Examples of calculation of default risk exposure under the SA-CCR approach

◆ The counterparty of the derivative contracts in each of the cases below is an unrated corporate and the AI concerned has not made use of any recognized guarantee or recognized credit derivative contract to mitigate the default risk exposure to the corporate arising from these contracts.

Case 1: Unmargined contracts not covered by recognized netting

In this case, since the derivative contracts entered into by the AI with the corporate are <u>not</u> covered by recognized netting, each contract forms a single netting set. Also, neither the AI nor the counterparty has posted collateral for the contracts.

Netting set A

Contract	Type of contract	Base currency	Notional (HK$'000)	Residual maturity (in year)	Pay	Receive	Market value (HK$'000)
A1	Interest rate swap	HKD	10,000	0.25	Fixed	Floating	10

Netting set B

Contract	Type of contract	Base currency	Notional (HK$'000)	Residual maturity (in year)	Pay	Receive	Market value (HK$'000)
A2	Interest rate swap	HKD	10,000	5	Floating	Fixed	-25

Netting set C

Contract	Type of contract	Base currency	Notional (HK$'000)	Residual maturity (in year)	Reference entity	ECAI issuer rating of reference entity	Position of the AI	Market value (HK$'000)
A3	Credit default swap	HKD	10,000	2	Firm X	BBB	Protection seller	50

I. Calculation of default risk exposure

Step 1: Calculation of replacement cost (RC) at the level of netting set

$$RC \quad = max \ (V - C; 0)$$

$$RC_{netting \ set \ A} = \max(10 - 0; 0) = 10$$

$$RC_{netting \ set \ B} = \max(-25 - 0; 0) = 0$$

$$RC_{netting \ set \ C} = \max(50 - 0; 0) = 50$$

Step 2: Calculation of add-on at the level of netting set

Step 2.1: Calculation of contract-level adjusted notional amount (d_i)

Contract	Hedging Set	S_i	E_i	Notional amount (HK$'000) (a)	Supervisory duration (SD_i) (b)	Adjusted notional amount (d_i) (HK$'000) = (a) × (b)
A1	HKD	0	0.25	10,000	0.248	2,484
A2	HKD	0	5	10,000	4.424	44,240
A3	NA	0	2	10,000	1.903	19,033

The supervisory duration of contract *i*, which is subject to a floor of 10 business days, is calculated as follows:

$$SD_i = \frac{exp(-0.05 * S_i) - exp(-0.05 * E_i)}{0.05}$$

$$SD_{A1} = \frac{exp(-0.05*0) - exp(-0.05*0.25)}{0.05} = 0.248$$

$$SD_{A2} = \frac{exp(-0.05*0) - exp(-0.05*5)}{0.05} = 4.424$$

$$SD_{A3} = \frac{exp(-0.05*0) - exp(-0.05*2)}{0.05} = 1.903$$

Step 2.2: Calculation of effective notional amount (D_i) at the level of hedging set

For unmargined contract *i* not subject to recognized netting, the effective notional amount of a hedging set is equivalent to the effective notional amount of contract *i* and is given by the following formula:

$$D_i = \delta_i * d_i * MF_i^{(unmargined)}$$

where $MF_i^{(unmargined)}$ is the maturity factor applicable to contract *i* given by the following formula (M_i is subject to a floor of 10 business days):

$$MF_i^{(unmargined)} = \sqrt{\frac{min\{M_i; 1 \ year\}}{1 \ year}}$$

$$MF_{A1}^{(unmargined)} = \sqrt{\frac{min\{0.25; 1\}}{1}} = 0.5$$

$$MF_{A2}^{(unmargined)} = \sqrt{\frac{min\{5; 1\}}{1}} = 1$$

$$MF_{A3}^{(unmargined)} = \sqrt{\frac{min\{2; 1\}}{1}} = 1$$

Contract	Residual maturity (M_i)	Supervisory delta (δ_i) (a)	Adjusted notional amount (d_i) (HK$'000) (b)	Maturity factor (MF_i) (c)	Effective notional amount (D_i) (HK$'000) = (a) × (b) × (c)
A1	0.25	+1	2,484	0.5	1,242
A2	5	-1	44,240	1	-44,240
A3	2	-1	19,033	1	-19,033

Step 2.3: Calculation of add-on at the level of netting set

For an interest rate[1] or credit-related[2] derivative contract not covered by recognized netting, the add-on for the netting set concerned is calculated as follows:

$$AddOn = SF * |D_i|$$

Netting set	Contract	Absolute value of effective notional amount ($|D_i|$) (HK\$'000) (a)	Supervisory factor (*SF*) (b)	Add-on (HK\$'000) = (a) × (b)
A	A1	1,242	0.5%	6.21
B	A2	44,240	0.5%	221.20
C	A3	19,033	0.54%	102.78

Step 3: Calculation of potential future exposure (PFE) and default risk exposure at the level of netting set

$$PFE = multiplier * AddOn$$

$$Default\ Risk\ Exposure = alpha * (RC + PFE)$$

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[1] For a netting set that contains only one contract, if the contract is an interest rate contract, Formulas 23AS and 23AT in §226BU(2) of the BCR should result in the same effective notional amount for the contract.   That is-

$$Effective\ Notional^{(IR)} = |D^{(MB)}|$$

where $D^{(MB)}$ is the effective notional amount for the maturity bucket in which the contract falls.   However, since there is only one maturity bucket in the netting set, the actual calculation does not require allocation of the contract into a maturity bucket.

[2] For a netting set that contains only one contract, if the contract is a credit-related derivative contract, Formula 23AQ in §226BT(3) of the BCR will be reduced to –

$$AddOn^{(credit)} = [AddOn(Entity_k)^2]^{0.5} = AddOn(Entity_k) = SF_k^{(Credit)} * Effective\ Notional_k^{(Credit)}$$

Netting set	RC (HK$'000) (a)	Multiplier (b)	Add-on (HK$'000) (c)	PFE (HK$'000) (d) = (b) × (c)	Default risk exposure (HK$'000) =1.4*((a) + (d))
A	10	1	6.21	6.21	22.69
B	0	0.945	221.20	209.03	292.65
C	50	1	102.78	102.78	213.89
				Total	**529.23**

The multiplier applied to each of the above netting sets is calculated as follows:

$$multiplier = \min\left\{1; Floor + (1 - Floor) * exp\left(\frac{V - C}{2 * (1 - Floor) * AddOn}\right)\right\}$$

For both netting sets A and C, since the current market value of the netting set is positive and no net collateral is held by the AI, the multiplier is equal to 1.

For netting set B−

$$multiplier_{netting\ set\ B} = \min\left\{1; 5\% + (1 - 5\%) * exp\left(\frac{-25}{2*(1-5\%)*221.2}\right)\right\} = 0.945$$

II. Reporting arrangement

<u>Division A - RWA</u>

a. Part IIIa

(in HK$'000)

Item	Nature of item	On-balance sheet exposures	Off-balance sheet exposures			Risk-weight %	Risk-weighted Amount
		Principal Amount (A1)	Principal Amount / Notional Amount (A2)	Credit Equivalent Amount (A3)	Default Risk Exposure (A4)	(A5)	(A6) = (A1+A3+A4) x A5
Class VIII	**Other Exposures**						
29a.	Exposures to corporates or individuals not elsewhere reported		30,000		529	100	529
29b.	Holdings of equity or other forms of capital instruments issued by, and non-capital LAC liabilities of, financial sector entities subject to 100% risk-weight					100	
29h.	Other exposures not elsewhere reported						
29h(1).							
29h(2).							
29h(3).							
29h(4).							
	SUBTOTAL		30,000		529		529

b. Part IIIb

(in HK$'000)

Item	Nature of item	On-balance sheet exposures		Off-balance sheet exposures			Risk-weight %	Risk-weighted Amount
		Principal Amount (A1)	Principal Amount after CRM (A2)	Principal Amount / Notional Amount (A3)	Credit Equivalent Amount after CRM (A4)	Default Risk Exposure after CRM (A5)	(A6)	(A7) = (A2+A4+A5) x A6
Class VI	**Corporate Exposures**							
9a.	Risk-weight 20%						20	
9b.	Risk-weight 30%						30	
9c.	Risk-weight 50%						50	
9d.	Risk-weight 100%			30,000		529	100	529
9e.	Risk-weight 150%						150	
	SUBTOTAL			30,000		529		529

Division B – Default risk exposure amount

a. Part IIIa Division B - III

Item	Nature of item						
18.	Unmargined contracts not covered by recognized netting						
						Out of which:	
	Type of Contract	Total Notional Amount (B17)	Total Replacement Cost (B18)	Total Potential Future Exposure (B19)	Total Default Risk Exposure (B20)	Sovereign exposures (B21)	Exposures to corporates or individuals (B25)
18a.	Interest rate contracts	20,000	10	215	315		315
18b.	Exchange rate contracts						
18c.	Credit-related derivative contracts	10,000	50	103	214		214
18d.	Equity-related derivative contracts						
18e.	Commodity-related derivative contracts						
	SUBTOTAL	30,000	60	318	529		529

b. Part IIIb Division B - II

Item	Nature of item							
11.	Unmargined contracts not covered by recognized netting							
						Out of which:		
	Type of Contract	Total Notional Amount (B13)	Total Replacement Cost (B14)	Total Potential Future Exposure (B15)	Total Default Risk Exposure (B16)	Sovereign exposures (B17)	Corporate exposures (B22)	Regulatory retail exposures (B23)
11a.	Interest rate contracts	20,000	10	215	315		315	
11b.	Exchange rate contracts							
11c.	Credit-related derivative contracts	10,000	50	103	214		214	
11d.	Equity-related derivative contracts							
11e.	Commodity-related derivative contracts							
	SUBTOTAL	30,000	60	318	529		529	

Case 2: Margined contracts not covered by recognized netting

In this case, the netting sets include netting sets A and B in Case 1 and the following netting sets:

Netting set D

Contract	Type of contract	Entity	Number of units referenced by the contract	Strike (HK$)	Residual maturity (in year)	Current price of underlying (HK$)	Market value (HK$'000)
A4	Bought equity call option (European style)	Firm B	1,000	245	0.25	234	11

Netting set E

Contract	Type of contract	Notional (US$'000)	Contract rate	Residual maturity (in year)	Market value (HK$'000)
A5	Long FX forward (USD/CNH)	1,000	6.6248	0.4	16

The four netting sets are subject to the same margin agreement with the following details:

(in HK$'000)

Margining frequency	Threshold	Min. Transfer Amount	Independent Amount	Haircut value of net collateral held by the AI
daily	0	5	450	500

I. Calculation of default risk exposure

Step 1: Calculation of replacement cost (RC) of netting sets covered by margin agreement MA

$$RC_{MA} = max \left\{ \sum_{NS \in MA} max\{V_{NS}; 0\} - max\{C_{MA}; 0\}; 0 \right\}$$

$$+ max \left\{ \sum_{NS \in MA} min\{V_{NS}; 0\} - min\{C_{MA}; 0\}; 0 \right\}$$

Contract	max{V_NS; 0}	min{V_NS; 0}
A1	10	0
A2	0	-25
A4	11	0
A5	16	0
Total	**37**	**-25**

$$= \max\{37 - \max\{500; 0\}; 0\} + \max\{-25 - \min\{500; 0\}; 0\}$$

$$= \max(37 - 500; 0) + \max(-25; 0)$$

$$= 0$$

Step 2: Calculation of add-on at the level of netting set

Step 2.1: Calculation of contract-level adjusted notional amount (d_i)

Contract	Hedging Set	USD leg (HK$'000)	CNH leg (HK$'000)	Number of units referenced by the contract	Current price of one unit of the underlying assets (HK$)	Adjusted notional amount (d_i) (HK$'000)
A4	Firm B	NA	NA	1,000	234	234
A5	USD/CNH	7,774	7,881	NA	NA	7,881

Step 2.2: Calculation of effective notional amount (D_i) at the level of hedging set

Contract	Residual maturity (M_i)	Supervisory delta (δ_i) (a)	Adjusted notional amount (d_i) (HK$'000) (b)	Maturity factor (MF_i) (c)	Effective notional amount (D_i) (HK$'000) = (a) × (b) × (c)
A4	0.25	+0.588	234	0.5000	69
A5	0.40	+1	7,881	0.6325	4,984

The supervisory delta adjustment of Contract A4 is calculated in accordance with §226BZB(2) and (3) of the BCR. Spot price of the underlying equity is used in the calculation for illustrative purposes.

$$\delta_{A4} = +N\left(\frac{In\left(\frac{P}{K}\right) + 0.5 \cdot \sigma^2 \cdot T}{\sigma \cdot \sqrt{T}}\right)$$

$$\delta_{A4} = +N\left(\frac{In\left(\frac{234}{245}\right) + 0.5 \cdot 120\%^2 \cdot 0.25}{120\% \cdot \sqrt{0.25}}\right)$$

$$= +0.588$$

As there are multiple netting sets covered by the same variation margin agreement, the potential future exposure of each of Contract A4 and Contract A5 must be calculated in a manner as if the contracts were unmargined contracts (see §226BS of the BCR). Accordingly, the maturity factor of each of the contracts is calculated by using the formula for unmargined contracts.

$$MF_i^{(unmargined)} = \sqrt{\frac{min\{M_i; 1\ year\}}{1\ year}}$$

$$MF_{A4}^{(unmargined)} = \sqrt{\frac{min\{0.25; 1\}}{1}} = 0.5$$

$$MF_{A5}^{(unmargined)} = \sqrt{\frac{min\{0.4; 1\}}{1}} = 0.6325$$

Step 2.3: Calculation of add-on at the level of netting set

Contract	Effective notional amount (D_i) (HK\$'000) (a)	Supervisory factor (*SF*) (b)	Add-on[3] (HK\$'000) = (a) × (b)
A4	69	32%	22.03
A5	4,984	4%	199.36

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[3] See footnote 2 above.

Step 3: Calculation of potential future exposure (PFE) of netting sets covered by margin agreement MA

Step 3.1: Calculation of multiplier of each netting set

As the same collateral is shared by four netting sets and the AI in this example is a net receiver of collateral (C>0), netting sets with positive market values must first be allocated collateral up to the amount of those market values. Only after all positive market values have been compensated may surplus collateral be attributed freely among all netting sets. Also, the allocated parts must add up to the total collateral available for the margin agreement. Apart from these limitations, AIs may allocate available collateral at their discretion. The following table shows the multipliers calculated by using one of the possible collateral allocations.

Netting set	Market value (HK$'000)	Collateral allocated* (HK$'000)	Multiplier
A	10	22.65	0.375
B	-25	0	0.945
D	11	55.90	0.375
E	16	421.44	0.376

*The allocation is for illustrative purpose only and does not represent any preference of the HKMA.

From Case 1, the multiplier of netting set B is 0.945. The multipliers of other netting sets are calculated as follows:

$$multiplier_{netting\ set\ A} = \min\left\{1; 5\% + (1-5\%) * exp\left(\frac{10-22.65}{2*(1-5\%)*6.21}\right)\right\} = 0.375$$

$$multiplier_{netting\ set\ D} = \min\left\{1; 5\% + (1-5\%) * exp\left(\frac{11-55.90}{2*(1-5\%)*22.03}\right)\right\} = 0.375$$

$$multiplier_{netting\ set\ E} = \min\left\{1; 5\% + (1-5\%) * exp\left(\frac{16-421.44}{2*(1-5\%)*199.36}\right)\right\} = 0.376$$

Step 3.2: Calculation of PFE of each netting set on unmargined basis

Netting set	AddOn (HK$'000) (a)	Multiplier (b)	PFE (unmargined) (HK$'000) = (a)×(b)
A	6.21	0.375	2.33

Netting set	AddOn (HK$'000) (a)	Multiplier (b)	PFE (unmargined) (HK$'000) = (a)×(b)
B	221.20	0.945	209.06
D	22.03	0.375	8.26
E	199.36	0.376	74.91
		Total	**294.56**

$$PFE_{MA} = \sum_{NS \in MA} PFE_{NS}^{(unmargined)}$$

= 294.56

Step 4: Calculation of default risk exposure of netting sets covered by margin agreement MA

$$Default\ risk\ exposure_{MA} = alpha * (RC_{MA} + PFE_{MA}) = 1.4 * (0 + 294.56) = 412$$

II. Reporting arrangement

Division A - RWA

a. Part IIIa

(in HK$'000)

Item	Nature of item	On-balance sheet exposures Principal Amount (A1)	Off-balance sheet exposures Principal Amount / Notional Amount (A2)	Credit Equivalent Amount (A3)	Default Risk Exposure (A4)	Risk-weight % (A5)	Risk-weighted Amount (A6) = (A1+A3+A4) x A5
Class VIII	**Other Exposures**						
29a.	Exposures to corporates or individuals not elsewhere reported		28,008		412	100	412
29b.	Holdings of equity or other forms of capital instruments issued by, and non-capital LAC liabilities of, financial sector entities subject to 100% risk-weight					100	
29h.	Other exposures not elsewhere reported						
29h(1).							
29h(2).							
29h(3).							
29h(4).							
	SUBTOTAL		28,008		412		412

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b. Part IIIb

(in HK$'000)

Item	Nature of item	On-balance sheet exposures		Off-balance sheet exposures			Risk-weight %	Risk-weighted Amount
		Principal Amount (A1)	Principal Amount after CRM (A2)	Principal Amount / Notional Amount (A3)	Credit Equivalent Amount after CRM (A4)	Default Risk Exposure after CRM (A5)	(A6)	(A7) = (A2+A4+A5) x A6
Class VI	**Corporate Exposures**							
9a.	Risk-weight 20%						20	
9b.	Risk-weight 30%						30	
9c.	Risk-weight 50%						50	
9d.	Risk-weight 100%			28,008		412	100	412
9e.	Risk-weight 150%						150	
	SUBTOTAL			28,008		412		412

Division B – Default risk exposure amount

In this example, the stated notional amount of the FX forward contract is USD1,000.   The notional amount reported in the CAR return is the HKD equivalent of USD1,000, instead of the adjusted notional amount of the contract.

a. Part IIIa Division B – III

(in HK$'000)

Item	Nature of item	Type of Contract	Total Notional Amount (B17)	Total Replacement Cost (B18)	Total Potential Future Exposure (B19)	Total Default Risk Exposure (B20)	Out of which:	
							Sovereign exposures (B21)	Exposures to corporates or individuals (B25)
19.	Margined contracts not covered by recognized netting							
19a.		Interest rate contracts	20,000					
19b.		Exchange rate contracts	7,774					
19c.		Credit-related derivative contracts						
19d.		Equity-related derivative contracts	234					
19e.		Commodity-related derivative contracts						
19f.		Multiple netting sets covered by single variation margin agreement		0	294	412		412
		SUBTOTAL	28,008	0	294	412		412

b. Part IIIb Division B - II

Item	Nature of item							
12.	Margined contracts not covered by recognized netting							
						Out of which:		
	Type of Contract	Total Notional Amount (B13)	Total Replacement Cost (B14)	Total Potential Future Exposure (B15)	Total Default Risk Exposure (B16)	Sovereign exposures (B17)	Corporate exposures (B22)	Regulatory retail exposures (B23)
12a.	Interest rate contracts	20,000						
12b.	Exchange rate contracts	7,774						
12c.	Credit-related derivative contracts							
12d.	Equity-related derivative contracts	234						
12e.	Commodity-related derivative contracts							
12f.	Multiple netting sets covered by single variation margin agreement		0	294	412		412	
	SUBTOTAL	28,008	0	294	412		412	

Case 3: Unmarginaled contracts covered by recognized netting

In this case, the contracts involved are the same as contracts A1, A2 and A3 in Case 1, except that the three contracts are covered by recognized netting and therefore fall within the same netting set. Also, neither the AI nor the counterparty has posted collateral for the contracts.

I.   Calculation of default risk exposure

Step 1: Calculation of replacement cost (RC) at the level of netting set

$$RC = max \ (V - C; 0) = max \ (10 - 25 + 50; 0) = 35$$

Step 2: Calculation of add-on at the level of netting set

Step 2.1: Calculation of effective notional amount (D_i) at the level of hedging set

From Case 1, we have the following information on each of the derivative contracts:

Contract	Maturity bucket	Residual maturity (M_i)	Supervisory delta (δ_i) (a)	Adjusted notional amount (d_i) (HK$'000) (b)	Maturity factor (MF_i) (c)	Effective notional amount (D_i) (HK$'000) = (a) × (b) × (c)
A1	1	0.25	+1	2,484	0.5	1,242
A2	2	5	-1	44,240	1	-44,240
A3	NA	2	-1	19,033	1	-19,033

The effective notional amount of the hedging set that contains contracts A1 and A2 is calculated by using Formula 23AS in §226BU(2) of the BCR as follows:

$$Effective \ Notional_{hedging \ set} = [(D_{A1})^2 + (D_{A2})^2 + 1.4 \cdot D_{A1} \cdot D_{A2}]^{0.5}$$

$$= [(1,242)^2 + (-44,240)^2 + 1.4 * (1,242) * (-44,240)]^{0.5} = 43,379.67$$

Step 2.2: Calculation of add-on at the level of asset class

Given the effective notional amounts calculated under Step 2.1, the add-on for each asset class is calculated as follows:

Asset class	Effective notional amount (HK$'000) (a)	Supervisory factor (b)	Add-on[4] (HK$'000) = (a) × (b)
Interest rate contracts	43,380	0.5%	216.90
Credit-related derivative contracts	19,033	0.54%	102.78

Step 2.3: Calculation of add-on at the level of netting set

$$AddOn^{(aggregate)} = AddOn^{(IR)} + AddOn^{(Credit)} = 216.90 + 102.78 = 319.68$$

Step 3: Calculation of potential future exposure at the level of netting set

$$multiplier = \min\left\{1; Floor + (1 - Floor) * exp\left(\frac{V - C}{2 * (1 - Floor) * AddOn^{(aggregate)}}\right)\right\}$$

$$= \min\left\{1; 5\% + (1 - 5\%) * exp\left(\frac{(10 - 25 + 50) - 0}{2 * (1 - 5\%) * 319.68}\right)\right\}$$

$$= 1$$

$$PFE = multiplier * Addon^{(aggregate)} = 1 * (319.68) = 319.68$$

Step 4: Calculation of default risk exposure of the netting set

$$Default\ Risk\ Exposure = alpha * (RC + PFE) = 1.4 * (35 + 319.68) = 496.55$$

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[4] Also see footnote 2.

II.   Reporting arrangement

<u>Division A - RWA</u>

a.   Part IIIa

(in HK$'000)

Item	Nature of item	On-balance sheet exposures Principal Amount (A1)	Off-balance sheet exposures Principal Amount / Notional Amount (A2)	Credit Equivalent Amount (A3)	Default Risk Exposure (A4)	Risk-weight % (A5)	Risk-weighted Amount (A6) = (A1+A3+A4) x A5
Class VIII	**Other Exposures**						
29a.	Exposures to corporates or individuals not elsewhere reported		30,000		497	100	497
29b.	Holdings of equity or other forms of capital instruments issued by, and non-capital LAC liabilities of, financial sector entities subject to 100% risk-weight					100	
29h.	Other exposures not elsewhere reported						
29h(1).							
29h(2).							
29h(3).							
29h(4).							
	SUBTOTAL		30,000		497		497

b.   Part IIIb

(in HK$'000)

Item	Nature of item	On-balance sheet exposures Principal Amount (A1)	Principal Amount after CRM (A2)	Off-balance sheet exposures Principal Amount / Notional Amount (A3)	Credit Equivalent Amount after CRM (A4)	Default Risk Exposure after CRM (A5)	Risk-weight % (A6)	Risk-weighted Amount (A7) = (A2+A4+A5) x A6
Class VI	**Corporate Exposures**							
9a.	Risk-weight 20%						20	
9b.	Risk-weight 30%						30	
9c.	Risk-weight 50%						50	
9d.	Risk-weight 100%			30,000		497	100	497
9e.	Risk-weight 150%						150	
	SUBTOTAL			30,000		497		497

Division B – Default risk exposure amount

a. Part IIIa Division B – III

Item	Nature of item						
20.	Contracts covered by recognized netting						
						Out of which:	
	Type of Contract	Total Notional Amount (B17)	Total Replacement Cost (B18)	Total Potential Future Exposure (B19)	Total Default Risk Exposure (B20)	Sovereign exposures (B21)	Exposures to corporates or individuals (B25)
20a.	Interest rate contracts	20,000					
20b.	Exchange rate contracts						
20c.	Credit-related derivative contracts						
20d.	Equity-related derivative contracts	10,000					
20e.	Commodity-related derivative contracts						
	SUBTOTAL	30,000	35	320	497		497

b. Part IIIb Division B - II

Item	Nature of item							
13.	Contracts covered by recognized netting							
						Out of which:		
	Type of Contract	Total Notional Amount (B13)	Total Replacement Cost (B14)	Total Potential Future Exposure (B15)	Total Default Risk Exposure (B16)	Sovereign exposures (B17)	Corporate exposures (B22)	Regulatory retail exposures (B23)
13a.	Interest rate contracts	20,000						
13b.	Exchange rate contracts							
13c.	Credit-related derivative contracts	10,000						
13d.	Equity-related derivative contracts							
13e.	Commodity-related derivative contracts							
	SUBTOTAL	30,000	35	320	497		497	

Case 4: Margined contracts covered by recognized netting

> In this case, the contracts involved are the same as Case 2 and subject to the same margin agreement as described in Case 2, except that the contracts are covered by the same valid bilateral netting agreement and therefore fall within the same netting set.

I. Calculation of default risk exposure

Step 1: Calculation of replacement cost (RC) at the level of netting set

$$RC = max\,(V - C\,;\,TH + MTA - NICA;\,0)$$

$$V = 10 - 25 + 11 + 16 = 12$$

$$RC = max\,(12 - 500\,;\,0 + 5 - 450;\,0) \ = 0$$

Step 2: Calculation of add-on at the level of netting set

Step 2.1: Calculation of contract-level effective notional amount (D_i)

From Cases 1 and 2, we have the following information on each of the derivative contracts:

Contract	Maturity bucket	Supervisory delta (δ_i) (a)	Adjusted notional amount (d_i) (HK$'000) (b)	Maturity factor (MF_i) (c)	Effective notional amount (D_i) (HK$'000) = (a) × (b) × (c)
A1	1	+1	2,484	0.3	745.33
A2	2	-1	44,240	0.3	-13,271.95
A4	NA	+0.588	234	0.3	41.31
A5	NA	+1	7,881	0.3	2,364.17

The maturity factor for margined transactions depends on the margin period of risk (MPOR). For daily re-margining, the MPOR is at least 10 business days. In this example, the contracts are not centrally cleared and the requirements in §226BZE(3), (4) and (6) do not apply to the contracts. Hence, the maturity factor for the contracts in the netting set is as follows (the convention of 250 business days in a year is used):

$$MF_i^{(margined)} = \frac{3}{2}\sqrt{\frac{MPOR_i}{1\text{ year}}} = 1.5 * \sqrt{\frac{10}{250}} = 0.3$$

Step 2.2: Calculation of effective notional amount (D_i) at the level of hedging set

Contracts A1 and A2 are in the same hedging set but in different maturity buckets. The effective notional amount of the hedging set is calculated by using Formula 23AS in §226BU(2) of the BCR as follows:

$$Effective\ Notional\ = [(D_{A1})^2 + (D_{A2})^2 + 1.4 \cdot D_{A1} \cdot D_{A2}]^{0.5}$$

$$= [(745.33)^2 + (-13{,}271.95)^2 + 1.4 * (745.33) * (-13{,}271.95)]^{0.5} = 12{,}761.33$$

In the case of Contracts A4 and A5, each contract forms its own hedging set. Hence, the effective notional amount of each hedging set is same as the contract-level effective notional amount.

Step 2.3: Calculation of add-on at the level of asset class

Given the effective notional amounts calculated under Step 2.2, the add-on for each asset class is calculated as follows:

Asset class	Effective notional amount (HK$'000) (a)	Supervisory factor (b)	Add-on[5] (HK$'000) = (a) × (b)
Interest rate contract	12,761.33	0.5%	63.81
Equity-related derivative contract	41.31	32%	13.22
Exchange rate contract	2,364.17	4%	94.57

Step 2.4: Calculation of add-on at the level of netting set

$$AddOn^{(aggregate)} = AddOn^{(IR)} + AddOn^{(Equity)} + AddOn^{(FX)}$$

$$= 63.81 + 13.22 + 94.57 = 171.59$$

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[5] See footnote 2, which also applies in the case of equity-related derivative contracts.

Step 3: Calculation of potential future exposure at the level of netting set

$$multiplier = \min\left\{1; Floor + (1 - Floor) * exp\left(\frac{V - C}{2 * (1 - Floor) * AddOn^{(aggregate)}}\right)\right\}$$

$$= \min\left\{1; 5\% + (1 - 5\%) * exp\left(\frac{12 - 500}{2 * (1 - 5\%) * 171.59}\right)\right\}$$

$$= 0.2627$$

$$PFE = multiplier * Addon^{(aggregate)} = 0.2627 * (171.59) = 45.07$$

Step 4: Calculation of default risk exposure of the netting set

$$Default\ Risk\ Exposure = alpha * (RC + PFE) = 1.4 * (0 + 45.07) = 63$$

II. Reporting arrangement

Division A - RWA

a. Part IIIa

(in HK$'000)

Item	Nature of item	On-balance sheet exposures Principal Amount (A1)	Off-balance sheet exposures Principal Amount / Notional Amount (A2)	Credit Equivalent Amount (A3)	Default Risk Exposure (A4)	Risk-weight % (A5)	Risk-weighted Amount (A6) = (A1+A3+A4) x A5
Class VIII	**Other Exposures**						
29a.	Exposures to corporates or individuals not elsewhere reported		28,008		63	100	63
29b.	Holdings of equity or other forms of capital instruments issued by, and non-capital LAC liabilities of, financial sector entities subject to 100% risk-weight					100	
29h.	Other exposures not elsewhere reported						
29h(1).							
29h(2).							
29h(3).							
29h(4).							
	SUBTOTAL		28,008		63		63

b. Part IIIb

		On-balance sheet exposures		Off-balance sheet exposures				
Item	Nature of item	Principal Amount (A1)	Principal Amount after CRM (A2)	Principal Amount / Notional Amount (A3)	Credit Equivalent Amount after CRM (A4)	Default Risk Exposure after CRM (A5)	Risk-weight % (A6)	Risk-weighted Amount (A7) = (A2+A4+A5) x A6
Class VI	Corporate Exposures							
9a.	Risk-weight 20%						20	
9b.	Risk-weight 30%						30	
9c.	Risk-weight 50%						50	
9d.	Risk-weight 100%			28,008		63	100	63
9e.	Risk-weight 150%						150	
	SUBTOTAL			28,008		63		63

Division B – Default risk exposure amount

a. Part IIIa Division B – III

Item	Nature of item						
20.	Contracts covered by recognized netting					Out of which:	
	Type of Contract	Total Notional Amount (B17)	Total Replacement Cost (B18)	Total Potential Future Exposure (B19)	Total Default Risk Exposure (B20)	Sovereign exposures (B21)	Exposures to corporates or individuals (B25)
20a.	Interest rate contracts	20,000					
20b.	Exchange rate contracts	7,774					
20c.	Credit-related derivative contracts						
20d.	Equity-related derivative contracts	234					
20e.	Commodity-related derivative contracts						
	SUBTOTAL	28,008		45	63		63

b. Part IIIb Division B – II

Item	Nature of item							
13.	Contracts covered by recognized netting					Out of which:		
	Type of Contract	Total Notional Amount (B13)	Total Replacement Cost (B14)	Total Potential Future Exposure (B15)	Total Default Risk Exposure (B16)	Sovereign exposures (B17)	Corporate exposures (B22)	Regulatory retail exposures (B23)
13a.	Interest rate contracts	20,000						
13b.	Exchange rate contracts	7,774						
13c.	Credit-related derivative contracts							
13d.	Equity-related derivative contracts	234						
13e.	Commodity-related derivative contracts							
	SUBTOTAL	28,008	0	45	63		63	