

8. Capital Charge for Market Risk

8.1 Introduction

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 market risk positions subject to capital charge requirement are:

- (i) The risks pertaining to interest rate related instruments and equities in the trading book; and
- (ii) Foreign exchange risk (including open position in precious metals) throughout the bank (both banking and trading books).

8.2 Scope and Coverage of Capital Charge for Market Risks

8.2.1 These guidelines seek to address the issues involved in computing capital charges for interest rate related instruments in the trading book, equities in the trading book and foreign exchange risk (including gold and other precious metals) in both trading and banking books. Trading book for the purpose of capital adequacy will include:

- (i) Securities included under the Held for Trading category
- (ii) Securities included under the Available for Sale category
- (iii) Open gold position limits
- (iv) Open foreign exchange position limits
- (v) Trading positions in derivatives, and
- (vi) Derivatives entered into for hedging trading book exposures.

I. Common elements of banks' approaches to risk measurement

1. The internal models methodology for measuring exposure to market risks is based on the following general conceptual framework. Price and position data arising from the bank's trading activities, together with certain measurement parameters, are entered into a computer model that generates a measure of the bank's market risk exposure, typically expressed in terms of *value-at-risk*. This measure represents an estimate of the likely maximum amount that could be lost on a bank's portfolio with a certain degree of statistical confidence.

2. The remainder of this section describes the main components of this sequential process as it is typically deployed and serves as background for the discussion of the proposed supervisory framework in the subsequent sections of the paper.³

(a) Inputs

3. The inputs of the measurement system include the following components:
- *Position data*, comprising positions arising out of trading activities;
 - *Price data on the risk factors* that affect the value of the different positions in the portfolio. The risk factors are generally divided into broad categories that include interest rates, exchange rates, equity prices, and commodity prices, with related options volatilities being included in each risk factor category;
 - *Measurement parameters*, which include the holding period over which the value of the positions can change; the historical time horizon over which risk factor prices are observed (observation period); and a confidence interval for the level of protection judged to be prudent. These measurement parameters are in part judgmental; for example, they may depend on the level of protection that the model seeks to provide, unlike the position and price data which are in principle exogenous.

(b) The modelling process

4. Based on the above inputs, an internal valuation model calculates the potential change in the value of each position resulting from specified movements in the relevant underlying risk factors. The changes in value are then aggregated, taking account of historical correlation between the different risk factors to varying degrees - either at the level of an individual portfolio or across trading activities throughout the bank. The movements in risk factors and the historical correlations between them are measured over the observation period chosen by the bank as appropriate for capturing market conditions within its overall strategy.

5. Banks generally use one of two broad methodologies for measuring market risk exposure: variance/covariance matrix methodology and historical simulation. In the case of the variance/covariance methodology, the change in value of the portfolio is calculated by combining the risk factor sensitivities of the individual positions - derived from valuation models - with a variance/covariance matrix based on risk factor volatilities and correlations. The volatilities and correlations of the risk factors are calculated by each bank on the basis of the holding period and the observation period. The confidence level is then used to determine value-at-risk.

6. The historical simulation approach calculates the hypothetical change in value of the current portfolio in the light of actual historical movements in risk factors. This calculation is carried out for each of the defined holding periods over a given historical measurement horizon to arrive at a range of simulated profits and losses. The confidence level is used to determine the value-at-risk.

7. There is also a third, less widely used approach, the Monte Carlo simulation method, which tests the value of the portfolio under a large sample of randomly chosen combinations of price scenarios, whose probabilities are based on historical experience. This method is particularly useful in measuring the risk in options and other instruments with non-linear price characteristics but is less frequently used to measure the market risk in a broad portfolio of products.

(c) Output

8. Each of the measurement methods described produces a final value-at-risk number. Depending on the way the model is constructed, this number may be calculated for individual positions, for different risk factor categories or for exposure to all kinds of market risk. The numbers generated serve as the basis for monitoring exposure levels and exposure limits and at some banks for allocating capital internally across the different business lines of the bank.

Standardized approach

8.3 Measurement of Capital Charge for Interest Rate Risk

8.3.1 This section describes the framework for measuring the risk of holding or taking positions in debt securities and other interest rate related instruments in the trading book.

8.3.2 The capital charge for interest rate related instruments would apply to current market value of these items in bank's trading book. Since banks are required to maintain capital for market risks on an ongoing basis, they are required to mark to market their trading positions on a daily basis. The current market value will be determined as per extant RBI guidelines on valuation of investments.

8.3.3 The minimum capital requirement is expressed in terms of two separately calculated charges, (i) "**specific risk**" charge for each security, which is designed to protect against an adverse movement in the price of an individual security owing to factors related to the individual issuer, both for short (short position is not allowed in India except in derivatives and Central Government Securities) and long positions, and (ii) "**general market risk**" charge towards interest rate risk in the portfolio, where long and short positions (which is not allowed in India except in derivatives and Central Government Securities) in different securities or instruments can be offset.

8.3.4 For the debt securities held under AFS category, in view of the possible longer holding period and attendant higher specific risk, the banks shall hold total capital charge for market risk equal to greater of (a) or (b) below:

- (a) Specific risk capital charge, computed notionally for the AFS securities treating them as held under HFT category (as computed according to Table 16: Part A / C / E(i) / F / G / H, as applicable) plus the General Market Risk Capital Charge.
- (b) Alternative total capital charge for the AFS category computed notionally treating them as held in the banking book (as computed in accordance with Table 16: Part B / D / E(ii) / F / G / I, as applicable)

B. General Market Risk

8.3.7 The capital requirements for general market risk are designed to capture the risk of loss arising from changes in market interest rates. The capital charge is the sum of four components:

- (i) the net short (short position is not allowed in India except in derivatives and Central Government Securities) or long position in the whole trading book;
- (ii) a small proportion of the matched positions in each time-band (the “vertical disallowance”);
- (iii) a larger proportion of the matched positions across different time-bands (the “horizontal disallowance”), and
- (iv) a net charge for positions in options, where appropriate.

8.3.8 Separate maturity ladders should be used for each currency and capital charges should be calculated for each currency separately and then summed with no

offsetting between positions of opposite sign. In the case of those currencies in which business is insignificant (where the turnover in the respective currency is less than 5 per cent of overall foreign exchange turnover), separate calculations for each currency are not required. The bank may, instead, slot within each appropriate time-band, the net long or short position for each currency. However, these individual net positions are to be summed within each time-band, irrespective of whether they are long or short positions, to produce a gross position figure. The gross positions in each time-band will be subject to the assumed change in yield set out in Table-18 with no further offsets.

8.3.9 The Basel Committee has suggested two broad methodologies for computation of capital charge for market risks. One is the standardised method and the other is the banks' internal risk management models method. As banks in India are still in a nascent stage of developing internal risk management models, it has been decided that, to start with, banks may adopt the standardised method. Under the standardised method there are two principal methods of measuring market risk, a "maturity" method and a "duration" method. As "duration" method is a more accurate method of measuring interest rate risk, it has been decided to adopt standardised duration method to arrive at the capital charge. Accordingly, banks are required to measure the general market risk charge by calculating the price sensitivity (modified duration) of each position separately. Under this method, the mechanics are as follows:

- (i) first calculate the price sensitivity (modified duration) of each instrument;
- (ii) next apply the assumed change in yield to the modified duration of each instrument between 0.6 and 1.0 percentage points depending on the maturity of the instrument (see **Table 17**);
- (iii) slot the resulting capital charge measures into a maturity ladder with the fifteen time bands as set out in **Table 17**;
- (iv) subject long and short positions (short position is not allowed in India except in derivatives and Central Government Securities) in each time band to a 5 per cent vertical disallowance designed to capture basis risk; and
- (v) carry forward the net positions in each time-band for horizontal offsetting subject to the disallowances set out in **Table 18**.

8.4 Measurement of Capital Charge for Equity Risk

8.4.1 The capital charge for equities would apply on their current market value in bank's trading book. Minimum capital requirement to cover the risk of holding or taking positions in equities in the trading book is set out below. This is applied to all instruments that exhibit market behaviour similar to equities but not to non-convertible preference shares (which are covered by the interest rate risk requirements described earlier). The instruments covered include equity shares, whether voting or non-voting, convertible securities that behave like equities, for example: units of mutual funds, and commitments to buy or sell equity.

Specific and General Market Risk

8.4.2 Capital charge for specific risk (akin to credit risk) will be 11.25 per cent or capital charge in accordance with the risk warranted by external rating (or lack of it) of the counterparty, whichever is higher and specific risk is computed on banks' gross equity positions (i.e. the sum of all long equity positions and of all short equity positions - short equity position is, however, not allowed for banks in India). In addition, the general market risk charge will also be 9 per cent on the gross equity positions. These capital charges will also be applicable to all trading book exposures, which are exempted from capital market exposure ceilings for direct investments.

8.5 Measurement of Capital Charge for Foreign Exchange Risk

The bank's net open position in each currency should be calculated by summing:

- The net spot position (i.e. all asset items less all liability items, including accrued interest, denominated in the currency in question);
- The net forward position (i.e. all amounts to be received less all amounts to be paid under forward foreign exchange transactions, including currency futures and the principal on currency swaps not included in the spot position);
- Guarantees (and similar instruments) that are certain to be called and are likely to be irrecoverable;
- Net future income/expenses not yet accrued but already fully hedged (at the discretion of the reporting bank);
- Depending on particular accounting conventions in different countries, any other item representing a profit or loss in foreign currencies;
- The net delta-based equivalent of the total book of foreign currency options

Foreign exchange open positions and gold open positions are at present risk-weighted at 100 per cent. Thus, capital charge for market risks in foreign exchange and gold open position is 9 per cent. These open positions, **limits or actual whichever is higher**, would continue to attract capital charge at 9 per cent. This capital charge is in addition to the capital charge for credit risk on the on-balance sheet and off-balance sheet items pertaining to foreign exchange and gold transactions.

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