sterling					
US dollar					
EUR					
Japanese yen					
Gold					
Foreign currencies not separately specified above[1]					
				Sub Total	
				Rupee Balancing Item	
				Total	ZERO

Footnote 1: Enter details for other individual foreign currencies with:

Net spot claims or liabilities equivalent to MUR 1 million or more.
Business in foreign currencies with smaller balances should be aggregated and reported in the row "Foreign currencies not Currencies not separately specified above".

Calculation of Capital Charge Relating to General Market
Risk for Interest Rate Related Instruments: A Worked Example

Bank ABC (improvised for the Worked Examples) has the following positions:

(i) Qualifying bond: MUR13.33 mn market value, residual maturity 8 years, coupon 8%;

(ii) Government bond: MUR75 mn market value, residual maturity 2 months, coupon 7%;

(iii) Interest rate swap, MUR150 mn, bank receives floating rate interest and pays fixed, next interest fixing after 9 months, residual life of swap 8 years;

(iv) Long position in interest rate future, MUR50 mn, delivery date after 6 months, life of underlying govemment security 3.5 years.

The calculation under the maturity method is as follows:

(a) The overall net position (+ 0.15 - 0.20 + 1.05 + 1.125 - 5.625 + 0.5) is -3.00 leading to a capital charge of 3.00.

(b) The *vertical disallowance* in time-band 7-10 years has to be calculated. The matched position in this time-band is 0.5 (the lesser of the absolute values of the added (weighted) long and (weighted) short positions in the same time-band), which leads to a capital charge of 10% of 0.5 = 0.05 (MUR50,000). The remaining net (short) position is -5.125. Since there are no positions in other zone 3 time-bands, this is the net position in zone 3.

(c) The *horizontal disallowances within the zones* have to be calculated. As there is more than one position in zone 1 only, a horizontal disallowance need only be calculated in this zone. In doing this, the matched position is calculated as 0.2 (the lesser of the absolute values of the added long and short positions in the same zone). The capital charge for the horizontal disallowance within zone 1 is 40% of 0.2 = 0.08 = MUR 80,000. The remaining net (long) position in zone 1 is +1.00.

(d) The *horizontal disallowances between adjacent zones* have to be calculated. After calculating the net position within zone 1 the following positions remain: zone 1 +1.00, zone 2 +1.125, zone 3 -5.125. The matched position between zones 2 and 3 is 1.125 (the lesser of the absolute values of the long and short positions between adjacent zones). The capital charge in this case is 40% of 1.125 = 0.45.

(e) The horizontal disallowance between zones 1 and 3 has to be calculated. After offsetting the +1.125 in zone 2 against the -5.125 in zone 3, this leaves -4.00 in zone 3 which can be offset against the +1.00 in zone 1. The horizontal disallowance between the two zones is 100 per cent of the matched position, which leads to a capital charge of 100 per cent of 1.00 = 1.00.

The total capital charge (MUR million) in this example is:

▪	for the overall net open position	3.00
▪	for the vertic al disallowance	0.05
▪	for the horizontal disallowance in zone 1	0.08
▪	for the horizontal disallowance between adjacent zones	0.45
▪	for the horizontal disallowance between zones 1 and 3	<u>1.00</u>
	Total Capital Charge	**4.58**

Zones		Zone 1 (months)				Zone 2 (years)			Zone 3 (years)						Total
Maturity Time-band		0-1	1-3	3-6	6-12	1-2	2-3	3-4	4-5	5-7	7-10	10-15	15-20	>20	
Sum of Long Positions (MUR million)	A		+75 (Gov.)		+150 (swap)			+50 (future)			13.33 (bond)				
Sum of Short Positions (MUR Million)	B			-50 (future)							-150 (swap)				
Risk Weight (%)	C	0.0	0.20	0.40	0.70	1.25	1.75	2.25	2.75	3.25	3.75	4.50	5.25	6.00	

Sum of Weighted long positions (MUR Million)	D =A × C	0	+0.15	0	+1.05	0	0	+1.125	0	0	+0.50	0	0	0	
Sum of Weighted Short positions (MUR Million)	E= B × C	0	0	-0.20	0	0	0	0	0	0	-5.625	0	0	0	
Net Weighted Position	F =D – E	0	+0.15	-0.20	+1.05	0	0	+1.125	0	0	-5.125	0	0	0	-3.00

Vertical Disallowance

Matched position in each band (i.e the lesser of the absolute values of F in each zone)	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	
Capital Charge	J=10% X G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05

Horizontal Disallowance

Sum of positive positions in each zone		1.2	1.125	0
Sum of negative positions in each zone		-0.2	0	-5.125
Matched Position in each Zone	K	0.20	0.00	0.00
Risk Weight	L	40%	30%	30%
Capital Charge	M=K × L	0.08	0.00	0.00	0.08

Net position in each zone		+1.000	+1.125	-5.1251
Matched Position between Zones		Zones 1 & 2	Zones 2 & 3	Zones 1 & 3
Matched Position	N	0.000	1.125	1.000
Risk Weight	O	40%	40%	100%
Capital Charge	P= N X O	0	0.45	1.00	1.45

Computation of Equity Risk: A Worked Example

Calculation of Capital Charge

Bank ABC has the following positions in its equity portfolio for a particular national market:

Company	Position	No. of shares	Market Price (MUR)	Market Value (MUR)
A	Long	10,000	35	350,000
B	Short	20,000	25	500,000
C	Short	5,000	50	250,000
D	Long	15,000	20	300,000
E	Short	2,000	60	120,000

To calculate the capital charge for equity risk, we must add the capital charges for:

- General market risk; and
- Specific risk.

General Market Risk

Step 1

Determine the overall net open position.

Overall long position   :   350,000 + 300,000 = 650,000
Overall short position   :   500,000 + 250,000 + 120,000 = 870,000
Net open position   :   - 650,000 − 870,000 = (220,000)

Step 2

Apply a 10% capital charge on the overall net open position

Capital charge for general market risk = 10% × 220,000 = 22,000

Specific Risk

Step 3

Calculate the gross equity position.
Gross equity position = 350,000 + 500,000 + 250,000 + 300,000 + 120,000 = 1,520,000

Capital charge for specific risk = 10% × 1,520,000 = 152,000

Therefore,

	MUR
Capital charge for general market risk	22,000
Capital charge for specific risk	152,000
Total capital charge for equity position	**174,000**

Commodities Risk: The Simplified Approach - A Worked Example

Bank ABC has the following positions in a commodity held in US Dollar. The reporting currency is in the Mauritian Rupee.

Step 1

Position	Standard Units (Kg)	Maturity
Long	+128	4 months
Short	-160	5 months
Long	+96	13 months
Short	-96	4 years

Step 2

The following information will be required in the conversion:

Current spot price of the commodity: USD 10 per Kg

Current MUR/USD FX spot rate: 1 USD = MUR 30

Position	Maturity	Standard Units (Kg)	Spot Price	Value (USD)	FX spot rate	Value (MUR)
Long	4 months	+128	10	+1,280	30	+38,400
Short	5 months	-160	10	-1,600	30	-48,000
Long	13 months	+96	10	+960	30	+28,800
Short	3 years	-96	10	-960	30	-28,800

Step 3

Compute the net long or short position in each commodity

Gross long position   :   38,400 + 28,800 = 67,200
Gross short position   :   (48,000) + (28,800) = (76,800)
Overall net open position   :   67,200 – (76,800) = (9,600)

Step 4

Compute a capital charge of 15% on the overall net open position.

Capital charge = 15% × 9600 = 1,440

Step 5

Compute the gross position in each commodity.

Gross position = Gross long position + Gross short position

      144,000 =   67,200 + 76,800

Step 6

Compute a capital charge of 3% of the sum of the bank's gross positions, i.e., the sum of the absolute values of the long and short positions in each commodity.

Capital charge = 3% × 144,000 = 4,320

Step 7

The capital charge for this commodity is the sum of the 15% and the 3% capital charges

	MUR
A capital charge equal to 15% of the overall net long or short position in each commodity	1,440
A capital charge equal to 3% of the sum of the bank's gross positions in each commodity	4,320
Total Capital charge	**5,760**

Commodities Risk: The Maturity Ladder Approach - A Worked Example

Bank ABC has positions in a commodity held in USD, as reported in Mauritian Rupee as follows:

Position	Standard Units (Kg)	Maturity
Long	+128	4 months
Short	-160	5 months
Long	+96	13 months
Short	-96	4 years

Step 1

Express each commodity position (spot plus forward) in terms of the standard unit of measurement (barrels, kilos, grams, etc) and convert in Mauritian rupees/USD (reporting currency) at the current spot price.

Current spot price of the commodity USD 10 per Kg

Current MUR/USD FX spot rate: 1 USD = MUR 30

Position	Maturity	Standard Units (Kg)	Spot Price	Value (USD)	FX spot rate	Value (MRU)
Long	4 months	+128	10	+1,280	30	+38,400
Short	5 months	-160	10	-1,600	30	-48,000
Long	13 months	+96	10	+960	30	+28,800
Short	4 years	-96	10	-960	30	-28,800

Step 2

Allocate each position into the respective time-bands in the maturity ladder according to the remaining maturity.

Time-band	Maturity Ladder (Positions in MUR)	
	Long	**Short**
0 - 1 month		
>1 - 3 months		
>3 - 6 months	+38,400	-48,000
>6 - 12 months		
>1 - 2 years	+28,800	
>2 - 3 years		
Over 3 years		-28,800

Step 3

Compute a capital charge for the matched long and short positions in each time-band, i.e., multiply the sum of the matched short and long positions in each time-band by 1.5% to capture spread risk.

Time-band	Maturity Ladder (Positions in MUR)		Matched Positions (MUR)	
	Long	Short	Long	Short
0 - 1 month				
>1 - 3 months				
>3 - 6 months	+38,400	-48,000	+38,400	-38,400
>6 – 12 months				
>1 - 2 years	+28,800			
>2 - 3 years				
Over 3 years		-28,800		

Capital charge = 1.5% × (38,400 + 38,400) = 1,152

Step 4

Carry forward the unmatched position to the next relevant time-band and apply a capital charge of 0.6% to this residual net position multiplied by the number of time-bands it has been carried forward

Time-band	Maturity Ladder (Positions in MRU)		Matched Positions (MUR)		Residual Position (MUR)	Capital charge (1.5%) Spread Risk	Capital charge for positions carried forward (0.6%)
	Long	Short	Long	Short	Long/Short		
0 – 1 month							
>1 - 3 months							
>3 - 6 months	+38,400	-48,000	+38,400	-38,400	**-9,600**	(38,400+ 38,4000) x 1.5% = 1,152	(9,600 x 2 x 0.6%) = 115.2
>6 - 12 months							
>1 - 2 years							
>2 - 3 years							
Over 3 years							

Step 5

Repeat step 3 and step 4 for each time-band

Time-band	Maturity Ladder (Positions in Rs)		Matched Positions (MUR)		Residual Position (MUR)	Capital charge (1.5%) Spread Risk	Capital charge for positions carried forward (0.6%)
	Long	Short	Long	Short	Long/Short		
0 - 1 month							
>1 - 3 months							
>3 - 6 months	+ 38,400	- 48,000	+ 38,400	- 38,400	**-9,600**	(38,400+38,400) x 1.5% = 1,152	(9,600 x 2 x 0.6%) = 115.2
>6 - 12 months							
>1 - 2 years	+28,800	-9,600	+9,600	-9,600	**+19,200**	(9,600 + 9,600) x 1.5% = 288	(19,200 x 2 x 0.6%) = 230.4
>2 - 3 years							
Over 3 years	+19,200	-28,800	+19,200	-19,200	**-9,600**	(19,200 + 19,200) x 1.5% = 576	

Step 6

Apply a capital charge of 15% to the overall net open position

Capital charge = 15% × 9,600 = 1,440

Step 7

Derive the total capital charge by summing the charges for spread risk, for positions carried forward and for the overall net open position.

Capital charges		MUR
Charge for spread risk	(1,152 + 288 + 576)	2,016.0
Charge for the positions carried forward	(115.2 + 230.4)	345.6
Charge for overall net position		1,440.0
Total capital charge		**3,801.6**

Treatment of Options - A Worked Example

Simplified Approach

Bank ABC holds 100 shares currently valued at USD 10, and also holds an equivalent number of put options with a strike price of USD 11 (each option entitles the bank to sell one share).

Since these are equity options, they are subject to the capital charges for general and specific market risk according to the standardized framework for equity risk. The capital charge is levied at 8% for general market risk and 8% for specific market risk, giving a summed charge of 16%.

Market value of 100 shares = USD 1,000

Step 1

Multiply the market value by the sum of general and specific market risk charges.

USD 1,000 x 16% = USD 160

Step 2

Calculate the amount the option is in-the-money.

(USD 11 – USD 10) x 100 = USD 100

The capital charge is the general and specific market risk charge less the amount the option is in-the-money.

USD 160 – USD 100 = USD 60

A similar methodology applies for options whose underlying is a foreign currency, an interest rate related instrument or a commodity.