

January 07, 2004

IDMD 1/(PDRS) 03.64.00 /2003-04.

To All Primary Dealers in the Government Securities Market.

Dear Sirs,

Capital Adequacy Standards and Risk Management Guidelines for Primary Dealers

Please refer to our Circular No. IDMC.PDRS.PDC.3/03.64.00/2000-01 dated December 11, 2000 prescribing capital adequacy standards for Primary Dealers (PDs) wherein detailed guidelines on measurement of credit risk and market risk for capital charge were advised. Based on the feedback received from the PDs on the draft guidelines on measurement of market risk, circulated by us in July, 2003, and the experiences gained over time, it has been decided to review the existing capital adequacy guidelines including the guidelines on risk management. The revised guidelines are enclosed (**Annex**). We have also revised the PDR-III return. A copy of the revised format of the return is enclosed as **Appendix E** to the Annex. The revised guidelines would become operational from the quarter ending March 31, 2004. PDs should work out the capital charges on their portfolio for the quarter ending March 2004 based on the revised guidelines and submit the return on capital adequacy as per the revised PDR - III accordingly. The PDR III return for the quarter ending March 31, 2004 should be submitted by April 15, 2004 along with all the annexes prescribed in the circular. For the subsequent quarters only PDR III return may be submitted by 15th of the month following the reporting quarter and no annexes need to be forwarded to RBI. However, PDs should prepare all the annexes and keep ready at their end for every quarter and these should be made available to us as and when called for.

2. Besides, it has been decided to reduce holding period for computing the capital charge for market risk to 15 days. The VaR number would continue to be based on 99% one tailed confidence interval as at present.

3. Most of the primary dealers have already put in place the internal models for measuring the VaR. Accordingly, keeping in view the feedback received from PDs, it has been decided to withdraw the option of maintaining capital charge at 7 (seven) percent on the portfolio, exclusively for the market risk. PDs should henceforth compute the capital charge for market risk using the standardized approach and the internal VaR model and the higher of the two values should be taken as the capital charge for market risk. The details are given in **Appendix D** to the guidelines.

4. Please acknowledge receipt.

Yours faithfully,

(H.R. Khan)
Chief General Manager-in-Charge

Encl: As above.

ANNEX

(REF. RBI CIRCULAR No. IDMD 1/(PDRS) 03.64.00 /2003-04 Dated January 7, 2004)

CAPITAL FUNDS & CAPITAL REQUIREMENTS

General Guidelines

1. General

1.1 Capital adequacy standards for Primary Dealers in Government Securities has been in vogue since December 2000.

1.2 Under the above system, both the credit risks and the market risks in the balance sheet assets, non-funded items and other off-balance sheet exposures are measured and PDs have to maintain unimpaired minimum capital funds equivalent to the prescribed ratio on the aggregate of the risk weighted assets and other exposures on an ongoing basis.

1.3 The existing guidelines have been revised keeping in view the developments in the market, experience gained over time and introduction of new products like exchange traded derivatives. The revised guidelines are detailed below.

2.0. Capital Funds

Capital Funds would include the following elements:

2.1 Tier-I Capital

Tier-I Capital would mean paid-up capital, statutory reserves and other disclosed free reserves. *Investment in subsidiaries where applicable, intangible assets, losses in current accounting period, deferred tax asset (DTA) and losses brought forward from previous accounting periods will be deducted from the Tier I capital.* In case any PD is having substantial interest/ (as defined for NBFCs) exposure by way of loans and advances not related to business relationship in other Group companies, such amounts will be deducted from its Tier I capital.

2.2 Tier-II capital

Tier II capital includes the following :-

- (i) Undisclosed reserves and cumulative preference shares other than those which are compulsorily convertible into equity. Cumulative Preferential shares should be fully paid-up and should not contain clauses which permit redemption by the holder.

- (ii) Revaluation reserves discounted at a rate of fifty five percent;
- (iii) General provisions and loss reserves to the extent these are not attributable to actual diminution in value or identifiable potential loss in any specific asset and are available to meet unexpected losses, up to the maximum of 1.25 percent of total risk weighted assets;
- (iv) Hybrid debt capital instruments, which combine certain characteristics of equity and certain characteristics of debt.
- (v) Subordinated debt

a) To be eligible for inclusion in Tier II capital, the instrument should be fully paid-up, unsecured, subordinated to the claims of other creditors, free of restrictive clauses, and should not be redeemable at the initiative of the holder or without the consent of the Reserve Bank of India. It often carries a fixed maturity, and as it approaches maturity, it should be subjected to progressive discount, for inclusion in Tier II capital. Instruments with an initial maturity of less than 5 years or with a remaining maturity of one year should not be included as part of Tier II capital. Subordinated debt instruments eligible to be reckoned as Tier II capital will be limited to 50 percent of Tier I capital.

b) The subordinated debt instruments included in Tier II capital may be subjected to discount at the rates shown below:

Remaining Maturity of Instruments	Rate of Discount (%)
Less than one year	100
One year and more but less than two years	80
Two years and more but less than three years	60
Three years and more but less than four years	40
Four years and more but less than five years	20

2.3 Tier – III Capital

Tier III capital is the capital issued to meet solely market risk capital charge in accordance with the criteria as laid down in **Appendix A**.

2.4. Minimum Requirement of Capital Funds

PDs are required to maintain a minimum Capital to Risk-weighted Assets Ratio (CRAR) norm of 15 percent on an ongoing basis.

In order to ensure consistency in the calculation of the capital requirements for credit and market risks, an explicit numerical link will be created by multiplying the measure of market risk by 6.67 (i.e., the reciprocal of the credit risk ratio of 15%) and adding the resulting figure to the sum of risk-weighted assets compiled for credit risk purposes. The ratio will then be calculated in relation to the sum of the two, using as the numerator only eligible capital.

In calculating eligible capital, it will be necessary first to calculate the PDs' minimum capital requirement for credit risk, and only afterwards its market risk requirement, to establish how much tier I and tier II capital is available to support market risk. Eligible capital will be the sum of the whole of the PDs' tier I capital, plus all of its tier II capital under the limits imposed as summarized in **Appendix D**. Tier III capital will be regarded as eligible only if it meets the criteria set out in **Appendix A**.

3.0 Measurement of Risk Weighted Assets:

The details of credit risk weights for the various on-balance sheet items and off-balance sheet items based on the degree of credit risk and methodology of computing the risk weighted assets for the credit risk are listed in **Appendix B**. The procedure for measurement of market risk is detailed in **Appendix C**.

4.0 Regulatory reporting of Capital adequacy:

All PDs should report the position of their capital adequacy in PDR III return on a quarterly basis. The revised PDR III statement is given in **Appendix E**.

Criteria for raising Tier III Capital

The principal form of eligible capital to cover market risk consists of shareholders' and retained earnings (Tier I Capital) and supplementary capital (Tier II Capital) as defined above. But PDs may also employ a third tier of capital ("Tier III"), consisting of short-term subordinated debt, as defined below, for the sole purpose of meeting a portion of the capital requirements for market risks.

For short-term subordinated debt to be eligible as Tier III Capital, it needs, if circumstances demand, to be capable of becoming part of PD's permanent capital and that be available to absorb losses in the event of insolvency. It must, therefore, at a minimum;

- (i) be unsecured, subordinated and fully paid up;
- (ii) have an original maturity of at least two years;
- (iii) not be repayable before the agreed repayment date unless the RBI agrees;
- (iv) be subject to a lock-in clause that neither interest nor principal may be paid (even at maturity) if such payment means that the PD falls below or remains below its minimum capital requirement.

CAPITAL ADEQUACY FOR CREDIT RISK

Risk weights for calculation of CRAR

(a) On-Balance Sheet assets

All the on-balance sheet items are assigned percentage weights as per degree of credit risk. The value of each asset/item is to be multiplied by the relevant risk weight to arrive at risk adjusted value of the asset, as detailed below. The aggregate of the Risk Weighted Assets will be taken into account for reckoning the minimum capital ratio.

Nature of asset/item	Percentage weight
(i) Cash balances and balances in Current Account with RBI	0
(ii) Amounts lent in call/notice money market/ Other money market instruments of banks/ FIs including CDs and balances in Current account with banks	20
(iii) <u>Investments</u>	
(a) `Government` securities/`Approved` securities guaranteed by Central/State Governments [other than at (e) below]	0
(b) Fixed Deposits, Bonds of banks and FIs (as specified by DBOD)	20
(c) Bonds issued by banks/Financial Institutions as Tier II capital	100
(d) Shares of all Companies and debentures/bonds/Commercial Paper of Companies other than in (b) above/units of mutual funds	100
(e) Securities of Public Sector Undertakings guaranteed by Government but issued outside the market borrowing programme	20

(f)	Securities of and other claims on Primary Dealers including rediscounting of bills discounted by other PDs	100
(g)	Bills discounted by banks/FIs that are rediscounted	20
(iv)	<u>Current assets</u>	
(a)	Inter-corporate deposits	100
(b)	Loans to staff	100
(c)	Other secured loans and advances considered good	100
(d)	Bills purchased/discounted	100
(e)	Others (to be specified)	100
(v)	<u>Fixed Assets (net of depreciation)</u>	
(a)	Assets leased out (net book value)	100
(b)	Fixed Assets	100
(vi)	<u>Other assets</u>	
(a)	Income tax deducted at source (net of provision)	0
(b)	Advance tax paid (net of provision)	0
(c)	Interest accrued on Government securities	0
(d)	Others (to be specified and risk weight indicated as per counter party)	x

Notes: (1) Netting may be done only in respect of assets where provisions for depreciation or for bad and doubtful debts have been made.

(2) Assets which have been deducted from capital fund as at 'Capital Funds' above, shall have a risk weight of 'zero'.

- (3) The PDs net off the Current Liabilities and Provisions from the Current Assets, Loans and Advances in their Balance Sheet, as the Balance Sheet is drawn up as per the format prescribed under the Companies Act. For capital adequacy purposes, no such netting off should be done except to the extent indicated above.

(b) Off-Balance Sheet items

The credit risk exposure attached to off-Balance Sheet items has to be first calculated by multiplying the face value of each of the off-Balance Sheet items by 'credit conversion factor' as indicated in the table below. This will then have to be again multiplied by the weights attributable to the relevant counter-party as specified above under balance sheet items.

	Nature of item	Credit conversion factor percentage
i)	Financial guarantees considered as credit substitutes	100
ii)	Other guarantees	50
iii)	Share/debenture/stock underwritten	50
iv)	Partly-paid shares/debentures/other securities and actual devolvement	100
v)	Notional Equity /Index position underlying the equity Derivatives *	100
vi)	Bills discounted/rediscounted	100
vii)	Repurchase agreements (e.g. buy/sell) where the credit risk remains with the PD	100
viii)	Other contingent liabilities/ commitments like standby facility with original maturity of over one year	50
ix)	Similar contingent liabilities/ commitments with original maturity of upto one year or which can be unconditionally cancelled at any time	0

* For guidelines on calculation of notional positions underlying the equity derivatives, please refer to section A.2, **Appendix C** (Measurement of Market Risk)

Note: Cash margins/deposits shall be deducted before applying the Conversion Factor.

(c) Interest Rate Contracts

For the trading/hedging positions in Interest Rate related contracts, such as, interest rate swaps, forward rate agreements, basis swaps, interest rate futures, interest rate options, exchange traded interest rate derivatives and other contracts of similar nature, risk weighted asset and the minimum capital ratio will be calculated as per the two steps given below.

Step 1

The notional principal amount of each instruments is to be multiplied by the conversion factor given below:

Original Maturity	Conversion Factor
Less than one year	0.5 per cent
One year and less than two years	1.0 per cent
For each additional year	1.0 per cent

Step 2

The adjusted value thus obtained shall be multiplied by the risk weightage allotted to the relevant counter-party as specified below:

Government/any exposure guaranteed by Government	0%
Banks/Financial Institutions (as specified by DBOD)	20%
Primary Dealers in the Government Securities market	100%
All others	100%

(d) Foreign Exchange Contracts

Like the interest rate contracts, the outstanding contracts should be first multiplied by a conversion factor as shown below:

Aggregate outstanding foreign exchange contracts of original maturity -	
• less than one year	2%
• for each additional year or part thereof	3%

This will then have to be again multiplied by the weights attributable to the relevant counter-party as specified above.

Foreign exchange contracts with an original maturity of 14 calendar days or less, irrespective of the counterparty, may be assigned "zero" risk weight as per international practice.

MEASUREMENT OF MARKET RISK

Market risk may be defined as the possibility of loss caused by change in market variables. 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 especially exposed in their portfolio.

The methods for working out the capital charge for market risks are the standardised model and the internal risk management framework based model. PDs would continue to calculate capital charges based on the standardised method as also under the internal risk management framework based (VaR) model and maintain the higher of the two requirements. However, where price data is not available for specific category of assets, then PDs may follow the standardised method for computation of market risk. In such a situation, PDs shall disclose to Reserve Bank of India, details of such assets and ensure that consistency of approach is followed. PDs should obtain Reserve Bank of India's permission before excluding any category of asset for calculations of market risk. The Bank 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, the following points should be adhered to:

- a. In case of devolvement of underwriting commitment for government securities, 100% of the devolved amount would qualify for the measurement of market risk.
- b. In case of underwriting under merchant banking issues (other than Gsecs), 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.

The methodology for working out the capital charges for market risk on the portfolio is explained below:

A: Standardised Method: Capital charge under standardized method will be the measures of risk arrived at in terms of paragraphs A.1-3 below summed arithmetically.

A1. For fixed income instruments

Under standardized method, duration method would continue to apply as hitherto. Under this, the price sensitivity of all interest rate positions viz., Dated securities, Treasury bills, Bills purchased/Discounted, Commercial papers, PSU/FI/Corporate Bonds, Special Bonds, Mutual fund units and derivative instruments like IRS, FRAs, Interest Rate Futures 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 given below:

- 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*”);
- d) a net charge for positions in options, where appropriate

Note : Since blank short selling in the cash position is not allowed, 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.

However, under the duration method, PDs with the necessary capability may, with Reserve Bank of India'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 Reserve Bank of India. The mechanics of this method are as follows:

- i. First calculate the price sensitivity of all instruments in terms of a change in interest rates of 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 : Points iii and iv above are applicable only where opposite positions exist as explained at **Note** above.

Table 1			
Duration time-bands and assumed changes in yield		Assumed change in yield (%)	
Zone 1		Zone 3	
0 to 1 month	1.00	4 to 5 years	0.85
1 to 3 months	1.00	5 to 7 years	0.80
3 to 6 months	1.00	7 to 10 years	0.75
6 to 12 months	1.00	10 to 15 years	0.70
		15 to 20 years	0.65
		Over 20 years	0.60
Zone 2			
1to2 years	0.95		
2 to 3 years	0.90		
3 to 4 years	0.85		

Table 2								
Horizontal disallowances								
Zones	Time-band	Within the zone	Between adjacent zones	Between zones 1 and 3				
Zone 1	0 – month	40%	40%	100%				
	1 - 3 months							
	3 – 6 months							
	6 – 12 months							
Zone 2	1 – 2 years	30%			40%	100%		
	2 – 3 years							
	3 – 4 years							
Zone 3	4 – 5 years	30%					40%	100%
	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 should include all interest rate derivatives and off balance-sheet instruments in the trading book which react to changes in interest rates, (e.g. forward rate agreements (FRAs), other forward contracts, bond futures, interest rate positions).

A1.2. Calculation of positions

The derivatives should be converted into positions in the relevant underlying and become subject to market risk charges as described above. In order to calculate the market risk as per the standardized method 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 forward rate agreements

These instruments are treated as a combination of a long and a short position in a notional government security. The maturity of a future or a 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 interest rate future 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 government securities with relevant maturities. For example, an interest rate swap 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 repricing maturity category, with the equity component being included in the equity framework.

A1.5. Calculation of capital charges

(a) 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 reported. 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 can 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 should 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 should be slotted into the maturity ladder and treated according to the rules identified earlier.

A 2. Capital charge for equity positions:

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 behavior 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 may be reported on a net basis. The instruments covered include equity shares, convertible securities that behave like equities, i.e., units of MF and commitments to buy or sell equity securities. The equity or equity like positions including those arrived out in relation to equity /index derivatives as described below may 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 method 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

A.3 Capital Charge for Foreign Exchange Position:

PDs normally would not be dealing in foreign exchange transactions. However, by virtue of they having been permitted to raise resources under FCNR(B) loans route, subject to prescribed guidelines, may end up holding open foreign exchange position. This open position in equivalent rupees arrived at by marking to market at FEDAI rates will be subject to a flat market risk charge of 15%.

B. Internal risk model (VaR) based method

The PDs should calculate the capital requirement based on their internal Value at Risk (VaR) model for market risk, as per the following minimum parameters :

- (a) **"Value-at-risk"** must be computed on a daily basis.
- (b) In calculating the value-at-risk, a 99th percentile, one-tailed confidence interval is to be used.
- (c) 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.
- (d) Interest rate sensitivity of the entire portfolio should be captured on an integrated basis by including all fixed income securities like Government securities, Corporate/PSU bonds, CPs and derivatives like IRS, FRAs, Interest rate futures etc., based on the mapping of the cash flows to work out the portfolio VaR. Wherever data for calculating volatilities is not available, PDs may calculate the volatilities of such instruments using the G-Securities 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. Instruments which are part of trading book, but found difficult to be subjected to measurement of market risk may be applied a flat market risk measure of 15%. The instruments likely to be applied the flat market risk measure are units of MF, Unquoted Equity, etc., and added arithmetically to the measure obtained under VaR in respect of other instruments.
- (e) Underwriting commitments as explained at the beginning of the Appendix should also be mapped into the VaR framework for risk measurement purposes.

- (f) The unhedged foreign exchange position arising out of the foreign currency borrowings under FCNR(B) loans scheme would carry a market risk of 15% 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 value-at-risk 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 (i) the previous day's value-at-risk number measured according to the above parameters specified in this section and (ii) the average of the daily value-at-risk measures on each of the preceding sixty business days, multiplied by a multiplication factor prescribed by Reserve Bank of India (3.30 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, or Monte Carlo simulations or EVT etc.
- (j) The criteria for use of internal model for market risk is given in **Appendix F**.

Appendix D

SUMMATION OF CAPITAL ADEQUACY REQUIREMENTS

The capital adequacy requirements for the PDs will comprise

- the capital charge for credit risk requirements as indicated in **Appendix B**, plus
- the capital charge for market risk requirements as indicated in **Appendix C**
- In working out the eligible capital, the PDs are required to first calculate their minimum capital requirements for credit risk and only afterwards the capital charge towards market risk requirements. The total capital funds will represent the capital available to meet both the credit as also the market risks.
- Of the 15% capital charge for credit risk, at least 50% should be met by Tier I capital, that is the total of Tier II Capital, if any, shall not exceed one hundred per cent of Tier I Capital, at any point of time, for meeting the capital charge for credit risk.
- Subordinated debt as capital should not exceed 50% of tier II capital.
- The total of Tier III Capital, if any, shall not exceed two hundred and fifty per cent of the Tier I Capital that is available for meeting market risk capital charge i.e. excess over the credit risk capital requirements.
- The total of Tier II and Tier III capital eligible for working out the total capital funds should not exceed 100% of Tier I capital.
- The overall capital adequacy ratio will be calculated by establishing an explicit numerical link between the credit risk and the market risk factors, by multiplying the market risk capital charge with 6.67 i.e. the reciprocal of the minimum credit risk capital charge of 15 %. The resultant figure is added to the sum of risk weighted assets worked out for credit risk purpose. The numerator for calculating the overall ratio will be the PD's Tier I , Tier II and the Tier III Capital after head room deductions, if any. The calculation of capital charge is illustrated in PDR III (revised) format, which is enclosed as **Appendix E**.

PDR III Return

Statement of Capital Adequacy - Quarter ended -

Name of the Primary Dealer :

Rupees

Statement - 1 (Summary)		
(i)	Total of Risk Weighted Assets for Credit Risk (Annex I)	Rs.
(ii)	(a) Tier I Capital funds (after deductions)	Rs.
	(b) Tier II Capital funds eligible	Rs.
	(c) Total of available Tier I & II capital funds	Rs.
(iii)	Minimum credit risk capital required i.e. (i) x 15 per cent	Rs.
(iv)	Excess of Tier I & II capital funds available For market risk capital charge i.e. (ii) (c) – (iii)	Rs.
(v)	The Market Risk capital charge worked out as the higher of the amounts under the Standardised method and the one as per Internal Risk Management (VaR) Model (Appendices II and III)	Rs.
(vi)	Capital funds available to meet (v) i.e: excess of Tier I and Tier II as at (iv) above, plus eligible Tier III capital funds [maximum up to 250 % of surplus Tier I capital]	Rs.
(vii)	Over all Capital Adequacy	
	(a) Total RWA for credit risk i.e. (i)	Rs.
	(b) Capital charge for market risk i.e. (v)	Rs.
	(c) Numerical Link for (b) = i.e.(reciprocal of credit risk capital ratio of 15%)	6.67
	(d) Risk Weighted Assets relating to Market Risk i.e. (b) x (c)	Rs.
	(e) Total Risk Weighted Assets i.e. (a) + (d)	Rs.
	(f) Minimum capital required i.e. (e) x 15%	Rs.
	(g) Total Capital funds available i.e. (ii) + (vi)	Rs.

(h) less : Capital funds prescribed by other regulators/ licensors e.g. SEBI/ NSE/ BSE/OTCEI	Rs.
(i) Net capital funds available (g – h) for PD business	Rs.
The PDs should ensure that capital charge requirements are being met on a continuous basis.	
(viii) Surplus Tier III Capital funds, if any	Rs.

Following Annexes are to be sent along with the return :

Annex I - Details of the various on-balance sheet and off-balance sheet items, the risk weights assigned and the risk adjusted value of assets has to be reported in this annex as usual. Revised format enclosed.

Annex II - Details of the market risk charge using the standardised model as usual. Revised format enclosed.

Annex III - Details of market risk using the internal model as per the format enclosed.

Annex IV - Details of back-testing results for the previous quarter, giving the details of VaR predicted by the model, the actual change in the value of the portfolio and the face value of the portfolio.

Annex V - Details of stress testing, giving details of the change in the value of the portfolio for a given change in the yield and on specific date to be advised by Reserve Bank of India. Format enclosed.

Annex I

CREDIT RISK

A. BALANCE SHEET ITEMS

FUNDED RISK ASSET	BOOK VALUE Rupees	RISK WEIGHT %	RISK ADJ VALUE
I. <u>Cash balances and balances in current account with RBI</u>		0%	
II. <u>Amounts lent in call/ notice money market and balances in current account with banks</u>		20%	
III. <u>Investments</u>			
(a) Government and Approved securities, guaranteed by Central/state governments other than at (e) below		0%	
(b) Fixed deposits, Bonds and Certificates of Deposit of banks, PDs and public Financial Institutions as specified by DBOD		20%	
(c) Bonds issued by banks/PDs/ public financial Institutions (as specified by DBOD) as Tier II capital		100%	
(d) Shares of all companies and debentures/ bonds/ commercial papers of companies other than in (b) above/ Units of mutual funds		100%	
(e) Securities of Public sector Undertakings guaranteed by Central/state govts. but issued outside the market borrowing programme Note : In case where the guarantee has been invoked and the concerned state government has remained in default, PDs should assign 100% risk weight.		20%	
(f) Securities of and other exposures on Primary Dealers in the Government Securities market including bills rediscounted		100%	
(g) Bills discounted by banks/FIs that are rediscounted		20%	

IV. Current Assets

(a) Inter-corporate deposits	100%
(b) Loans to staff	100%
(c) Other secured loans and advances considered good	100%
(d) Bills purchased/discounted	100%
(e) Others (to be specified)	100%

V. Fixed Assets (net of depreciation)

(a) Assets leased out	100%
(b) Fixed Assets	100%

VI. Other assets

(a) Income-tax deducted at source (net of provision)	0%
(b) Advance tax paid (net of provision)	0%
(c) Interest due on Government securities	0%
(d) Others (to be specified and risk weight indicated as per the counter party)	X%

AA. TOTAL RISK-WEIGHTED BALANCE SHEET ASSETS

B. OFF-BALANCE SHEET ITEMS

FUNDED RISK ASSET	BOOK VALUE Rupees	CREDIT CONV FACTOR %	RISK WEIGHT %	RISK ADJ VALUE
<u>I. Financial guarantees considered as credit substitutes</u>				
- Government/ any exposure guaranteed by Government		100%	0%	
- Banks/ Financial Institutions (as specified by DBOD)		100%	20%	
- Primary Dealers in the Government securities market		100%	100%	
- All others		100%	100%	
<u>II. Other guarantees</u>				
- Government/ any exposure guaranteed by Government		50%	0%	
- Banks/ Financial Institutions (as specified by DBOD)		50%	20%	
- Primary Dealers in the Government securities market		50%	100%	
- All others		50%	100%	
<u>III. Share/ debenture/ auction stock underwritten</u>				
- Government/ any exposure guaranteed by Government		100%	0%	
- Banks/ Financial Institutions (as specified by DBOD)		100%	20%	
- Primary Dealers in the Government securities market		100%	100%	
- All others		100%	100%	
<u>Partly-paid shares/ debentures including actual devolvement and other securities</u>				
<u>IV. and other securities</u>				
- Government/ any exposure guaranteed by Government		100%	0%	
- Banks/ Financial Institutions (as specified by DBOD)		100%	20%	
- Primary Dealers in the Government securities market		100%	100%	
- All others		100%	100%	
<u>Notional Equity/Index Positions underlying the equity derivative</u>				
<u>V.</u>		100%	100%	
<u>VI. Bills discounted/ rediscounted</u>				
- Government/ any exposure guaranteed by Government		100%	0%	
- Banks/ Financial Institutions (as specified by DBOD)		100%	20%	
- Primary Dealers in the Government securities market		100%	100%	
- All others		100%	100%	
<u>VII. Repurchase agreements where the credit risk remains with the PD</u>				
- Government/ any exposure guaranteed by Government		100%	0%	
- Banks/ Financial Institutions (as specified by DBOD)		100%	20%	
- Primary Dealers in the Government securities market		100%	100%	

- All others	100%	100%
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VIII

. Other contingent liabilities/ commitments like standby

- Government/ any exposure guaranteed by Government	50%	0%
- Banks/ Financial Institutions (as specified by DBOD)	50%	20%
- Primary Dealers in the Government securities market	50%	100%
- All others	50%	100%

IX. Interest Rate swaps

Original maturity of less than 1 year	0.5%	100%
Original maturity of greater than 1 year and less than 2 years	1%	100%
Original maturity of greater than 2 years and less than 3 years	2%	100%
Original maturity of greater than 3 years and less than 4 years	3%	100%
Original maturity of greater than 4 years and less than 5 years	4%	100%
Original maturity of greater than 5 years and less than 6 years	5%	100%
Original maturity of greater than 6 years and less than 7 years (Every additional year - CCF increases by 1%)	6%	100%

X. Foreign Exchange Forward Contract

Original maturity of less than 1 year\$	2%	20- 100%
Original maturity of more than 1 year and less than 2 years\$ (Every additional year – CCF increases by 3%)	5%	20-100%

\$ Risk depends on the counter party

Note: Cash margins/ deposits should be deducted before applying the credit conversion factor

BB. TOTAL RISK-WEIGHTED OFF-BALANCE SHEET ASSETS

**CC. TOTAL RISK-WEIGHTED BALANCE SHEET &
OFF-BALANCE SHEET ASSETS**

Annex II

Statement 3

PDR-III
Quarterly
Return

MARKET RISK CAPITAL STATEMENT (Correlations i.e. appreciation not recognised)

(i) Standardised Method

A. Interest rate Instruments & Equity /Equity like instruments

INSTRUMENT	Maturity Date	POSITION (FV)	BOOK PRICE	BOOK VALUE	MODIFIED DURATION	DURATION BUCKET	ZONE	YIELD	ASSUMED CHANGE IN YIELD (bps)	CHANGED YIELD	CHANGED PRICE	CHANGE IN PRICE	MARKET RISK CHARGE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	

(Including equity positions)

Total of A
B. Unhedged Foreign Exchange Position 15%

Total (A+B)

(ii) Internal Risk Model (VaR) Method

A. Interest Rate instruments & Equity /Equity like instruments

INSTRUMENT	Maturity Date	Modified Duration	Last Market Value	Yield Volatility	Convexity	Price as per 99 C.L.	1day H.P. VaR	15 day H.P. VaR				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				

VaR Average of previous 60 Days of Col.No.9 =Rs.
(a) 3.3 times the average =Rs.

(b) Previous days VaR at Col.No.9=Rs.

Capital Charge i.e.: Higher of (a) and (b) =Rs.

Position (Marked to Market value) Market Risk Measure (15% of the position)

B. Unhedged Foreign Exchange Position

C. Asset items subjected to flat charge of 15% for market risk measurement

Memo items:

Items of assets which, with the approval of RBI, have been classified as investment items and not subjected to market risk measure:

Asset	Book Value	MTM/NAV
1.		
2.		
3.		

Annex IV

Back Testing of VaR Model

For the last 250 trading days

No. of observations (excluding holidays) =

No. of failures i.e., No. of times VaR under predicted the actual MTM losses =

Date wise Back testing results

(Rs. in crore)

Sl. No.	Date	1 day VaR on entire portfolio	Market value of the entire portfolio	Market value next day, portfolio being the same	Difference	Failure Yes/No
1						
2						
3						
4						
Up to 250 days						

The daily VaR preceding holidays should be upscaled by the square root of number of intervening holidays. For example. If the Friday is followed by 2 holidays, then the one VaR figure for Friday should be multiplied by square root of 2.

Annex V

Stress testing of Portfolio

Date : _____

S.No.	Particulars	Amount (Rs. in crores)
1.	Net Owned funds	
2.	Portfolio Value	
3.	Portfolio Modified Duration	
4.	Net Interest Income (including discount on treasury bills)	
5.	Trading Profits	
6.	Unrealised MTM	
7.	Other incomes	
8.	Total Income (4+5+6+7)	
9.	Effect of 1% shock in yields	
10.	Shock as % of accruals and NOF (=9/(1+8)*100)	

Criteria for use of internal model to measure market risk capital charge

A. General criteria

1. In order that the internal model is effective, it should be ensured that :
 - the PD's risk management system is conceptually sound and its implementation is certified by external auditors;
 - the PD has sufficient numbers of staff skilled in the use of sophisticated models not only in the trading area but also in the risk control, audit, and back office areas;
 - the PD has a proven track record of reasonable accuracy in measuring risk (back testing);
 - the PD regularly conducted stress tests along the lines discussed in Para B.4 below
2. In addition to these general criteria, PDs using internal models for capital purposes will be subject to the requirements detailed in Sections B.1 to B.5 below.

B.1 Qualitative standards

The extent to which PDs meet the qualitative criteria contained herein will influence the level at which the RBI will ultimately set the multiplication factor referred to in Section B.3 (h) below, for the PD. Only those PDs, whose models are in full compliance with the qualitative criteria, will be eligible for use of the minimum multiplication factor. The qualitative criteria include:

- a) The PD should have an independent risk control unit that is responsible for the design and implementation of the system. The unit should produce and analyse daily reports on the output of the PD's risk measurement model, including an evaluation of the relationship between measures of

- risk exposure and trading limits. This unit must be independent from trading desks and should report directly to senior management of the PD.
- b) The unit should conduct a regular back testing programme, i.e. an ex-post comparison of the risk measure generated by the model against actual daily changes in portfolio value over longer periods of time, as well as hypothetical changes based on static positions.
 - c) Board of Directors and senior management should be actively involved in the risk control process and must regard risk control as an essential aspect of the business to which significant resources need to be devoted. In this regard, the daily reports prepared by the independent risk control unit must be reviewed by a level of management with sufficient seniority and authority to enforce both reductions in positions taken by individual traders and reductions in the PD's overall risk exposure.
 - d) The PD's internal risk measurement model must be closely integrated into the day-to-day risk management process of the institution. Its output should accordingly be an integral part of the process of planning, monitoring and controlling the PD's market risk profile.
 - e) The risk measurement system should be used in conjunction with internal trading and exposure limits. In this regard, trading limits should be related to the PD's risk measurement model in a manner that is consistent over time and that it is well-understood by both traders and senior management.
 - f) A routine and rigorous programme of stress testing should be in place as a supplement to the risk analysis based on the day-to-day output of the PD's risk measurement model. The results of stress testing should be reviewed periodically by senior management and should be reflected in the policies and limits set by management and the Board of Directors. Where stress tests reveal particular vulnerability to a given set of circumstances, prompt steps should be taken to manage those risks appropriately.
 - g) PDs should have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operation of the risk measurement system. The risk measurement system must be well documented, for example, through a manual that describes the basic principles of the risk management system and that provides an explanation of the empirical techniques used to measure market risk.
 - h) An independent review of the risk measurement system should be carried out regularly in the PD's own internal auditing process. This review should

include both the activities of the trading desks and of the risk control unit. A review of the overall risk management process should take place at regular intervals (ideally not less than once a year) and should specifically address, at a minimum:

- the adequacy of the documentation of the risk management system and process;
 - the organisation of the risk control unit ;
 - the integration of market risk measures into daily risk management;
 - the approval process for risk pricing models and valuation systems used by front and back-office personnel;
 - the validation of any significant change in the risk measurement process;
 - the scope of market risks captured by the risk measurement model;
 - the integrity of the management information system;
 - the accuracy and completeness of position data;
 - the verification of the consistency, timeliness and reliability of data sources used to run internal models, including the independence of such data sources;
 - the accuracy and appropriateness of volatility and other assumptions;
 - the accuracy of valuation and risk transformation calculations;
 - the verification of the model's accuracy through frequent back testing as described in (b) above and in the Attachment I.
- i) The integrity and implementation of the risk management system in accordance with the system policies/procedures laid down by the Board of Directors should be certified by the external auditors as outlined at Para B.5.
- j) A copy of the back testing result should be furnished to Reserve Bank of India.

B.2 Specification of market risk factors

An important part of a PD's internal market risk measurement system is the specification of an appropriate set of market risk factors, i.e. the market rates and prices that affect the value of the PD's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in all the PD's portfolio of on-and-off-balance sheet positions. The following guidelines should be kept in view:

- (a) For *interest rates*, there must be a set of risk factors corresponding to interest rates in each portfolio in which the PD has interest-rate-sensitive on-or-off-balance sheet positions.

The risk measurement system should model the yield curve using one of a number of generally accepted approaches, for example, by estimating forward rates of zero coupon yields. The yield curve should be divided into various maturity segments in order to capture variation in the volatility of rates along the yield curve. For material exposures to interest rate movements in the major instruments, PDs must model the yield curve using all material risk factors, driven by the nature of the PD's trading strategies. For instance, a PD with a portfolio of various types of securities across many points of the yield curve and that engages in complex arbitrage strategies, would require a greater number of risk factors to capture interest rate risk accurately.

The risk measurement system must incorporate separate risk factors to capture spread risk (e.g. between bonds and swaps), i.e. risk arising from less than perfectly correlated movements between Government and other fixed-income instruments.

- (b) For *equity prices*, at a minimum, there should be a risk factor that is designed to capture market-wide movements in equity prices (e.g. a market index). Position in individual securities or in sector indices could be expressed in "beta-equivalents" relative to this market-wide index. More detailed approach would be to have risk factors corresponding to various sectors of the equity market (for instance, industry sectors or cyclical, etc.), or the most extensive approach, wherein, risk factors corresponding to the volatility of individual equity issues are assessed. The method could be decided by the PDs corresponding to their exposure to the equity market and concentrations.

B.3. Quantitative standards

- (a) PDs should update their *data sets* at least once every three months and should also reassess them whenever market prices are subject

to material changes. Reserve Bank of India may also require a PD to calculate their value-at-risk using a shorter observation period if, in its judgement, this is justified by a significant upsurge in price volatility.

- (b) The multiplication factor will be set by Reserve Bank of India on the basis of the assessment of the quality of the PD's risk management system, as also the back testing framework and results, subject to an absolute minimum of 3. The document '*Back testing mechanism to be used in conjunction with the internal risk based model for market risk capital charge*', enclosed as Attachment I, presents in detail the back testing mechanism.

PDs will have flexibility in devising the precise nature of their models, but the parameters indicated at Appendix- C(B) are the minimum which the PDs need to fulfill for acceptance of the model for the purpose of calculating their capital charge. Reserve Bank of India will have the discretion to apply stricter standards.

B.4 Stress testing

1. PDs that use the internal models approach for meeting market risk capital requirements must have in place a rigorous and comprehensive stress testing program to identify events or influences that could greatly impact them.
2. PD's stress scenarios need to cover a range of factors than can create extraordinary losses or gain in trading portfolios, or make the control of risk in those portfolios very difficult. These factors include low-probability events in all major types of risks, including the various components of market, credit and operational risks.
3. PD's stress test should be both of a quantitative and qualitative nature, incorporating both market risk and liquidity aspects of market disturbances. Quantitative criteria should identify plausible stress scenarios to which PDs could be exposed. Qualitative criteria should emphasize that two major goals of stress testing are to evaluate the capacity of the PD's capital to absorb potential large losses and to identify steps the PD can take to reduce its risk and conserve capital. This assessment is integral to setting and evaluating the PD's management strategy and the results of stress testing should be regularly communicated to senior management and, periodically, to the PD's Board of Directors.
4. PDs should combine the standard stress scenarios with stress tests developed by PDs themselves to reflect their specific risk characteristics.

Specifically, Reserve Bank of India may ask PDs to provide information on stress testing in three broad areas, which are discussed below.

(a) Scenarios requiring no simulations by the PD.

5. PDs should have information on the largest losses experienced during the reporting period available for Reserve Bank of India's review. This loss information could be compared to the level of capital that results from a PD's internal measurement system. For example, it could provide Reserve Bank of India with a picture of how many days of peak day losses would have been covered by a given Value-at-Risk estimate.

(b) Scenarios requiring a simulation by the PD.

6. PDs should subject their portfolios to a series of simulated stress scenarios and provide Reserve Bank of India with the results. These scenarios could include testing the current portfolio against past periods of significant disturbance, for example, the January 2003 volatility incorporating both the large price movements and the sharp reduction in liquidity associated with these events. A second type of scenario would evaluate the sensitivity of the PD's market risk exposure to changes in the assumptions about volatilities and correlations. Applying this test would require an evaluation of the historical range of variation for volatilities and correlations and evaluation of the PD's current positions against the extreme values of the historical range. Due consideration should be given to the sharp variation that at times has occurred in a matter of days in periods of significant market disturbance.

(c) Scenarios developed by the PD itself to capture the specific characteristics of its portfolio

7. In addition to the scenarios prescribed by Reserve Bank of India under (a) and (b) above, a PD should also develop its own stress tests which it identified as most adverse based on the characteristics of its portfolio. PDs should provide Reserve Bank of India with a description of the methodology used to identify and carry out stress testing under the scenarios, as well as with a description of the results derived from these scenarios.

8. The results should be reviewed periodically by senior management and should be reflected in the policies and limits set by management and the Board of Directors. Moreover, if the testing reveals particular vulnerability to a given set of circumstances, Reserve Bank of India would expect the PD to take prompt steps to manage those risks appropriately (e.g. by reducing the size of its exposures).

B.5 External Validation

PDs should get the internal model's accuracy validated by external auditors, including at a minimum, the following:

- (a) verifying that the *internal validation processes* described in B.1(h) are operating in a satisfactory manner;
- (b) ensuring that the *formulae* used in the calculation process as well as for the pricing of complex instruments are validated by a qualified unit, which in all cases should be independent from the trading desks;
- (c) Checking that the *structure* of internal models is adequate with respect to the PD's activities and geographical coverage;
- (d) Checking the results of the PD's back testing of its internal measurement system (i.e. comparing Value-at-Risk estimates with actual profits and losses) to ensure that the model provides a reliable measure of potential losses over time. PDs should make the results as well as the underlying inputs to their value-at-risk calculations available to the external auditors;
- (e) Making sure that data flows and processes associated with the risk measurement system are *transparent and accessible*. In particular, it is necessary that auditors are in a position to have easy access, wherever they judge it necessary and under appropriate procedures, to the models' specifications and parameters.

..... X

Attachment I

“BACK TESTING” mechanism to be used in conjunction with the internal risk based model for market risk capital charge

The following are the parameters of the back testing framework for incorporating into the internal models approach to market risk capital requirements.

Primary Dealers that have adopted an internal model-based approach to market risk measurement are required routinely to compare daily profits and losses with model-generated risk measures to gauge the quality and accuracy of their risk measurement systems. This process is known as "back testing".

The objective of the back testing efforts is the comparison of actual trading results with model-generated risk measures. If the comparison uncovers sufficient differences, problems almost certainly must exist, either with the model or with the assumptions of the back test.

II. Description of the back testing framework

The back testing program consists of a periodic comparison of the Primary Dealer's daily Value-at-Risk measures with the subsequent daily profit or loss ("trading outcome"). The Value-at-Risk measures are intended to be larger than all but a certain fraction of the trading outcomes, where that fraction is determined by the confidence level of the Value-at-Risk measure. Comparing the risk measures with the trading outcomes simply means that the Primary Dealer counts the number of times that the risk measures were larger than the trading outcome. The fraction actually covered can then be compared with the intended level of coverage to gauge the performance of the Primary Dealer's risk model.

Under the Value-at-Risk framework, the risk measure is an estimate of the amount that could be lost on a set of positions due to general market movements over a given holding period, measured using a specified confidence level.

The back tests to be applied compare whether the observed percentage of outcomes covered by the risk measure is consistent with a 99% level of confidence. That is, they attempt to determine if a PD's 99th percentile risk measures truly cover 99% of the firm's trading outcomes.

i) Significant changes in portfolio composition relative to the initial positions are common at trading day end. For this reason, the back testing framework suggested involves the use of risk measures calibrated to a one-day holding period.

A more sophisticated approach would involve a detailed attribution of income by source, including fees, spreads, market movements, and intra-day trading results.

Primary Dealers should perform back tests based on the hypothetical changes in portfolio value that would occur were end-of-day positions to remain unchanged.

ii) Back testing using actual daily profits and losses is also a useful exercise since it can uncover cases where the risk measures are not accurately capturing trading volatility in spite of being calculated with integrity.

Primary Dealers should perform back tests using both hypothetical and actual trading outcomes. The steps involve calculation of the number of times that the trading outcomes are not covered by the risk measures (“exceptions”). For example, over 200 trading days, a 99% daily risk measure should cover, on average, 198 of the 200 trading outcomes, leaving two exceptions.

The back testing framework to be applied entails a formal testing and accounting of exceptions on a quarterly basis using the most recent twelve months of date. Primary Dealers may however base the back test on as many observations as possible. Nevertheless, the most recent 250 trading days' observations should be used for the purposes of back testing. The usage of the number of exceptions as the primary reference point in the back testing process is the simplicity and straightforwardness of this approach.

Normally, in view of the 99% confidence level adopted, a level of 4 exceptions in the observation period of 250 days would be acceptable to consider the model as accurate. Exceptions above this, would invite supervisory actions. Depending on the number of exceptions generated by the Primary Dealer's back testing model, both actual as well as hypothetical, Reserve Bank of India may initiate a dialogue regarding the Primary Dealer's model, enhance the multiplication factor, may impose an increase in the capital requirement or disallow use of the model as indicated above depending on the number of exceptions.

In case large number of exceptions are being noticed, it may be useful for the PDs to dis-aggregate their activities into sub sectors in order to identify the large exceptions on their own. The reasons could be of the following categories:

Basic integrity of the model

- 1) The PD's systems simply are not capturing the risk of the positions themselves (e.g. the positions of an office are being reported incorrectly).
- 2) Model volatilities and/or correlations were calculated incorrectly (e.g. the computer is dividing by 250 when it should be dividing by 225).

Model's accuracy could be improved

- 3) The risk measurement model is not assessing the risk of some instruments with sufficient precision (e.g. too few maturity buckets or an omitted spread).

Bad luck or markets moved in fashion unanticipated by the model

- 4) Random chance (a very low probability event).
- 5) Markets moved by more than the model predicted was likely (i.e. volatility was significantly higher than expected).
- 6) Markets did not move together as expected (i.e. correlations were significantly different than what was assumed by the model).

Intra-day trading

- 7) There was a large (and money-losing) change in the PD's positions or some other income event between the end of the first day (when the risk estimate was calculated) and the end of the second day (when trading results were tabulated).