Measurement of Market Risk

Market risk is defined as the risk of loss arising from movements in market prices or rates away from the rates or prices set out in a transaction or agreement. The objective in introducing the capital adequacy for market risk is to provide an explicit capital cushion for the price risk to which the PDs are exposed to in their portfolio.

2.The capital charge for market risks should be worked out by the standardised approach and the internal risk management framework based Value at Risk (VaR) model. The capital charge for market risk to be provided by PDs would be higher of the two requirements. However, where price data is not available for specific category of assets, PDs shall follow the standardised approach for computation of market risk. In such a situation, PDs should disclose to RBI, details of such assets and ensure that consistency of approach is followed. PDs should obtain RBI's permission before excluding any category of asset for calculations of market risk. PDs would normally consider the instruments of the nature of fixed deposits, commercial bills etc., for this purpose. Such items will be held in the books till maturity and any diminution in the value will have to be provided for in the books.

Note:In case of underwriting commitments, following points should be adhered to:
   a. *In case of devolvement of underwriting commitment for G-Sec, 100% of the devolved amount would qualify for the measurement of market risk.*
   b. *In case of underwriting under merchant banking issues (other than G-Sec), where price has been committed/frozen at the time of underwriting, the commitment is to be treated as a contingent liability and 50% of the commitment should be included in the position for market risk. However, 100% of devolved position should be subjected to market risk measurement.*

3.The methodology for working out the capital charges for market risk on the portfolio is as below:

A. Standardized Approach
Capital charge will be the measure of risk arrived at in terms of paragraphs A1 – A3 below, summed arithmetically.

A1. For Fixed Income Instruments

Duration method shall continue to apply as hitherto. Under this, the price sensitivity of all interest rate positions viz., Dated securities, Treasury bills, Commercial papers, PSU/FI/Corporate Bonds, Special Bonds, Mutual Fund units and derivative instruments like IRS, FRA, IRF etc., including underwriting commitments/devolvement and other contingent liabilities having interest rate/equity risk will be captured.

In duration method, the capital charge is the sum of four components namely:

a) the net short or long position in the whole trading book;

      b) a small proportion of the matched positions in each time-band (the "*vertical disallowance*");

      c) a larger proportion of the matched positions across different time-bands (the "*horizontal disallowance*");and

d) a net charge for positions in options, where appropriate.

Note 1: Since short position in India is allowed only in derivatives and G-Sec, netting as indicated at (a) and the system of `disallowances' as at (b) and (c) above are applicable currently only to the PDs entering into FRAs / IRSs / exchange traded derivatives and G-Sec.

However, under the duration method, PDs with the necessary capability may, with RBI's permission use a more accurate method of measuring all of their general market risks by calculating the price sensitivity of each position separately. PDs must select and use the method on a consistent basis and the system adopted will be subjected to monitoring by the RBI. The mechanics of this method are as follow:

 (i)   first calculate the price sensitivity of all instruments in terms of a change in interest rates between 0.6 and 1.0 percentage points depending on the duration of the instrument (as per Table 1 given below);

 (ii)   slot the resulting sensitivity measures into a duration-based ladder with the thirteen time-bands set out in Table 1;

 (iii) subject the lower of the long and short positions in each time-band to a 5% capital charge towards vertical disallowance designed to capture basis risk;

(iv)   carry forward the net positions in each time-band for horizontal offsetting across the zones subject to the disallowances set out in Table 2.

Note 2:   *Points (iii) and (iv) above are applicable only where opposite positions exist as explained at Note 1 above.*

Table 1	
Duration time-bands and assumed changes in yield (%)	
Zone 1	
0 to 1 month	1.00
1 to 3 months	1.00
3 to 6 months	1.00
6 to 12 months	1.00
Zone 2	
1 to 2 years	0.95
2 to 3 years	0.90
3 to 4 years	0.85
Zone 3	
4 to 5 years	0.85
5 to 7 years	0.80
7 to 10 years	0.75
10 to 15 years	0.70
15 to 20 years	0.65
Over 20 years	0.60

Table 2				
Horizontal disallowances				
Zones	**Time-band**	**Within the zone**	**Between adjacent zones**	**Between zones 1 and 3**
Zone 1	0 – month 1 – 3 months 3 – 6 months	40%	40%	100%

	6 – 12 months			
Zone 2	1 – 2 years	30%		
	2 – 3 years			
	3 – 4 years			
Zone 3	4 – 5 years	30%		
	5 – 7 years			
	7 – 10 years			
	10 – 15 years			
	15 – 20 years			
	Over 20 years			

The gross positions in each time-band will be subject to risk weighting as per the assumed change in yield set out in Table 1, with no further offsets.

A1.1 Capital charge for interest rate derivatives

The measurement system shall include all interest rate derivatives and off balance-sheet instruments in the trading book which react to changes in interest rates, (e.g. FRAs, other forward contracts, bond futures, interest rate positions).

A1.2 Calculation of positions

Derivatives shall be converted into positions in the relevant underlying and subjected to market risk charges as described above. In order to calculate the market risk as per the standardized approach described above, the amounts reported should be the market value of the principal amount of the underlying or of the notional underlying.

A1.3 Futures and Forward Contracts (including FRAs)

These instruments are treated as a combination of a long and a short position in a notional government security. The maturity of a future contract or an FRA will be the period until delivery or exercise of the contract, plus - where applicable - the life of the underlying instrument. For example, a long position in a June three-month IRF taken in April is to be reported as a long position in a government security with a maturity of five months and a short position in a government security with a maturity of two months. Where a range of deliverable instruments may be delivered to fulfill the contract, the PD has

flexibility to elect which deliverable security goes into the maturity or duration ladder but should take account of any conversion factor defined by the exchange. In the case of a future on a corporate bond index, positions will be included at the market value of the notional underlying portfolio of securities.

A1.4 Swaps

Swaps will be treated as two notional positions in G-Sec with relevant maturities. For example, an IRS under which a PD is receiving floating rate interest and paying fixed will be treated as a long position in a floating rate instrument of maturity equivalent to the period until the next interest fixing and a short position in a fixed-rate instrument of maturity equivalent to the residual life of the swap. For swaps that pay or receive a fixed or floating interest rate against some other reference price, e.g. a stock index, the interest rate component should be slotted into the appropriate re-pricing maturity category, with the equity component being included in the equity framework.

A1.5 Calculation of capital charges

Allowable offsetting of matched positions -PDs may exclude from the interest rate maturity framework altogether (long and short positions, both actual and notional) in identical instruments with exactly the same issuer, coupon and maturity. A matched position in a future or forward and its corresponding underlying may also be fully offset, and thus excluded from the calculation. When the future or the forward comprises a range of deliverable instruments, offsetting of positions in the future or forward contract and its underlying is only permissible in cases where there is a readily identifiable underlying security which is most profitable for the trader with a short position to deliver. The leg representing the time to expiry of the future should, however, be taken into account. The price of this security, sometimes called the "cheapest-to-deliver", and the price of the future or forward contract should in such cases move in close alignment.

In addition, opposite positions in the same category of instruments can in certain circumstances be regarded as matched and allowed to offset fully. To qualify for this treatment the positions must relate to the same underlying instruments and be of the same nominal value. In addition:

(i) **For futures**: offsetting positions in the notional or underlying instruments to which the futures contract relates must be for identical products and mature within seven days of each other;

(ii) **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); and

(iii) **For swaps, FRAs and forwards**: the next interest fixing date or, for fixed coupon positions or forwards, the residual maturity must correspond within the following limits:

- less than one month hence: same day;
- between one month and one year hence: within seven days;
- over one year hence: within thirty days.

PDs with large swap books may use alternative formulae for these swaps to calculate the positions to be included in the duration ladder. One method would be to first convert the payments required by the swap into their present values. For that purpose, each payment shall be discounted using zero coupon yields, and a single net figure for the present value of the cash flows entered into the appropriate time-band using procedures that apply to zero (or low) coupon bonds; these figures should be slotted into the general market risk framework as set out earlier. An alternative method would be to calculate the sensitivity of the net present value implied by the change in yield used in the duration method and allocate these sensitivities into the time-bands set out in Table 1. Other methods which produce similar results could also be used. Such alternative treatments will, however, only be allowed if:

- the supervisory authority is fully satisfied with the accuracy of the systems being used;
- the positions calculated fully reflect the sensitivity of the cash flows to interest rate changes and are entered into the appropriate time-bands;

General market risk applies to positions in all derivative products in the same manner as for cash positions, subject only to an exemption for fully or very closely-matched positions in identical instruments as defined in above paragraphs. The various categories of instruments shall be slotted into the maturity ladder and treated according to the rules identified earlier.

A2 Capital charge for equity positions[35]

A2.1 Equity positions

This section sets out a minimum capital standard to cover the risk of holding or taking positions in equities by the PDs. It applies to long and short positions in all instruments that exhibit market behaviour similar to equities, but not to non-convertible preference shares (which will be covered by the interest rate risk requirements). Long and short positions in the same issue shall be reported on a net basis. The instruments covered include equity shares, convertible securities that behave like equities, i.e., units of Mutual Funds and commitments to buy or sell equities. The equity or equity like positions including those arrived at in relation to equity /index derivatives as described in following sections shall be included in the duration ladder below one month.

A2.2 Equity derivatives

Equity derivatives and off balance-sheet positions which are affected by changes in equity prices should be included in the measurement system. This includes futures and swaps on both individual equities and on stock indices. The derivatives are to be converted into positions in the relevant underlying.

A2.3 Calculation of positions

In order to calculate the market risk as per the standardized approach for credit and market risk, positions in derivatives should be converted into notional equity positions:

- futures and forward contracts relating to individual equities should in principle be reported at current market prices;
- futures relating to stock indices should be reported as the marked-to-market value of the notional underlying equity portfolio;
- equity swaps are to be treated as two notional positions

A3   Capital Charge for Foreign Exchange (FE) Position:

Under the standardised approach, SPDs shall maintain a market risk capital charge of 15% for net open positions (limits or actual, whichever is higher)

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[35]As per the circular IDMD.PDRS.26/03.64.00/2006-07 dated July 4, 2006 on "Diversification of PD Activities", PDs have been allowed to calculate the capital charge for market risk on equity and equity derivatives using the Internal Models approach only.

arising out of forex business with a risk weight of 100%. The net open position for foreign exchange exposures shall be calculated as per the methodology prescribed in paragraph 8.5 of [Master Circular – Basel III Capital Regulations dated April 01, 2022](#) (as amended from time to time) to the extent applicable to SPDs.

Further, as SPDs have been permitted to raise resources under FCNR (B) loan route, subject to prescribed guidelines, they may end up holding open FE positions. Such open positions in equivalent rupees arrived at by marking to market at FEDAI rates will be subject to a flat market risk charge of 15 per cent and be part of the positions stated above.

B. Internal risk management framework based method

The PDs should calculate the capital requirement based on their internal risk management framework based VaR model for market risk, as per the following minimum parameters:

(a) **VaR** must be computed on a daily basis at a 99th percentile, one-tailed confidence interval.

(b) An instantaneous price shock equivalent to a 15-day movement in prices is to be used, i.e. the minimum "holding period" will be fifteen trading days.

(c) Interest rate sensitivity of the entire portfolio should be captured on an integrated basis by including all fixed income securities like G-Sec, Corporate/PSU bonds, CPs and derivatives like IRS, FRAs, IRFs, etc., based on the mapping of the cash flows to work out the portfolio VaR. Wherever data for calculating volatilities is not available, PDs shall calculate the volatilities of such instruments using the G-Sec yield curve with appropriate spread. However, the details of such instruments and the spreads applied have to be reported and consistency of methodology should be ensured.

(d) Instruments which are part of trading book, but found difficult to be subjected to measurement of market risk shall be applied a flat market risk measure of 15 per cent. These include units of Mutual Funds, unquoted equity, etc., and should be added arithmetically to the measure obtained under VaR in respect of other instruments.

(e) Underwriting commitments as explained at the beginning of the Annex should also be mapped into the VaR framework for risk measurement purposes.

(f) The unhedged FE position arising out of the foreign currency borrowings under FCNR (B) loans scheme would carry a market risk of 15 per cent as hitherto and the measure obtained will be added arithmetically to the VaR measure obtained for other instruments.

(g) The choice of *historical observation period* (sample period) for calculating VaR will be constrained to a minimum length of one year and not less than **250** trading days. For PDs who 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 time lag of the individual observations cannot be less than 6 months).

(h) The capital requirement will be the higher of:
   a) the previous day's VaR number measured according to the above parameters specified in this section; and
   b) the average of the daily VaR measures on each of the preceding **sixty** business days, multiplied by a multiplication factor prescribed by the RBI (**3.3** presently).

(i) No particular type of model is prescribed. So long as the model used captures all the material risks run by the PDs, they will be free to use models, based for example, on variance-covariance matrices, historical simulations, Monte Carlo simulations or Extreme Value Theory (EVT), etc.

(j) The criteria for use of internal model to measure market risk capital charge are given by Internal Debt Management Department of the Bank.