Attachment-II

Worked out examples for computing capital charge for market risks

Example indicating computation of capital charge for market risks – without equities and interest rate related derivative instruments is given below:

A bank may have the following position:

Sl. No	Details	Amount Rs. Crore
1.	Cash & Balances with RBI	200.00
2.	Bank balances	200.00
3.	Investments: Held for Trading Available for Sale Held to Maturity	 500.00 1000.00 500.00
4.	Advances (net)	2000.00
5.	Other Assets	300.00
6.	Total Assets	4700.00

In terms of counter party, the investments are assumed to be as under:

Government - Rs.1000 crore
Banks - Rs. 500 crore
Others - Rs. 500 crore

For simplicity sake let us assume the details of investments as under:

Government securities

Date of Issue	Date of reporting	Maturity Date	Amount Rs. in crore	Coupon(%)	Type
01/03/1992	31/03/2003	01/03/2004	100	12.50	AFS
01/05/1993	31/03/2003	01/05/2003	100	12.00	AFS
01/03/1994	31/03/2003	31/05/2003	100	12.00	AFS
01/03/1995	31/03/2003	01/03/2015	100	12.00	AFS
01/03/1998	31/03/2003	01/03/2010	100	11.50	AFS
01/03/1999	31/03/2003	01/03/2009	100	11.00	AFS
01/03/2000	31/03/2003	01/03/2005	100	10.50	HFT
01/03/2001	31/03/2003	01/03/2006	100	10.00	HTM
01/03/2002	31/03/2003	01/03/2012	100	8.00	HTM
01/03/2003	31/03/2003	01/03/2023	100	6.50	HTM
Total			**1000**		

Bank Bonds

Date of Issue	Date of reporting	Maturity Date	Amount Rs. in crore	Coupon(%)	Type
01/03/1992	31/03/2003	01/03/2004	100	12.50	AFS
01/05/1993	31/03/2003	01/05/2003	100	12.00	AFS
01/03/1994	31/03/2003	31/05/2003	100	12.00	AFS
01/03/1995	31/03/2003	01/03/2006	100	12.50	AFS
01/03/1998	31/03/2003	01/03/2007	100	11.50	HFT
Total			**500**		

Other securities

Date of Issue	Date of reporting	Maturity Date	Amount Rs. in crore	Coupon(%)	Type
01/03/1992	31/03/2003	01/03/2004	100	12.50	HFT
01/05/1993	31/03/2003	01/05/2003	100	12.00	HFT
01/03/1994	31/03/2003	31/05/2003	100	12.00	HFT
01/03/1995	31/03/2003	01/03/2006	100	12.50	HTM
01/03/1998	31/03/2003	01/03/2017	100	11.50	HTM
Total			**500**		

Overall Position

				(Rs. in crore)
Break-up of Total Investments				
	Government Securities	**Bank Bonds**	**Other Securities**	**Total**
HFT	100	100	300	500
AFS	600	400	0	1000
Trading Book	700	500	300	1500
HTM	300	0	200	500
Total	**1000**	**500**	**500**	**2000**

As per the extant instructions to arrive at the risk-weight for the above position the following table would be helpful:

			(Rs. in crore)
Details of Assets	**Book Value**	**Risk Weight (%)**	**Risk weighted Assets**
Cash & balances with RBI	200	0	0
Bank balances	200	20	40
Investments: Government	1000	2.5	25

Banks Others	500 500	22.5 102.5	112.5 512.5
Advances (net)	2000	100	2000
Other Assets	300	100	300
Total	**4700**		**2990**

Assuming that the bank has a capital of Rs.400 crore, the CRAR works out to 13.38%.

Computation of risk weighted assets as per proposed method

A. Risk weighted assets for credit risk

As per the guidelines, held for trading and available for sale securities would qualify to be categorized as Trading Book. Thus trading book in the instant case would be Rs.1500 crore. While computing the credit risk, the securities held under trading book would be excluded and hence the credit risk based risk-weights would be as under:

(Rs. in crore)

Sl. No.	**Details of Assets**	**Book Value**	**Risk Weight (%)**	**Risk weighted Assets**
1.	Cash & balances with RBI	200	0	0
2.	Bank balances	200	20	40
3.	Investments: Government Banks Others	 300 0 200	 0 20 100	 0 0 200
4.	Advances (net)	2000	100	2000
5.	Other Assets	300	100	300
6.	Total	**3200**		**2540**

B. Risk weighted assets for market risk

Computation of capital charge for Trading Book:

a. Specific Risk

(i) Government securities: Rs.700 crore – Nil

(ii) Banks :

(Rs. in crore)			
Details	**Capital charge**	**Amount**	**Capital charge**
For residual term to final maturity 6 months or less	0.30%	200	0.60
For residual term to final maturity between 6 and 24 months	1.125%	100	1.125
For residual term to final maturity exceeding 24 months	1.80%	200	3.60
Total		**500**	**5.325**

(iii) Others : Rs.300 crore @ 9% =Rs. 27 crore

(i)+(ii)+(iii) = Rs.0 crore+Rs.5.325 crore + Rs.27 crore = Rs. 32.325 crore

Therefore, capital charge for specific risk in trading book is Rs.32.33 crore.

b. General Market Risk

Modified duration is used to arrive at the price sensitivity of an interest rate related instrument.

For all the securities listed below, date of reporting is taken as 31/3/2003.

(Rs. in crore)				
Counter Party	**Maturity Date**	**Amount (market value)**	**Coupon (%)**	**Capital Charge for general market risk**
Govt.	01/03/2004	100	12.50	0.84
Govt.	01/05/2003	100	12.00	0.08
Govt.	31/05/2003	100	12.00	0.16
Govt.	01/03/2015	100	12.50	3.63
Govt.	01/03/2010	100	11.50	2.79
Govt.	01/03/2009	100	11.00	2.75
Govt.	01/03/2005	100	10.50	1.35
Banks	01/03/2004	100	12.50	0.84
Banks	01/05/2003	100	12.00	0.08
Banks	31/05/2003	100	12.00	0.16
Banks	01/03/2006	100	12.50	1.77
Banks	01/03/2007	100	11.50	2.29
Others	01/03/2004	100	12.50	0.84
Others	01/05/2003	100	12.00	0.08
Others	31/05/2003	100	12.00	0.16
	Total	**1500**		**17.82**

c. Adding the capital charges for specific risk as well as general market risk would give the total capital charge for the trading book of interest rate related instruments. **Therefore, capital charge for Market Risks = Rs.32.33 crore + Rs.17.82 crore, i.e., Rs.50.15 crore.**

d. To facilitate computation of CRAR for the whole book, this capital charge needs to be converted into equivalent risk weighted assets. In India, the minimum CRAR is 9%. Hence, the capital charge could be converted to risk weighted assets by multiplying the capital charge by (100 ÷ 9).

Thus risk weighted assets for market risk is 50.15*(100 ÷ 9) = Rs.557.23 crore.

Computing the capital ratio:

		(Rs. in Crore)
1.	Total Capital	400
2.	Risk weighted assets for Credit Risk	2540.00
3.	Risk weighted assets for Market Risk	557.23
4.	Total Risk weighted assets (2+3)	3097.23
5.	CRAR [(1÷4)*100]	12.91 %

Example 2.

Example indicating computation of capital charge for market risks – with equities and interest rate related derivative instruments. Foreign exchange and gold open positions also have been assumed.

A bank may have the following position:

Sl. No.	**Details**	**Amount Rs. Crore**
1.	Cash & Balances with	200.00
2.	Bank balances	200.00
3.	Investments:Held for Trading Available for Sale Held to Maturity Equities	500.00 1000.00 500.00 300.00
4.	Advances (net)	2000.00
5.	Other Assets	300.00
6.	Total Assets	5000.00

In addition,

a) foreign exchange open position limit is assumed as Rs.60 crore and

b) Gold open position is assumed at Rs.40 crore.

c) Let us also assume that the bank is having the following **positions in interest rate related derivatives:**

i) Interest Rate Swaps (IRS), Rs.100 crore - bank received floating rate interest and pays fixed, next interest fixing after 6 months, residual life of swap 8 years, and

ii) Long position in interest rate future (IRF), Rs.50 crore, delivery after 6 months, life of underlying government security 3.5 years.

In terms of counter party the investments are assumed to be as under:

a) Interest rate related securities

Government - Rs.1000 crore
Banks - Rs. 500 crore
Others - Rs. 500 crore

b) Equities

Others - Rs.300 crore

For simplicity sake let us assume the details of investments in interest rate related securities as under:

Government securities

Date of Issue	Date of reporting	Maturity Date	Amount Rs.crore	Coupon (%)	Type
01/03/1992	31/03/2003	01/03/2004	100	12.50	AFS
01/05/1993	31/03/2003	01/05/2003	100	12.00	AFS
01/03/1994	31/03/2003	31/05/2003	100	12.00	AFS
01/03/1995	31/03/2003	01/03/2015	100	12.50	AFS
01/03/1998	31/03/2003	01/03/2010	100	11.50	AFS
01/03/1999	31/03/2003	01/03/2009	100	11.00	AFS
01/03/2000	31/03/2003	01/03/2005	100	10.50	HFT
01/03/2001	31/03/2003	01/03/2006	100	10.00	HTM
01/03/2002	31/03/2003	01/03/2012	100	8.00	HTM
01/03/2003	31/03/2003	01/03/2023	100	6.50	HTM
Total			**1000**		

Bank Bonds

Date of Issue	Date of reporting	Maturity Date	Amount Rs. crore	Coupon (%)	Type
01/03/1992	31/03/2003	01/03/2004	100	12.50	AFS
01/05/1993	31/03/2003	01/05/2003	100	12.00	AFS
01/03/1994	31/03/2003	31/05/2003	100	12.00	AFS
01/03/1995	31/03/2003	01/03/2006	100	12.50	AFS
01/03/1998	31/03/2003	01/03/2007	100	11.50	HFT
Total			**500**		

Other Securities

Date of Issue	Date of reporting	Maturity Date	Amount Rs. crore	Coupon (%)	Type
01/03/1992	31/03/2003	01/03/2004	100	12.50	HFT
01/05/1993	31/03/2003	01/05/2003	100	12.00	HFT
01/03/1994	31/03/2003	31/05/2003	100	12.00	HFT
01/03/1995	31/03/2003	01/03/2006	100	12.50	HTM
01/03/1998	31/03/2003	01/03/2017	100	11.50	HTM
Total			**500**		

Overall Position

	Break-up of total investments					
	Interest rate related instruments				Equity	Grand Total
	Govt. Securities	Bank Bonds	Other Securities	Total		
HFT	100	100	300	500	300	800
AFS	600	400	0	1000	0	1000
Trading Book	700	500	300	1500	300	1800
HTM	300	0	200	500	0	500
Grand Total	1000	500	500	2000	300	2300

As per the extant instructions to arrive at the risk-weighted assets for the bank with the above position the following table would be helpful:

(Rs. in crore)

Details of Assets	Book Value	Risk Weight	Risk weighted Assets
Cash& RBI	200	0%	0
Bank balances	200	20%	40

Interest rate related Investments: Government Banks Others	 1000 500 500	 2.5% 22.5% 102.5%	 25 112.5 512.5
Other investments: Equities	 300	 102.5%	 307.5
Advances (net)	2000	100%	2000
Other Assets	300	100%	300
Total Assets	**5000**		**3297.5**
IRS	100	1% + 1% per year (Credit Conversion Factor) and 100% RW	8.00
IRF	50	1% + 1% per year (Credit Conversion Factor) and 100% RW	4.00
Forex + Gold Open position	60 + 40 =100	100%	100.00
Total RWAs			**3407.50**

Assuming that the bank has a capital of Rs.400 crore, the CRAR works out to 11.74%.

Computation of risk weighted assets as per proposed method

A. Risk weighted assets for credit risk

As per the guidelines, held for trading and available for sale securities would qualify to be categorized as Trading Book. Thus trading book in respect of interest rate related investments in the instant case would be Rs.1500 crore. In addition, equities position of Rs.300 crore would be in the trading book. The derivative products held by banks are to be considered as part of trading book. Open position on foreign exchange and gold also would be considered for market risk. While computing the capital charge for credit risk, the securities held under trading book would be excluded and hence the credit risk based risk-weights would be as under:

(Rs. in crore)

Details of Assets	**Book Value**	**Risk Weight**	**Risk weighted Assets**
Cash & RBI	200	0%	0
Bank balances	200	20%	40
Investments in (HTM category) Government Banks	 300 0	 0% 20%	 0 0

Others	200	100%	200
Advances (net)	2000	100%	2000
Other Assets	300	100%	300
Total	**3200**		**2540**
Credit risk for OTC derivatives			
IRS	100	100% (credit conversion factor – 1% + 1% per year)	8.00
IRF	50	100% (credit conversion factor for maturities less than one year – 0.5%)	0.25
Total	**3350**		**2548.25**

B. Risk weighted assets for market risk

Computation of capital charge for the Trading Book:

a. **Specific Risk**

1. Investments in interest rate related instruments:

(i) Government securities – Rs.700 crore - Nil

(ii) Banks

(Rs. crore)			
Details	**Capital charge**	**Amount**	**Capital Charge**
For residual term to final maturity 6 months or less	0.30%	200	0.60
For residual term to final maturity between 6 and 24 months	1.125%	100	1.125
For residual term to final maturity exceeding 24 months	1.80%	200	3.60
Total		**500**	**5.325**

(iii) Others Rs.300 crore @ 9% = Rs.27 crore

(i)+(ii)+(iii) = Rs.0 crore+Rs.5.325 crore+Rs.27 crore = Rs.32.325 crore

2. Equities – capital charge of 9% - Rs.27 crore

Therefore, capital charge for specific risk in the trading book is Rs. 59.33 crore (Rs. 32.33 crore + Rs. 27 crore).

b. General Market Risk

1. Investments in interest rate related instruments:

Modified duration is used to arrive at the price sensitivity of an interest rate related instrument. For all the securities listed below, date of reporting is taken as 31/3/2003

(Rs. crore)

Counter Party	Maturity Date	Amount market value	Coupon (%)	Capital charge for general market risk
Govt.	01/03/2004	100	12.50	0.84
Govt.	01/05/2003	100	12.00	0.08
Govt.	31/05/2003	100	12.00	0.16
Govt.	01/03/2015	100	12.50	3.63
Govt.	01/03/2010	100	11.50	2.79
Govt.	01/03/2009	100	11.00	2.75
Govt.	01/03/2005	100	10.50	1.35
Banks	01/03/2004	100	12.50	0.84
Banks	01/05/2003	100	12.00	0.08
Banks	31/05/2003	100	12.00	0.16
Banks	01/03/2006	100	12.50	1.77
Banks	01/03/2007	100	11.50	2.29
Others	01/03/2004	100	12.50	0.84
Others	01/05/2003	100	12.00	0.08
Others	31/05/2003	100	12.00	0.16
	Total	**1500**		**17.82**

2. Positions in interest rate related derivatives

Interest rate swap

Counter Party	Maturity Date	Notional Amount (i.e., market value)	Modified duration or price sensitivity	Assumed change in yield	Capital charge
GOI	30/09/2003	100	0.47	1.00	0.47
GOI	31/03/2011	100	5.14	0.60	(-) 3.08
					(-) 2.61

Interest rate future

Counter Party	Maturity Date	Notional Amount (i.e., market value)	Modified duration or price sensitivity	Assumed change in yield	Capital charge
GOI	30/09/2003	50	0.45	1.00	(-) 0.225
GOI	31/03/2007	50	2.84	0.75	1.070
					0.84

3. **Disallowances**

The price sensitivities calculated as above have been slotted into a duration-based ladder with fifteen time-bands (Attachment III). Long and short positions within a time band have been subjected to vertical disallowance of 5%. In the instant case, vertical disallowance is applicable under 3-6 month time band and 7.3-9.3 year time band. Then, net positions in each time band have been computed for horizontal offsetting subject to the disallowances mentioned in the table. In the instant case, horizontal disallowance is applicable only in respect of Zone 3. Horizontal disallowances in respect of adjacent zones are not applicable in the instant case.

3.1. **Calculation of Vertical Disallowance**

While calculating capital charge for general market risk on interest rate related instruments, banks should recognize the basis risk (different types of instruments whose price responds differently for movement in general rates) and gap risk (different maturities within timebands). This is addressed by a small capital charge (5%) on matched (off-setting) positions in each time band ("Vertical Disallowance")

An off-setting position, for vertical disallowance, will be the either the sum of long positions and or the short positions within a time band, whichever is lower. In the above example, except for the time band 3-6 months in Zone 1 and the time band of 7.3-9.3 years, where there are off-setting positions of (-) 0.45 and 2.79, there is no off-setting position in any other time band. The sum of long positions in the 3-6 months time band is + 0.47 and the sum of short positions in this time band is (-) 0.45. This off-setting position of 0.45 is subjected to a capital charge of 5% i.e. 0.0225. The sum of long positions in the 7.3-9.3 years time band is + 2.79 and the sum of short positions in this time band is (-) 3.08. This off-setting position of 2.79 is subjected to a capital charge of 5% i.e. 0.1395. It may be mentioned here that if a bank does not have both long and short positions in the same time band, there is no need for any vertical disallowance. Banks in India are not allowed to take any short position in their books, except in derivatives. Therefore, banks in India will generally not be subject to vertical disallowance unless they have a short position in derivatives.

3.2 **Calculation of Horizontal Disallowance**

While calculating capital charge for general market risk on interest rate related instruments, banks must subject their positions to a second round of off-setting across time bands with a view to give recognition to the fact that interest rate movements are not perfectly correlated across maturity bands (yield curve risk and spread risk) i.e matched long and short positions in different time bands may not perfectly off-set. This is achieved by a "Horizontal Disallowance".

An off-setting position, for horizontal disallowance, will be the either the sum of long positions and or the short positions within a Zone, whichever is lower. In the above example, except in Zone 3 (7.3 to 9.3 years) where there is an off-setting (matched) position of (-) 0.29 , there is no off-setting position in any other Zone. The sum of long positions in this Zone is 10.81 and the sum of short positions in this Zone is (-) 0.29 . This off-setting position of 0.29 is subject to horizontal disallowance as under:

With in the same Zone (Zone 3) 30% of 0.29 = 0.09
Between adjacent Zones (Zone 2 & 3) = Nil
Between Zones 1 and Zone 3 = Nil

It may be mentioned here that if a bank does not have both long and short positions in different time zones, there is no need for any horizontal disallowance. Banks in India are not allowed to take any short position in their books except in derivatives. Therefore, banks in India will generally not be subject to horizontal disallowance unless they have short positions in derivatives.

Total capital charge for interest rate related instruments is shown below :

For overall net position	16.06
For vertical disallowance	0.15
For horizontal disallowance in Zone 3	0.09
For horizontal disallowance in adjacent zones	Nil
For horizontal disallowance between Zone 1 & 3	Nil
Total capital charge for interest rate related instruments	**16.30**

(4) The total capital charge in this example for general market risk for interest rate related instruments is computed as under :

Sl. No	Capital charge	Amount (Rs.)
1.	For the vertical disallowance (under 3-6 month time band)	1,12,500
2.	For the vertical disallowance (under 7.3-9.3 year time band)	13,95,000
3.	For the horizontal disallowance (under Zone 3)	9,00,000
4.	For the horizontal disallowances between adjacent zones	0
5.	For the overall net open position (17.82 - 2.61 + 0.84)	16,06,00,000
6.	**Total capital charge for general market risk on interest rate related instruments (1 + 2 + 3 + 4 + 5)**	**16,30,07,500**

(5) Equities

Capital charge for General Market Risk for equities is 9%. Thus, general market risk capital charge on equities would work out to Rs.27 crore.

(6) Forex / Gold Open Position

Capital charge on forex / gold position would be computed at 9%. Thus the same works out to Rs.9 crore

(7) Capital charge for market risks in this example is computed as under :

(Amount in Crores of Rupees)			
Details	**Capital Charge for Specific Risk**	**Capital Charge for General Market Risk**	**Total**
Interest Rate Related instruments	32.33	16.30	48.63
Equities	27.00	27.00	54.00
Forex / Gold	-	9.00	9.00
Total	**59.33**	**52.30**	**111.63**

Computing Capital Ratio

To facilitate computation of CRAR for the whole book, this capital charge for market risks in the Trading Book needs to be converted into equivalent risk weighted assets. As in India, a CRAR of 9% is required, the capital charge could be converted to risk weighted assets by multiplying the capital charge by (100 ÷ 9), i.e. Rs.111.63*(100 ÷ 9) = Rs.1240.33 cr. Therefore, risk weighted assets for market risk is Rs.1240.33 cr.

		(Amount in Crores of Rupees)
1	Total Capital	400.00
2	Risk weighted assets for Credit Risk	2548.25
3	Risk weighted assets for Market Risk	1240.33
4	Total Risk weighted assets (2+3)	3788.58
5	CRAR [(1÷4)*100]	10.56 %