Unofficial translation of the Swiss Federal Banking Commission's „Rundschreiben der Eidg. Bankenkommission: Eigenmittelanforderungen für Marktrisiken (Marktrisiken)"

DISCLAIMER:

This document is an unofficial translation of the preprint of the Swiss Federal Banking Commission's "EBK-RS 06/2 Markrisiken". The only binding version is the one published in the official gazette of the federal laws.

Swiss Federal Banking Commission Circular:
Capital adequacy requirements for market risks
(Market risk)
Dated 29 September 2006

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I. Object and purpose of the Guidelines

The present guidelines govern the measurement and capital adequacy requirements for risks stemming from interest rate changes and share prices in the trading book, and currency, gold and commodity risks throughout the bank. 1

The Guidelines give concrete form to the corresponding provisions in the Capital Adequacy Ordinance (Arts. 68-76 CAO) and describe the measurement and capital adequacy requirements for market risks based on the standardized and model-based approaches and the methods for calculating the consolidated capital required to cover market risks. 2

In addition to the capital adequacy requirements for market risks pursuant to Art. 68-76 CAO dealt with in these Guidelines, capital is also required to cover all additional risks arising from positions in interest-bearing or equity-type instruments in the trading book and from positions in currency, gold and commodity instruments in the same bank pursuant to Art. 37 CAO. 3

II. Trading book

A. Definition

Under Art. 5 CAO, the trading book consists of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book. To be eligible for trading book capital treatment, positions must either be free of any restrictive covenants on their tradability or able to be hedged completely. Trading intent exists if the bank intends to hold the positions for the short term, or with a view to benefiting from short-term fluctuations in their market price or to realizing arbitrage gains (examples include proprietary positions, positions arising from client servicing (e.g. matched principal broking) and market maker positions). The positions should be valued frequently and precisely, and the portfolio should be actively managed. 4

In principle, trading book positions pursuant to Art. 5 CAO constitute "trading business" within the meaning of the accounting rules (RRV-SFBC). On the other hand, trading positions to be valued according to the "lower of cost or market" principle (margin no. 22d RRV-SFBC) are not trading book positions pursuant to Art. 5 CAO. 5

B. Trading strategy and active management

A clearly documented trading strategy approved by senior management must be in place for the positions or portfolios and must also include information on the expected holding period for said positions. 6

The instructions and processes for the active management of the positions must cover the following points:

- The positions are managed via trading. 7
- Position limits are set and monitored for appropriateness. 8
- Dealers have the autonomy to enter into and manage the positions within the agreed limits and strategies. 9
- Positions are marked to market prices at least daily. When marking to model, the parameters must be assessed on a daily basis. 10
- Positions are reported to senior management as an integral part of the bank's risk management process. 11

- Positions are actively monitored with reference to market information sources. This includes assessing the quality and availability of market inputs to the valuation process, level of market turnover and the sizes of positions traded in the market. 12

- Principles and processes for monitoring the positions against the bank's trading strategy including the monitoring of turnover and stale positions. 13

C. Definition as distinct from the banking book

The bank must define appropriate uniform criteria for allocating the positions to the trading book. In addition, control systems are required which ensure compliance with these criteria and the proper, non-arbitrary treatment of internal transactions. 14

A bank must have implemented clearly defined instructions and processes for determining which positions are held in the trading book and which not. At a minimum, these instructions and processes must provide answers to the following questions: 15

- Which activities does the bank define as trading, with the result that the relevant positions are defined as part of the trading book for purposes of determining capital adequacy requirements? 16

- To what extent can the positions be valued daily with reference to an active liquid market? 17

- For positions valued using a model, to what extent can the bank:

  - identify the material risks of the positions? 18

  - hedge the material risks of these positions? And to what extent do the hedging instruments have an active liquid market? 19

  - can reliable estimates be inferred for the most important assumptions and parameters used in the model? 20

- To what extent can the bank perform valuations for positions which can be externally validated on a consistent basis? 21

- To what extent could legal provisions or other operating requirements prevent the bank from liquidating positions immediately? 22

- To what extent can the bank actively manage the risk of the positions? 23

- What criteria exist for transfers of positions between the trading book and the banking book? 24

If a bank hedges a credit risk in the banking book with a credit derivative booked in the trading book (internal hedging), the position in the banking book can only be recognized as hedged for purposes of calculating capital adequacy requirements if the front office has forwarded this internal risk transfer to an external third party with an exactly opposite transaction (see margin no. 204 SFBC Circular 06/1 "Credit risks"). Otherwise, a credit risk in the banking book can only be hedged with a credit derivative purchased from a recognized external protection provider which meets the requirements for the recognition of credit derivatives (see margin nos. 220-231 SFBC Circular 06/1 "Credit risks"). If the hedging effect of an external credit derivative is recognized, the banking book requirements will apply to the calculation of the capital adequacy requirements. 25

Banks which calculate capital adequacy requirements for credit risks using the Swiss standardized approach (SA-CH), treat qualified participations in equities and other equity-type securities of companies operating in the financial sector in accordance with Annex 5 CAO. Those banks that calculate capital adequacy requirements for credit risks using the international standardized approach (SA-BIS), treat equities and other equity-type securities issued by companies operating in the financial 26

sector in accordance with Annex 5 CAO. Banks that apply the IRB treat these positions in accordance with the SA-BIS (Annex 5 CAO), though the IRB risk weightings must be determined using a market-based method or in accordance with PD/LGD.

A bank may apply to the supervisory authority for a special exemption to calculate capital adequacy for these positions according to the trading book rules if it is:

- an active market maker **27**
- and has appropriate systems and controls for trading such positions. **28**

At the present time, the following positions strictly do not meet the criteria for allocation to the trading book and are subject to a capital charge according to the rules for the banking book:

- Open shares in hedge funds, private equity investments and **29**
- real estate holdings. **30**

If a bank nonetheless wishes to calculate capital adequacy requirements for shares in hedge funds according to the rules of the trading book, it can submit an application to the supervisory authority explaining how the criteria for treatment according to these rules are fulfilled. **31**

D. Guidelines for prudent valuation

The following guidelines are particularly important for less liquid positions. **32**

The bank must have appropriate systems and controls in place which ensure prudent and reliable valuations. **33**

The bank must have documented guidelines and procedures for the valuation process. These include: clearly defined responsibilities of the units involved in the determination of the valuation, sources of market information and review of their appropriateness, frequency of independent valuation, timing of closing prices, procedures for adjusting valuations, and end-month and ad-hoc verification procedures. **34**

Reporting by the unit responsible for the valuation must be independent of trading, right up to senior management level. **35**

Valuation at market prices:

This refers to the valuation of positions at least daily at readily available close-out prices that are sourced independently. The bank must mark to market as much as possible. The more prudent side of the bid/offer must be used unless the bank is a significant market maker for certain positions and it can close them out at mid-market. **36**

Marking to model:

This refers to any valuation which has to be inferred from market data. A prudent mark-to-model valuation depends on the following: **37**

- Senior management must be aware of the elements of the trading book which are required to be marked to model and must understand the materiality of the uncertainty this creates in the reporting of the risk/performance of a transaction. **38**
- Market inputs should be sourced, as far as possible, in line with market prices. The appropriateness of the market data for the individual positions being valued should be reviewed regularly. **39**
- Where available, generally accepted valuation methodologies for particular products should be used. **40**

- Where the model is developed by the bank itself, it must be based on appropriate assumptions, which have been assessed and challenged by suitably qualified parties not involved in the valuation process. The model must be developed or approved independently of the front office. 41

- There should be a formal change control procedure in place and a secure copy of the model must be kept. 42

- Risk management must be aware of the weaknesses of the models used and how best to reflect those in the valuation output. 43

- The model must be regularly verified to determine the precision of its results. 44

Both marking to market and marking to model must be verified at least monthly by a unit independent of trading. 45

E. Valuation adjustments/reserves

The bank must have instructions on how to take account of valuation adjustments and reserves. Valuation adjustments/reserves are to be subjected to formal verification in at least the following cases: credit spreads not yet assumed, close-out costs, operational risks, early maturities, investing and refinancing costs, and future administrative costs and, where appropriate, model risks. 46

In addition, valuation adjustments/reserves for less liquid positions must be considered. In deciding whether valuation adjustments/reserves for less liquid positions are necessary, the following factors must be verified: the time it would take to hedge out a position, the average volatility of bid/offer spreads, the availability of independent market prices and the extent of marking to model. In the case of concentrated positions and stale positions it must be taken into account that close-out prices are more likely to be adverse. 47

Valuation adjustments/reserves performed in accordance with margin no. 46 and 47 may go beyond accounting regulations and if so would affect core capital. 48

III. De minimis approach for equity-type and interest rate instruments (see Art. 71 CAO)

A bank does not need to use the standardized or model-based approach to calculating capital adequacy requirements for market risks in respect of risks stemming from interest rate changes and share prices if it does not hold any credit derivatives in its trading book (Art. 5 CAO) and if its trading book 49

- at no time exceeds 6% of the balance sheet total as of the last quarterly statement, as augmented by the absolute amounts of the contingent liabilities, irrevocable facilities granted, call and margin obligations, contingent credits and contract volumes of all open derivative financial instruments and 50

- at no time exceeds CHF 30 million. 51

Both conditions must be fulfilled cumulatively and permanent compliance must be assured by organizational measures – in particular through the structuring of the limits system. 52

The decisive size of the trading book corresponds to the sum of

- the absolute market values of all spot positions in the trading book, plus 53

- the absolute delta-weighted market values of all the instruments underlying the individual options positions in the trading book, plus 54

- the absolute market values of the largest component (in terms of amounts) of all the forward positions in the trading book[1]. **55**

At the same time positions which can be mutually netted off pursuant to margin nos. 73-80 may be disregarded, while observing the following points:

- In terms of verification of compliance with both limits relevant to the application of the de minimis approach (de minimis test), the offsetting option for futures provided for in margin no. 75 is not limited to interest rate futures. It applies analogously to equity, equity index, currency, gold and commodity futures. **56**

- By way of derogation from margin nos. 77-80, swaps, FRAs and forwards may be offset against each other independently of maturity by the next repricing or by maturity if the repricing/maturity dates are within ten calendar days. **57**

In addition, according to margin no. 123 positions which mutually offset each other may be disregarded for purposes of determining the decisive size of the trading book. However, the restrictions of margin nos. 74-75 are applied complementarily to equities and equity index futures; i.e. for their mutual offsetting to be admissible equity and equity index futures too need to fulfill the requirement that their maturity dates should not be further than seven calendar days apart. Moreover, these futures must be denominated in the same currency. **58**

Apart from the possibilities provided for in margin nos. 73-80 and margin no. 123, no additional offsetting of derivatives with corresponding underlying instruments or of derivatives among themselves is permissible in respect of the de minimus test. In particular, the structuring of equity indices into individual components, as provided for in margin no. 121 for the standardized approach, is not permissible for the de minimis test. **59**

For purposes of calculating their capital adequacy requirements, banks which use the de minimis approach may completely disregard the gamma and vega effects arising from options positions on interest rate and equity instruments relevant under the standardized approach to calculating capital adequacy requirements for market risks.[2] However, even where the bank uses the de minimis approach, capital adequacy requirements for non-linear currency, gold or commodities positions – regardless of whether they are allocated to the banking book or the trading book – must be determined by a method analogous to the standardized approach to calculating capital adequacy requirements for market risks. **60**

The de minimis approach can only be used for capital adequacy requirements for interest rate and share price-related risks in the trading book. The requirements for currency and commodity risks must in all cases be determined using the standardized or the model-based approach. **61**

Banks which avail themselves of this exception ruling calculate capital required for risks stemming from interest rate changes and share prices in the trading book in the same way as the requirements for interest rate and equity instruments outside the trading book under Arts. 49-64 CAO. They must define their risk policies and the limit structure for dealers and apply risk monitoring in such a way as to ensure that the limit values are never reached. **62**

[1] In the example of a forward contract to purchase a German share for EUR 100 in a year's time, the current forward price of the corresponding share should be compared with the current forward price of EUR 100. The greater of these two forward prices is then used for calculating the value of the trading book of relevance to the de minimis test.

[2] Those banks which do not meet the conditions for the use of the de minimis approach must calculate the capital required for options on interest rate and equity instruments according to a procedure set out in margin nos. 157-199 if these options positions are allocated to the trading book. If, however, they are in the banking book, there is no capital adequacy requirement for the gamma and vega impact.

IV. Standardized approach to calculating capital adequacy requirements for markets risks (Arts. 72-75 CAO)

Under the standardized approach to calculating capital adequacy requirements for market risks, the capital required for each category of risk factor (risks stemming from interest rate change, share price risk and currency and commodity risks) is calculated separately in accordance with the procedures defined in margin nos. 65–365. **63**

In contrast to the model-based approach to calculating capital adequacy requirements for market risks, banks that use the standardized approach to calculating capital adequacy requirements for market risks do not need to comply with any specific qualitative requirements over and above the general minimum requirements set forth in the Swiss Bankers Association's "Risk Management Guidelines for Trading and for the Use of Derivatives". The only exception are the provisions for ensuring data integrity pursuant to margin nos. 298-301 of the present guidelines. **64**

A. Interest rate risk

Calculation of the interest rate risk in the trading book must take account of all fixed and floating-rate debt instruments, including derivatives, and all other positions which present interest-induced risks. **65**

The capital required to cover interest rate risks consists of two components, which must be calculated separately:

- A component for specific risk: All risks which relate to factors other than changes in the general interest rate structure are to be recorded and subject to a capital charge. **66**
- A component for general market risk: Those risks which relate to a change in the general interest rate structure are to be recorded and subject to a capital charge. **67**

The component for specific risk is calculated per issuer, while the component for general market risk is calculated separately per currency. One exception is made for general market risk in currencies traded on a small scale [margin no. 99]. **68**

If interest rate instruments entail other risks (e.g. currency risks) in addition to the interest rate risks dealt with here, these other risks must be recorded in accordance with the corresponding provisions of margin nos. 116–156. **69**

a) Presentation of positions

For the purposes of calculating the components for general market risk and specific risk, all positions must initially be marked to market. Foreign currencies must be translated into CHF at the current spot rate. **70**

The capital adequacy and measurement system includes all derivatives and off-balance sheet instruments in the trading book which are interest rate-sensitive.[3] These should be presented as positions corresponding to the present value of the actual or notional underlying instrument (contract volume, i.e. market value of the underlying instruments) and should subsequently be treated according to the rules presented for general market risk and specific risk. **71**

Positions in identical instruments which can be wholly or almost wholly netted off against each other and which meet the conditions listed under margin nos. 73–80 are excluded from the calculation of the components for general market risk and specific risk. In calculating the requirements for specific risks, derivatives based on reference rates (e.g. interest rate swaps, currency swaps, FRAs, forward foreign exchange contracts, interest rate futures, futures on an interest rate index, etc.) should be disregarded. **72**

[3] Options are to be treated according to the methods described in margin nos. 157-199.

aa) Permissible offsetting of positions which can be mutually netted off

Offsetting is permissible for the following matching positions:

- Positions in a futures or forward contract which can be mutually netted off in terms of amount and the related underlying instrument, i.e. all deliverable securities. However, both positions must be denominated in the same currency. It must be borne in mind that futures and forwards are to be treated as a combination of a long and a short position (see margin nos. 81–84) and that one of the two futures or forward positions therefore remains when it is offset against a related spot position in the underlying instrument. **73**

- Contrary positions in derivatives which relate to the same underlying instruments and are denominated in the same currency[4]. In addition, the following conditions must be met: **74**

  - Futures: Identical underlying instruments and maturities not more than seven calendar days apart. **75**

  - Swaps and FRAs: Identical reference rates (floating-rate positions) and fixed-interest rates which are not more than 15 basis points apart. **76**

  - Swaps, FRAs and forwards: The next interest rate fixing date or – in the case of fixed-interest positions or forwards – the maturity dates are within the following limits:[5] **77**

    - less than one month after the cut-off date: the same day; **78**

    - between one month and one year from the cut-off date: a maximum of 7 calendar days apart; **79**

    - more than one year after the cut-off date: a maximum of 30 calendar days apart. **80**

bb) Futures, forwards and FRAs

Futures, forwards and FRAs are treated as a combination of a long and a short position. The maturity of a future, forward or FRA contract corresponds to the time until the contract is delivered or exercised plus – if applicable – the maturity of the underlying instrument. **81**

For example, a long position in an interest rate future should be presented as follows:

- a notional long position in the underlying interest instrument with interest due on maturity and **82**

- a short position in a notional government security of the same amount and maturity on the settlement date of the futures contract. **83**

If different instruments can be delivered to fulfill the contract, the bank may choose which deliverable financial instrument to use in the calculations. At the same time, however, the conversion factors laid down by the exchange should be taken into account. In the case of a futures contract on a corporate bond index, the positions are presented at the market value of the notional underlying portfolio. **84**

cc) Swaps

Swaps are presented as two notional positions in government securities with the corresponding maturities. An interest rate swap in which one bank receives a floating interest rate and pays a fixed interest rate will, for example, be presented as **85**

[4] A possibility also exists to offset cross-currency relationships (see detailed presentation in **Annex 5**).
[5] In respect of the de minimis test, the limits postulated in margin nos. 56-57 apply.

- a long position in a floating-rate instrument with a maturity corresponding to the period until the next repricing date and **86**

- a short position in a fixed-interest instrument with a maturity corresponding to the residual term to maturity of the swap. **87**

Should one leg of a swap be linked to another reference value such as an equity index, the interest component is to be taken into consideration with a remaining maturity (interest maturity) which corresponds to the term of the swap or the period until the next interest rate repricing date, while the equity component should be treated according to the rules pertaining to equities. In the case of interest rate/currency swaps, the long and short positions should be taken into account in the calculations for the currencies concerned. **88**

Banks with significant swap books which do not make use of the offsetting possibilities specified in margin nos. 73–80 may also use sensitivity or pre-processing models to calculate the positions to be reported in the maturity or duration ladders. The following possibilities exist: **89**

- Calculation of the present values of the payment flows brought about by each swap in that each individual payment is discounted with the corresponding zero coupon equivalent and allocated to the corresponding maturity band (for bonds with coupon < 3%) (see margin nos. 100-108). **90**

- Calculation of the sensitivity of the net present values of the individual payment flows on the basis of the yield changes specified in the duration method. The sensitivities should then be classified into the corresponding time bands and treated according to the duration method (see margin nos. 109-115). **91**

If one of the above options is used, the auditors must explicitly verify and confirm the appropriateness of the systems used. In particular, the calculation of the capital required must accurately reflect the sensitivities of the individual payment flows to interest rate changes. **92**

b) Specific risk

In calculating the capital required for specific risk, the net position per issuer is determined according to Art. 39 CAO[6]. Within one of the categories pursuant to margin no. 94, all interest rate instruments of the same issuer can be offset. The individual bank also remains free to allocate all interest rate instruments of an issuer to that category pursuant to margin no. 94 which corresponds to the highest capital ratio for an interest rate instrument of the issuer in question contained in the relevant portfolio. The bank must opt for one method and apply that method consistently. **93**

The requirements for specific risk are arrived at by multiplying the net position per issuer calculated in accordance with Art. 39 CAO by the following rates (Annex 6 CAO): **94**

[6] An exception applies where the simplified procedure is used for options (see margin nos. 162–166). In this case, the capital required for the general market risk and for the specific risk of the positions are determined at the same time and it is not necessary to take account of the option positions when determining the net positions pursuant to Art. 39 CAO.

Category	Rating class	Rate
Interest rate instruments of central governments and central banks	1 or 2	0.00 %
	3 or 4	0.25% (residual term to maturity ≤ 6 months)
		1.00 % (residual term to maturity > 6 months and ≤ 24 months)
	5 or 6	1.60% (residual term to maturity > 24 months)
	7	8.00 %
	No rating	12.00 %
		8.00 %
Qualified interest rate instruments pursuant to Art. 4 letter e CAO		0.25% (residual term to maturity ≤ 6 months)
		1.00 % (residual term to maturity > 6 months and ≤ 24 months)
		1.60% (residual term to maturity > 24 months)
Other interest rate instruments	5	8.00 %
	6 or 7	12.00 %
	No rating	8.00 %

For securitization transactions in the trading book which

- have to be deducted from capital under the rules for securitization transactions (margin nos. 254-265 SFBC Circular 06/1 "Credit risks"), or **95**

- are unrated liquidity facilities or guarantees, **96**

the capital adequacy requirements for securitization transactions in the banking book apply. **97**

c) General market risk

There are in principle two methods for measuring and calculating capital adequacy requirements for general market risk: The "maturity method" and the "duration method" (Art. 72 para. 2 CAO). **98**

The capital required must be calculated separately for each currency using a maturity ladder. Currencies in which the bank has little business activity can be grouped together in one maturity ladder. In this case, it is necessary to determine an absolute position value rather than a net position value, i.e. all net long or net short positions of all currencies in a band of maturities must be added together regardless whether they are positive or negative values and no further offsetting is permitted. **99**

aa) Maturity method

When applying the maturity method, the capital required for general market risk is calculated as follows:

- Allocating the positions valued at market to the maturity ladders: **100**
  All long and short positions are allocated to the corresponding time bands of the maturity ladder. Fixed-interest instruments are classified according to their residual terms to maturity up until final maturity and variable interest instruments are classified according to their residual term to maturity until the next date for resetting interest rates. The boundaries of the maturity bands are defined differently for instruments with coupons equal to or greater than 3% and for instruments with coupons of less than 3% (see Table 1 in margin no. 101). The maturity bands are assigned to three different zones.

- Weighting by maturity band: **101**
  In order to take account of price sensitivity in relation to interest rate changes, the positions in the

individual maturity bands are multiplied by the risk weighting factors listed in Table 1.

	Coupon ≥ 3%		Coupon < 3%		Risk weighting factor
	more than	up to and within	more than	up to and within	
Zone 1		1 month		1 month	0.00%
	1 month	3 months	1 month	3 months	0.20%
	3 months	6 months	3 months	6 months	0.40%
	6 months	12 months	6 months	12 months	0.70%
Zone 2	1 year	2 years	1.0 years	1.9 years	1.25%
	2 years	3 years	1.9 years	2.8 years	1.75%
	3 years	4 years	2.8 years	3.6 years	2.25%
Zone 3	4 years	5 years	3.6 years	4.3 years	2.75%
	5 years	7 years	4.3 years	5.7 years	3.25%
	7 years	10 years	5.7 years	7.3 years	3.75%
	10 years	15 years	7.3 years	9.3 years	4.50%
	15 years	20 years	9.3 years	10.6 years	5.25%
	20 years		10.6 years	12 years	6.00%
			12 years	20 years	8.00%
			20 years		12.50%

Table 1: Maturity method: Maturity bands and risk weighting factors

- Vertical offsetting: **102**
  The net position in each maturity band is determined from all weighted long and short positions. The risk-weighted closed position[7] must be assigned a ratio of 10% for each maturity band. This is to take account of the underlying risk and the interest rate structure risk within each maturity band.

- Horizontal offsetting: **103**
  To determine the total net interest position, it is also possible to offset between opposite positions with differing maturities, the resulting closed net positions are then assigned a charge ratio. This process is called horizontal offsetting. Horizontal offsetting takes place at two levels: first within each of the three zones and then between the zones.

  - Horizontal offsetting within a zone: **104**
    The risk-weighted open net positions of individual maturity bands are aggregated and offset against each other within their respective zone to obtain a net position for the zone. The closed positions resulting from the offsetting must be assigned a charge ratio. This amounts to 40% for zone 1 and 30% each for zones 2 and 3.

  - Horizontal offsetting between different zones: **105**
    Provided that they have opposite signs (i.e. one is "+" and the other "-"), the net zone positions of adjacent zones can be offset against each other. Resulting closed net positions must be assigned a ratio of 40%. An open position remaining after the offsetting of two adjacent zones remains in its zone and forms the basis for any further offsetting. Any closed net positions arising from offsetting between the non-adjacent zones 1 and 3 must be assigned a ratio of 100%.

[7] The smaller of the absolute amounts of the sums of weighted long and short positions which have been offset against each other is referred to as a closed position.

This means that under the maturity method the capital required for the interest rate risk in a given currency is obtained from the sum of the following components, which should be assigned various weightings: **106**

	Components	Weighting factors
1.	Net long positions or net short positions in total	100%
2.	Vertical offsetting:	
	• Weighted closed position in each maturity band	10%
3.	Horizontal offsetting:	
	• Closed position in zone 1	40%
	• Closed position in zone 2	30%
	• Closed position in zone 3	30%
	• Closed position from offsetting between adjacent zones	40%
	• Closed position from offsetting between non-adjacent zones	100%
4.	If applicable, add-on for option positions (pursuant to margin no. 162-166, 171-188 or 189-199)	100%

Table 2: Components of capital adequacy requirements

Offsetting is only applied where positions with opposite signs can be offset against each other within a maturity band, within a zone or between zones. **107**

An example for determining the capital required according to the maturity method is given in **Annex 1**. **108**

bb) Duration method

As an alternative to the maturity method, banks with the necessary organizational, personnel and technical capacities may use the duration method. If they have decided on the duration method, they may only switch back to the maturity method in cases in which they can give good grounds for doing so. The duration method must in principle be used by all branches and for all products. **109**

With this method, the price sensitivity of each financial instrument is calculated separately. It is also possible to split the financial instrument up into its payment flows in accordance with margin nos. 89-92 and take account of the duration for each individual payment. The capital adequacy requirements for general market risk are calculated as follows: **110**

- Calculation of price sensitivities: **111**
  Price sensitivity is calculated separately for each instrument, i.e. for its payment flows. At the same time, depending on the duration, the various changes in yields listed in Table 3 in margin no. 112 should be assumed. The price sensitivity is obtained by multiplying the market value of the instrument or payment flow by its modified duration and the assumed change in yield.

- Allocating price sensitivities to time bands: **112**
  The resulting sensitivities are entered in a ladder with 15 time bands based on the duration of the instrument or payment flow.

	more than	up to and within	Assumed change in yield
Zone 1		1 month	1.00%
	1 month	3 months	1.00%
	3 months	6 months	1.00%
	6 months	12 months	1.00%
Zone 2	1.0 year	1.9 years	0.90%
	1.9 years	2.8 years	0.80%
	2.8 years	3.6 years	0.75%
Zone 3	3.6 years	4.3 years	0.75%
	4.3 years	5.7 years	0.70%
	5.7 years	7.3 years	0.65%
	7.3 years	9.3 years	0.60%
	9.3 years	10.6 years	0.60%
	10.6 years	12 years	0.60%
	12 years	20 years	0.60%
	20 years		0.60%

Table 3: Duration method: time bands and change in yield

- Vertical offsetting: **113**
  Vertical offsetting within the individual time bands must be performed along similar lines to the maturity method, but the risk-weighted closed position is assigned a ratio of 5% for each maturity band.

- Horizontal offsetting: **114**
  Horizontal offsetting between time bands and zones is performed along similar lines to the maturity method.

The capital required for the general interest rate risk per currency is obtained by the duration method, i.e. from the sum of the net position, the various offsetting operations and, where applicable, an add-on for option positions pursuant to the following margin nos. 162-166, 171-188 or 189-199. **115**

B. Share price risk

To determine the capital adequacy requirements for share price risks, all positions in equities, derivatives and positions which behave like equities (generally referred to hereinafter as "equities") must be taken into account. Investment fund units must also be treated as equities, unless they are split up into their component parts and the individual components and the capital charges determined according to the provisions for the corresponding risk categories. **116**

The capital required for share price risks consists of the two following components, which must be calculated separately:

- The component for specific risks: those risks which are attributable to the issuer of the equities and cannot be explained by general market fluctuations are recorded and subject to a capital charge. **117**

- The component for general market risk: risks in the form of fluctuations in the relevant national stock market are recorded and subject to a capital charge. **118**

If positions entail other risks (e.g. currency risks or interest rate risks) in addition to the share price risks dealt with here, these risks must be recorded in accordance with the corresponding provisions of this Circular. **119**

a) Presentation of positions

All positions must initially be marked to market. Foreign currency positions must be translated into Swiss francs at the spot rate. **120**

Index positions may be treated either as index instruments or split up into their individual equity positions and treated as normal equity positions. However, the bank must opt for one method per index and apply that method consistently. **121**

Equity derivatives and off-balance sheet positions whose value is affected by changes in equity prices must be entered into the measurement system at the market value of the actual or notional underlying instruments (contract volume, i.e. market value of the underlying instruments)[8]. **122**

aa) Permissible offsetting of positions which can be mutually netted off

Contrary positions (different positions in derivatives or in derivatives and corresponding underlying instruments) in each identical equity or each identical equity index can be offset against each other. It must be remembered that futures and forwards are to be presented as a combination of a long and a short position (see margin no. 124), i.e. when offsetting with a corresponding spot position in the underlying instrument, the interest rate position remains in existence. **123**

bb) Futures and forward contracts

Futures and forward contracts are to be treated as a combination of a long or short position in an equity, an equity basket or an equity index on the one hand and a notional government bond on the other hand. Equity positions are entered at the current market price and equity basket or equity index positions are entered at the current value of the notional underlying equity portfolio (i.e. valued at market prices). **124**

cc) Swaps

Equity swaps are also presented as a combination of a long and a short position. This can either be a combination of two equity, equity basket or equity index positions or a combination of one equity, equity basket or equity index position and an interest rate position. **125**

b) Specific risk

To determine the capital required for the specific risk, the net position per issuer is determined according to Art. 39 CAO[9]. This means that positions with different signs (i.e. one is "+" and the other "-") for the same issuer can be offset. **126**

The capital required corresponds to 8% of the net position per issuer (Art. 73 para. 1 CAO). **127**

For diversified and liquid equity portfolios, the requirements for specific risks are reduced to 4% of the net position per issuer. Under Art. 73 para. 2 CAO, a diversified and liquid equity portfolio exists if the equities are exchange-listed and if no position of any single issuer accounts for more than 5% of the equity portfolio as a whole or of a subportfolio. The reference value for verifying the 5% limit is the sum of the absolute values of the net positions of all issuers. The global equity portfolio can be subdivided into two subportfolios such that one of the two subportfolios is "diversified and liquid" and the specific risks within this are subject to a 4% capital charge. **128**

If equity index contracts are not split up into their component parts, a net long (or net short) position in **129**

[8] Equity and equity index options are treated in accordance with the methods described in margin nos. 157-199.

[9] An exception applies where the simplified procedure (see margin nos. 162–166) is used for options. In this case, the requirements for the general market risk and for the specific risk of the positions are determined at the same time and it is not necessary to take account of the option positions when determining the net positions pursuant to Art. 39 CAO.

an equity index contract which represents a broadly diversified equity portfolio[10] requires only 2% equity capital cover. However, the rate of 2% is not applicable to sector indices, for example.

c) General market risk

The capital required for general market risk amounts to 8% of the net position per national stock market (Art. 73 para. 3 CAO). A separate calculation must be made for each national stock market. At the same time, long and short positions in instruments of different issuers of the same national market may be offset against each other.[11] **130**

C. Currency risk

All positions in foreign currencies and gold must be included when calculating the capital required for currency risk. **131**

a) Determining the net position

A bank's net position in a currency is calculated in accordance with Art. 39 CAO. It corresponds to the sum of the following positions: **132**

- Net spot position, i.e. all assets less all liabilities; **133**
- Net forward position, i.e. all outstanding amounts less all amounts payable in respect of all forward transactions performed in this currency. The net present values should be applied, i.e. the positions discounted with the current foreign currency interest rates. As these are present values, forward positions are also translated into CHF at the spot rate and not at the forward rate; **134**
- Net amount of known, future income and expenditure which has already been fully hedged; non-hedged future income and expenditure may optionally be taken into account – but only if done so consistently throughout; **135**
- Currency options pursuant to margin nos. 157–199. **136**

This results in a net long or net short position per currency. These are translated into CHF at the current spot rate. **137**

Basket currencies may be treated as currencies in their own right or split up into their component currencies. However, the treatment must be applied using the same method consistently and throughout. **138**

Positions in gold (spot and forward positions) should be converted to standard units of measurement (normally ounces or kilograms). The net position should then be valued at the current spot price. Any interest rate and/or currency risks arising from forward transactions in gold are to be recorded in accordance with the corresponding Sections of the present Guidelines. Provided they do so consistently and throughout, banks also have the option of treating their net gold position as a foreign currency position.[12] **139**

b) Exclusions

The following positions may be excluded from the calculation:

[10] For the diversification criterion, the provisions pursuant to margin no. 128 will not apply in the case of equity index contracts.
[11] Equities from the Principality of Liechtenstein may be assigned to the Swiss stock market.
[12] If, for example, a bank were also to treat its net long position in gold as a USD exposure, it would then be able to offset any existing USD position already in the portfolio against this additional USD (long) position. However, the additional treatment of net positions in gold as USD exposure would have to be applied consistently and could not be omitted for opportunistic reasons – e.g. if there were already an existing net long position in USD.

- Positions which may not be counted toward equity in the computation of eligible equity in accordance with Art. 31 para. 1 a to c and Art. 32 CAO; **140**

- Other participating interests which are disclosed at acquisition cost; **141**

- Positions which demonstrably and on an ongoing basis serve as a hedge against foreign currency fluctuations in order to secure the equity ratio. **142**

c) Determining the capital adequacy requirements

The capital required for foreign currencies and gold amounts to 10%

- The sum converted to CHF of net long or net short currency positions, whichever is the greater (Art. 74 CAO); plus **143**

- The net gold position, disregarding plus or minus signs (Art. 74 CAO). **144**

D. Commodity risk

This Section defines capital adequacy requirements for positions in commodities, including precious metals other than gold (see margin nos. 131-144). All balance sheet and off-balance sheet positions whose value is affected by changes in commodity prices must be taken into account. Commodities are defined as physical goods which are, or can be, traded on a secondary market, such as agricultural products, minerals and precious metals. **145**

In respect of commodity risk, the standardized approach to calculating capital adequacy requirements for market risks is only suitable for banks with commodity positions on a less-than-significant scale. Banks with significant trading book positions in commodities in either absolute or relative terms must use the model-based approach to calculating capital adequacy requirements for market risks. To determine the capital required for risks arising from positions in commodities, the following risks must in principle be taken into account (see also margin no. 265): **146**

- The risk of changes in spot prices **147**

- The "forward gap risk", i.e. the risk of changes in forward prices for reasons which cannot be explained by interest rate changes (for example because of changes in inventory costs); **148**

- The underlying risk for recording the risk of changes in price relationships between two similar, but not identical commodities. **149**

The interest rate and currency risks arising in connection with commodity transactions are to be treated in accordance with the corresponding Sections of this Circular. **150**

a) Determining net positions

All commodity positions are to be assigned to a commodity group in accordance with Table 4. Within the group, the net position can be calculated according to Art. 39 CAO, i.e. long and short positions may be offset against each other. **151**

Category	Commodity group
Crude oil	Classification by geographical criteria, e.g. Dubai (Persian Gulf), Brent (Europe and Africa), WTI (America), Tapis (Asia-Pacific) etc.
Refinery products	Classification by quality, e.g. gasoline, naphtha, aviation fuel, light heating oil (incl. diesel), heavy heating oil etc.
Natural gas	Natural gas
Precious metals	Classification by chemical elements, i.e. silver, platinum etc.
Non-ferrous metals	Classification by chemical elements, i.e. aluminum, copper, zinc etc.
Agricultural products	Classification by basic products, but without differentiation in terms of quality, i.e. soya (incl. beans, oil, flour), maize, sugar, coffee, cotton etc.

Table 4: Commodity groups

All commodity positions (spot and forward positions) must be converted to a standard unit of measurement (barrels, kilograms etc.) and valued at the current spot price. **152**

b) Commodity derivatives[13]

Futures and forward contracts are to be treated as a combination of a long or short position in a commodity on the one hand and a notional government bond on the other hand. **153**

Commodity swaps with a fixed price on the one hand and the current market price on the other must be treated as a series of positions which correspond to the nominal amount of the contract. At the same time, any payment in connection with the swap must be viewed as a position. A long position exists if the bank pays a fixed price and receives a variable price (short position: vice versa). Commodity swaps relating to different commodities must be recorded separately in the corresponding groups. **154**

Commodity futures and forwards are treated along the same lines as equity futures and forwards. **155**

c) Determining the capital adequacy requirements

The capital adequacy requirements for commodity risk amount to 20% of the net position per commodity group (Art. 75 para. 2 CAO). To take account of the underlying risk, interest rate risk and forward gap risk, an additional capital charge of 3% of the gross positions (sum of the absolute values of the long and short positions) of all commodity groups is required. **156**

E. Options

a) Segregation

In the case of financial instruments containing an option component which does not play a substantial and dominant role, the option element need not necessarily be treated as an option for purposes of capital adequacy requirements. Convertible bonds may be treated as bonds or equities in line with the specific characteristic of the financial instrument. Bonds with early redemption rights for the issuer may be treated as pure bonds and be assigned to the corresponding maturity band on the basis of the most likely redemption date. The procedure for calculating the capital required to cover credit derivatives is **157**

[13] Options on commodities are treated in accordance with the methods described in margin nos. 157-199.

dealt with in margin nos. 200-227.

b) Treatment of financial instruments with option-like characteristics

If the option-like characteristic plays a substantial and dominant role, the financial instruments in question must be treated as follows:

- Analytical breakdown into options and underlying instruments or **158**
- Approximation of their risk profiles by means of synthetic portfolios consisting of options and underlying instruments. **159**

The capital adequacy requirement for options identified in this way is determined according to margin nos. 161-199. **160**

c) Procedures for calculating capital required

There are three permissible procedures for calculating the capital required for options positions: The simplified procedure for banks which only use purchased options and the delta plus procedure and scenario analysis for all other banks. **161**

aa) Simplified procedure

Under the simplified procedure, options should not be included in the standardized approach to calculating capital adequacy requirements for market risks in respect of either specific risk or general market risk. Instead, they are covered by capital charges calculated separately. These are then added to the capital required for the individual categories, i.e. interest rate instruments, equities, foreign currencies, gold and commodities. **162**

- Purchased call and put options: capital required corresponds to the smaller of
  - the market value of the option or **163**
  - the market value of the underlying instrument (contract volume, i.e. market value of the underlying instruments) multiplied by the sum of the rates for the general market risk and for the specific risk – if any – in relation to the underlying instrument. **164**
- Spot long position and purchased put option or spot short position and purchased call option:[14] The capital required corresponds to the market value of the underlying instrument (contract volume, i.e. market value of the underlying instruments) multiplied by the sum of the rates for the general market risk and for the specific risk – if any – in relation to the underlying instrument less the intrinsic value of the option. The total requirement cannot be a negative value, however. The corresponding underlying instruments should no longer be included in the standardized approach to calculating capital adequacy requirements for market risks. **165**

An example for determining the capital required according to the simplified procedure is given in **Annex 2**. **166**

bb) Delta plus procedure

Where options are treated according to the delta plus procedure, they should be presented as positions corresponding to the market value of the underlying instrument (contract volume, i.e. market value of **167**

[14] The precondition for the formation of these combinations is not the existence of original cash positions. A forward position (or the spot position component resulting from it alongside the notional government bonds) may likewise be used as the basis for the formation of combination pairs with option instruments. At the same time, the notional government bond component must also be covered by equity outside the simplified procedure for options in accordance with the conventional procedure applicable to interest rate risk (see margin nos. 65-115).

the underlying instruments) multiplied by the delta (sensitivity of the option price to changes in the price of the underlying instrument). Depending on the underlying instrument, they are included in the capital adequacy calculation for the specific risk and the general market risk pursuant to margin nos. 65-156. However, as the delta does not adequately reflect the risks of options, banks must also calculate the gamma risk (risk based on non-linear relationships between changes in the option price and changes in the price of the underlying instrument) and the vega risk (risk based on the sensitivity of the option prices to changes in the volatility of the underlying instrument).

a. Delta risk

The capital adequacy requirements for the delta risk of options on interest rate instruments, equities, currencies and commodities are based on the delta-weighted positions. **168**

In calculating the general market risk, delta-weighted options on debt instruments or interest rates are assigned to the maturity bands for interest rate instruments described in margin nos. 98-115 and are also taken into account in calculating the specific risk – if any exists. Options on derivatives must be presented twice in the same way as the corresponding derivatives themselves. Thus, a purchased call option on a three-month interest rate future due in April is regarded – on the basis of its delta equivalent – as a long position with a maturity of five months and as a short position with a maturity of two months. The sold option is classified accordingly as a long position with a maturity of two months and as a short position with a maturity of five months. **169**

Options on equities, currencies, gold and commodities are also incorporated as delta-weighted positions in the measures of market risk described in margin nos. 116-156. **170**

b. Gamma risk

For each individual option, the gamma effect must be calculated according to the following definition **171**

$$\text{Gamma effect} = 0.5 \cdot \Gamma \cdot VB^2,$$

where Γ represents the gamma value and VB the price change in the (notional) underlying instrument of the option. VB is calculated by multiplying the market value of this underlying instrument (contract volume, i.e. market value of the underlying instruments) by the following rates:

- Option on bonds or corresponding forward contracts: risk weighting pursuant to Table 1 in margin no. 101 (depending on the maturity of the (notional) underlying instrument); **172**
- Options on interest rates or corresponding forward contracts: calculation method similar to options on bonds, based on the corresponding foreseeable change in yield according to Table 3 in margin no. 112;[15] **173**
- Options on equities or stock indices or corresponding forward contracts: 8%; **174**
- Options on currencies or gold or corresponding forward contracts: 10%; **175**
- Options on commodities or corresponding forward contracts: 20%. **176**

A net gamma effect for each category of underlying instruments should be calculated from the gamma effects. The individual categories are defined as follows: **177**

- Interest rate instruments in the same currency and in the same maturity band pursuant to Table 1 in margin no. 101 for banks which use the maturities method or pursuant to Table 3 in margin no. 112 for banks which use the duration method, **178**

[15] VB is thus obtained from the change in the current value resulting from the underlying instrument as implied by the corresponding foreseeable change in yield pursuant to Table 3.

- equities and stock indices of the same national market or the same single currency area, **179**
- foreign currencies of each identical currency pair, **180**
- gold and **181**
- commodities pursuant to Table 4 in margin no. 151. **182**

In the capital adequacy calculation, only the negative net gamma effects are to be included; these should be added as absolute values to the total capital required. **183**

The method presented here for calculating the capital required for gamma effects takes account of general market risk only. However, banks which have significant positions in options on individual equity instruments or debt instruments must also take account of specific risks when calculating the gamma effects. **184**

c. Vega risk

For each individual option, a vega effect must be calculated according to the following definition **185**

$$\text{Vega effect} = 0.25 \cdot \upsilon \cdot \text{volatility},$$

where υ represents the vega value. By adding all vega effects of long positions (purchased options) and subtracting all vega effects of short positions (sold options), a net vega effect should be calculated for each category of underlying instrument in accordance with margin nos. 177-182. The total capital required for the vega risk subject to a capital charge results from the aggregation of the sum of absolute values of net vega effects computed for each category. **186**

The vega effects must be calculated on the basis of implicit volatility. In the case of illiquid option instruments other procedures may, by way of exception, be used to determine the volatility structure. **187**

An example for calculating the capital required according to the delta plus procedure is given in **Annex 3**. **188**

cc) Scenario analysis

In determining the capital required for options and associated hedging positions[16] by means of scenario analysis, the potential change in value for all possible combinations of changes in the price of the underlying instrument (first dimension) and in volatility (second dimension) should be calculated in the framework of a separate, prescribed matrix for each category of underlying instruments in accordance with margin nos. 177-182. In the case of interest rate instruments it is possible to opt not to perform a separate analysis for the instruments in each maturity band, but to combine the maturity bands into groups. However, a maximum of three maturity bands may be combined into one group and at least six different groups must be formed. **189**

Cross-currency relationships may be taken into account in the scenario analysis procedure. The corresponding procedure is presented in detail in **Annex 8**. **190**

The two dimensions of the matrices to be used are defined as follows:

- **Dimension: Change in the value of the underlying instrument:**

Within the prescribed range, calculations for at least seven different changes in value (including a **191**

[16] **Annex 7** spells out the concept of associated hedging positions and explains in which cases it is permissible to integrate positions not classified as "associated hedging positions" into the scenario analysis.

change of 0%) must be performed. The intervals between the assumed changes in value must be equal in length. The ranges are defined as follows:

- Interest rate options: ± Change in yield in accordance with Table 3 in margin no. 112; if several maturities are combined into a group, the highest rate of the maturity bands combined will apply for the group; **192**
- Options on equities or stock indices: ± 8%; **193**
- Options on currencies or gold: ± 10%; **194**
- Options on commodities: ± 20%. **195**

Calculations based on these changes in value only take account of general market risk, but not specific risk. The requirements for specific risk must therefore be determined separately, based on the delta weighted positions [see margin nos. 93-97 and 126-129). **196**

- **Dimension: Change in volatility:**

In terms of the variation in volatility, calculations must be performed for at least three points: Unchanged volatility and relative changes in volatility of ± 25%. **197**

After calculating the matrix, each cell contains the net gain or loss on the options and the associated hedging instruments. The required capital calculated for each category of underlying instrument then correspond to the highest losses contained in the matrix. **198**

The scenario analysis must be performed on the basis of implicit volatilities. In the case of illiquid option instruments other procedures may, by way of exception, be used to determine the volatility structure. **199**

F. Credit derivatives

a) Basic principles

Before credit derivatives in the trading book can be used, the bank must ensure that the associated risks have been fully recognized and understood and have been appropriately recorded by the systems for measuring, managing and monitoring risks. **200**

Provided that a credit derivative and one of the deliverable claims meets the conditions of Art. 5 CAO, the credit derivative may be assigned to the trading book. **201**

For all credit derivatives in the trading book, the counterparty risks pursuant to Art. 40–45 CAO and margin nos. 16–102 SFBC Circular 06/1 "Credit risks" must be covered by equity capital. **202**

In order for hedging effects achieved through credit derivatives and offsetting opportunities pursuant to margin nos. 214–221 to be recognized, the requirements of margin nos. 204–216 and margin nos. 220–231 SFBC Circular 06/1 "Credit risks" must be met. **203**

In each case where a position in the basket of an n^{th}-to-default swap defaults, n will be reduced by one. This means, for example, that after the default of the first position represented in the basket a fifth-to-default swap should be regarded as a fourth-to-default swap. **204**

b) General market risk

With regard to capital adequacy for the general market risk of credit derivatives, the following principles apply: **205**

A "Total Return Swap" (TRS) should be treated by the protection seller as a combination of a long position in the reference claim and a short position in a government bond (and vice versa by the **206**

protection buyer).

A credit-linked note (CLN) should be presented as a bond of the issuer of the CLN: for the protection seller as a long position and for the protection buyer as a short position in its own bond. **207**

The market value of a "Credit Default Swap" (CDS) or a "First-to-Default Swap" (FDS) shows little if any response to changes in the general interest rate structure. The general market risk is therefore not subject to a capital charge in the case of a CDS or FDS. However, if periodic premium payments are agreed, they must be taken into account in calculating the capital adequacy requirements for the general market risk. The same applies to second-to-default swaps and n^{th}-to-default swaps. **208**

c) Specific risk

aa) With no opportunity for offsetting[17]

A TRS should be treated as a long position from the point of view of the protection seller and as a short position in the reference claim from the point of view of the protection buyer. **209**

A CLN should be presented by the protection seller as a long position at nominal amount both in the bond of the CLN issuer and in the reference claim. From the point of view of the protection buyer, a CLN should be treated as a short position at nominal amount in the reference claim. **210**

A CDS should be treated by the protection seller as a long position at nominal amount in the reference claim and by the protection buyer as a short position at nominal amount in the reference claim. **211**

The risks arising from an FDS are to be presented at nominal value in the form of synthetic positions for all claims contained in the basket – as long positions from the point of view of the protection seller and as short positions from the point of view of the protection buyer. **212**

For second-to-default swaps and n^{th}-to-default swaps an analogous procedure to the one outlined in margin no. 212 applies. However, in the case of a second-to-default swap, the position with the lowest capital charge for the specific risk may be disregarded. Accordingly, in the case of an n^{th}-to-default swap the n minus one positions with the lowest capital charges can be disregarded for the specific risk. **213**

bb) Offsetting opposite positions in credit derivatives

Opposite positions in identical credit derivatives do not need to be taken into account when calculating the capital adequacy requirements for the specific risk. **214**

Opposite positions in non-identical credit derivatives may be offset against each other only in the case of opposite CDSs or CLNs or CDS components of CLN contracts with direct CDS positions and only up to 80%, provided that the relevant reference claims are identical, the CDSs or the CLNs are denominated in the same currency and they have exactly the same residual terms to maturity[18]. For the purpose of covering the specific risk, a position amounting to 20% of the nominal value of the reference claim remains. **215**

cc) Offsetting credit derivatives with spot positions

A CDS and a spot position may be offset against each other up to 80% if the reference claim and the spot position are identical, if the proceeds of the CDSs and the spot position are denominated in the same currency and if the CDSs and the spot position have exactly the same residual terms to maturity. For the purpose of covering the specific risk, a position amounting to 20% of the nominal value of the **216**

[17] Credit derivative positions which cannot be offset will remain if there are no opportunities for offsetting pursuant to margin no. 203 and margin nos. 219–221 and if there are no opposite positions pursuant to margin nos. 224 and 225.

[18] Differences in such credit derivatives could arise for example as a result of different definitions of the credit event or from settlement terms.

reference claim remains.

The offsetting of a TRS against a spot position in the reference claim must be according to the provisions of margin nos. 73-80. **217**

The CDS component of a purchased CLN may be offset up to 80% against a short position (or an issued CLN against a long cash position) in the reference claim if the spot position and the reference claim are identical and if the CLN and the spot position are denominated in the same currency and have exactly the same residual term to maturity. For the purpose of covering the specific risk, a position amounting to 20% of the nominal value of the reference claim remains. **218**

If a bank holds an FDS and the corresponding spot positions, the specific risk component with the lowest capital charge can be offset up to 80%. If, after multiplication by their specific risk weightings, several positions represented in the basket are at the same time the smallest, the bank must choose one of these positions for offsetting. **219**

If a bank holds a second-to-default swap and the corresponding spot positions, the specific risk component with the second-lowest capital charge (pursuant to margin no. 94) can be offset up to 80%. If several positions represented in the basket have the second-smallest capital charge for specific risks, the bank must choose one of these positions for offsetting. **220**

For n^{th}-to-default swaps an analogous procedure to the one outlined in margin no. 220 applies. For example, if a bank holds a fifth-to-default swap and corresponding spot positions, then subject to the restrictions pursuant to margin no. 220 the specific risk component with the fifth-lowest capital charge can be offset up to 80%. **221**

After offsetting in accordance with margin nos. 219-221, a position amounting to 20% of the nominal value of the reference claim remains for calculating the capital adequacy requirement for the specific risk. **222**

dd) Determining capital required

If two credit derivatives pursuant to margin no. 215 or one credit derivative can be offset against a spot position pursuant to margin nos. 216 or 218-221, the remaining positions must each be added as absolute values to the absolute value of the net position of the issuer of the reference claim. **223**

In the case of opposite positions in credit derivatives which do not meet the above requirements because of maturity or currency mismatches or because of a mismatch between the benchmark index and the claim to be hedged (while simultaneously complying with the restrictions of margin nos. 228–231 of SFBC Circular 06/1 "Credit risks"), a long and a short position must be calculated. The larger of these two positions must be added as absolute values to the absolute value of the net position of the issuer of the reference claim. Notes from CLN contracts are to be treated by an analogous procedure. **224**

In the case of opposite positions in credit derivatives and spot positions which do not meet the above requirements because of maturity or currency mismatches or because of a mismatch between the benchmark index and the claim to be hedged (while simultaneously complying with the restrictions of margin nos. 228–231 of SFBC Circular 06/1 "Credit risks"), the procedure is the same as for margin no. 224. **225**

In the absence of any offsetting opportunities pursuant to margin no. 203 and margin nos. 214–221 or of any opposite positions pursuant to margin nos. 224 and 225, the relevant components of the corresponding credit derivatives should be added to the absolute value of the net position of the issuer of the benchmark claim as absolute values. **226**

If in the case of an FDS, a second-to-default swap or an n^{th}-to-default swap the required capital as determined according to margin nos. 223–226 exceeds the maximum possible loss, the corresponding synthetic positions may be reduced proportionately in such a way that the required capital from the instrument in question corresponds exactly to the maximum possible loss. **227**

V. Model-based approach to calculating capital adequacy requirements for market risks (Art. 76 CAO)

On request, the supervisory authority may authorize a bank to calculate the capital adequacy requirements for market risks using bank-specific risk aggregation models (Art. 76 para. 1 CAO). **228**

Risk aggregation models are defined as mathematical/statistical procedures for determining potential changes in value of portfolios on the basis of changes in the factors that determine the risks. **229**

The value which at a specific confidence level proves to be the maximum decline in value of the position as a whole for a predefined period of time is defined as the value-at risk (VaR). **230**

A. Preconditions for approval and issuing of approval

If a bank wishes to use the model-based approach to calculating capital adequacy requirements for market risks, it must file an application with the supervisory authority and submit the required documentation. **231**

The supervisory authority will base its decision on whether to authorize a given bank to use the model-based approach on the outcome of joint audits carried out under its overall control in collaboration with the auditors. The supervisory authority may also base its decision on the results of audits conducted by foreign supervisory authorities, by other auditors or by qualified independent experts. **232**

Approval for the use of the model-based approach to calculating capital adequacy requirements for market risks may be made dependent on certain requirements. **233**

The cost of model audits prior to the granting of approval and of audits required subsequently shall be borne by the bank being audited. **234**

The supervisory authority only gives its approval for the use of the model-based approach to calculating capital adequacy requirements for market risks if the following preconditions are met on a permanent basis:

- The bank has an adequate number of employees capable of working with complex models not only in the front office, but also in risk monitoring, in internal auditing and in the back office. **235**
- Both the front office as well as the back office and risk monitoring have an adequate information technology infrastructure. **236**
- In terms of the specific activities of the bank (composition of the trading book and role in the individual markets: market makers, dealers, end users), the risk aggregation model is based on a solid concept and has been implemented correctly. **237**
- The accuracy of measurement of the risk aggregation model is adequate. The supervisory authority may require the risk aggregation model to be initially monitored and tested under real conditions for a certain period of time before it is used for calculating the capital required for market risks. **238**
- The risk factors prescribed by way of minimum requirements are covered in the risk aggregation model (see margin nos. 265-290). **239**
- The risk aggregation model corresponds to the prescribed quantitative minimum requirements (see margin nos. 291-296). **240**
- The prescribed qualitative minimum requirements are complied with (see margin no. 297). **241**

Once approval has been issued for the use of the model-based approach to calculating capital adequacy requirements for market risks, the supervisory authority must be notified whenever

- significant changes are made in the risk aggregation model, or 242
- there is a change in risk policy. 243

The supervisory authority will decide whether further audits are necessary, and if so which. 244

B. Determining capital required

The capital required for risks stemming from interest rate changes and share prices in the trading book and for currency and commodity risks throughout the bank are obtained from aggregation of the VaR-based capital charge and any additional capital required for specific risks arising from equity and interest rate instruments. 245

a) VaR-based components and multiplier

The VaR-based capital charge on a given day corresponds to the larger of the following two amounts (Art. 76 para. 1 CAO):

- The VaR calculated under the model-based approach to calculating capital adequacy requirements for market risks for the portfolio held the previous day; 246
- The average of the VaR values calculated daily under the model-based approach to calculating capital adequacy requirements for market risks for the 60 trading days immediately preceding the current date, multiplied by the bank-specific multiplier stipulated by the supervisory authority. 247

There will be a minimum bank-specific multiplier of three. The precise figure will depend partly on 248

- the fulfillment of the qualitative minimum requirements (margin nos. 297-361) and 249
- the forecasting precision of the risk aggregation model is backtested (margin nos. 320-335). 250

b) Requirements for specific risks:

Banks which do not model specific risks in the form of residual risks or in the form of event and default risks (see margin nos. 275-283) determine the capital required for specific risks using the standardized approach to calculating capital adequacy requirements for market risks. 251

Banks which model specific risks according to the preconditions of margin nos. 275-283 and 321-323, but which restrict themselves to recording residual risks and do not record, or only partially record, event and default risks, are subject to an increased capital charge for (1) the specific risks of equity instruments and for (2) rating-spread risks and specific risks of interest rate instruments. This additional capital charge may be defined using a choice of one of the following two methods: 252

- Amount of the VaR for the equity and interest portfolio; 253
- Amount of the specific risk contained in the VaR for the equity portfolios or amount of the rating spread and specific risk contained in the VaR for the interest portfolio. 254

For the purposes of determining the additional capital required, the amount of the specific risks recorded by the risk aggregation model for an equity portfolio, or the rating spread and specific risks recorded for an interest portfolio, corresponds in this case to:

- the increase in the VaR for the corresponding subportfolio through inclusion of specific risks for equity instruments, or of the rating spread and specific risks for interest rate instruments, 255
- the difference between the VaR for the corresponding portfolio and the VaR obtained if all positions are substituted by positions whose change in value is driven solely by changes in the stock 256

market index or the benchmark yield curve, or

- the result of analytical separation between the general market risk for equity instruments and the risk implied by the benchmark yield curve for interest rate instruments on the one hand and the modeled specific risks of equity instruments and the modeled risks for interest rate instruments not implied by the benchmark yield curve on the other hand. 257

In determining this additional capital charge, the general market risk for equities must be defined using a single risk factor: A representative market index or the initial factor or a linear combination of factors within an empirical factor model. The benchmark yield curves to be used per currency for interest rate instruments must each be based on an established liquid market. 258

The method chosen by the bank for determining the additional capital charge for specific risks must be applied exclusively. 259

The requirements set out under margin nos. 275-290 must by implemented by January 1, 2010 at the latest. As soon as a bank fulfils these requirements, the additional capital required for the specific risks of equity and interest rate instruments, as described in margin nos. 252-254, will cease to apply. 260

c) Combination of market-risk model and standardized approaches

Banks which wish to use the internal models must in principle have a risk aggregation model which at least covers all categories of risk factors (currencies, interest rates, share prices, commodity prices) for general market risks. 261

During the phase in which a bank is moving over to the model-based approach to calculating capital adequacy requirements for market risks, the supervisory authority may allow it to combine the model-based and the standardized approach on condition that the same approach is used within the same category of risk factor, i.e. either the model-based or the standardized approach to calculating capital adequacy requirements for market risks. 262

If the positions in a given category of risk factors (such as commodities) are insignificant in both absolute and relative terms, the supervisory authority may also permit a bank not to integrate them into the model-based approach to calculating capital adequacy requirements for market risks, but to treat them separately according to the standardized approach. 263

If the model-based and the standardized approach to calculating capital adequacy requirements for market risks are combined, the total capital required will correspond to the sum of components calculated using the standardized approach and the model-based approach. 264

C. Risk factors to be recorded

In principle, the risk aggregation model must take account of all risk factors which affect the bank's relevant positions. One exception exists for the specific risks of equity and interest rate instruments, the capital charges of which may also be calculated according to the standardized approach to calculating capital adequacy requirements for market risks (see margin nos. 251-260). 265

The following minimum requirements apply to the individual categories of risk factors:

- Interest rate risks: Interest rate structure risks must be recorded in each currency in which significant interest rate-sensitive positions are held. Where: 266
  - The interest payment date structure must be modeled according to a recognized procedure. 267
  - The number (minimum of six) and distribution of maturity bands must be appropriate to the scale and structure of the transaction. 268
  - The risk aggregation model must record rating spread risks using separate risk factors. These consist in the fact that changes in the value of cash flows with the same maturity and currency, 269

but with borrowers of different (rating) categories, are not fully correlated.

- Currency risks: Risk factors for exchange rates between the domestic currency and each foreign currency in which the bank holds a significant position must be taken into account. **270**

- Share price risks: The risk aggregation model must take account of one risk factor (e.g. an equity market index) for at least each national stock market or single currency area in which significant positions are held. Risk factor definitions based on sector or industry indices are also conceivable. **271**

- Commodity risks: Risk factors must be modeled for each commodity group (see definition of commodity groups under the standardized approach to calculating capital adequacy requirements for market risks, Table 4 in margin no. 151). In addition, the risk aggregation model must take account of risks in the form of unexpected changes in the "convenience yield", i.e. of non-interest rate induced differing trends in spot and forward prices. **272**

- Risks of options positions: For options, in addition to the delta risks the VaR measure must also record at least the following risks:

  - Gamma risks: risks due to non-linear relationships between changes in options prices and changes in the price of the underlying instrument; **273**

  - Vega risks: risks due to the sensitivity of the options prices to changes in the volatility of the underlying instrument. Banks with large and complex options portfolios must take appropriate account of the volatility risks of the options positions according to different maturities. **274**

- Specific risks of equity and interest rate instruments: Specific risks correspond to those components of total market risk which are attributable to events relating to the issuers of the individual instruments and which cannot be directly explained by general market factors.[19] **275**

  - Specific risks in the form of residual risks: "Residual risk" refers to the component of the volatility of the price changes of equity or interest rate instruments which cannot be empirically explained by general factors in the context of a single or multiple-factor model. **276**

  - Specific risks in the form of event and default risks: Specific event risks correspond to the risk of an abrupt change in the price of a given equity or interest instrument owing to events relating to the issuer, and on a scale which cannot normally be explained by the analysis of historical price changes. Apart from default risk, all abrupt price changes relating to shock-type events, such as a takeover bid, constitute event risks. **277**

  Appropriate modeling of specific risks presupposes that the model satisfies all quantitative and qualitative minimum requirements[20], and that it

  - explains the historical change in the value of the portfolio to a large extent, **278**

  - can be shown to cover concentrations, i.e. that it is sensitive to changes in the composition of the portfolio, **279**

  - also proves robust in phases of tight market situations, **280**

  - records issue-specific underlying risk, i.e. it must respond sensitively to substantive issue-specific differences between positions which are similar but not identical, **281**

[19] I.e. for equity instruments by a representative market index or by the first factor (or a linear combination of factors) in the framework of a factor model, or for interest rate instruments by the benchmark yield curve and the rating spread curves.

[20] For the special requirements for backtesting in the context of the modelling of specific risks see margin nos. 320-335.

- records event risks. For interest rate instruments, migration risks must be modeled and for equity instruments events which cause major price changes, such as takeovers, must be modeled, taking account of the problems of survivorship bias.[21] **282**

A bank must have an approach in place which takes account of default risks not reflected in the VaR. To avoid double counting, when calculating such default risks it is permissible to take account of the extent to which default risks are already contained in the VaR, particularly for positions that would be closed within ten days if conditions were to deteriorate. No specific approach is prescribed and the default risks additionally modeled are subject neither to a multiplier nor to the backtesting rules. Regardless of the approach chosen, the bank must be able to prove that it meets similar standards to those used for the IRB in the field of credit risks. At the same time, the risk level can be assumed to remain constant and factors such as liquidity, concentrations, hedging possibilities and optionality can be taken into account. If a bank does not model the additional default risks, it may alternatively calculate eligible capital equity according to the rules for credit risks in the banking book. **283**

For securitization transactions in the trading book which

- have to be deducted from capital under the rules for securitization transactions (margin nos. 253-265 SFBC Circular 06/1 "Credit risks"), or **284**

- are unrated liquidity facilities, or guarantees, **285**

the capital adequacy requirements for securitization transactions in the banking book apply. **286**

A bank which has authorization for modeling specific risks and which models additional default risks as described under margin nos. 275-283 may decide not to apply the above treatment according to margin nos. 284-287 if the following conditions are met: **287**

- The bank is a trader in such positions; **288**

- There is a market with independent bid/offer prices for the positions in question (in the case of synthetic securitizations: for the securitization itself, or for all the risk components it contains), so that within a day a price can be found which bears a reasonable relation to the price most recently traded or quoted on the market and which also allows the transactions to be settled within the usual time; **289**

- The bank has sufficient market data to be able to fully cover the concentrated default risk of these positions in its model for the additional default risks. **290**

D. Minimum quantitative requirements

No particular type of risk aggregation model is prescribed for determining the capital required for market risks. Banks may determine the VaR on the basis of variable covariance models, historical simulations, Monte-Carlo simulations etc. However, the risk aggregation model must in all cases meet the following minimum quantitative requirements: **291**

- Frequency of calculations: The VaR must be calculated daily on the basis of the previous day's positions. **292**

- Confidence level: The VaR must be calculated for a unilateral forecasting interval with a confidence level of 99%. **293**

[21] Tendency for companies which have disappeared not to be taken into account in data surveys because they no longer exist.

- Holding period: When calculating the VaR, a change in the risk factors should be assumed which corresponds to a change over a ten-day period. It is also permissible to use VaRs arrived at on the basis of, for example, a one-day holding period and then multiplied by √10 to convert them to a ten-day holding period. However, over time banks with significant options positions must adopt a system of recording the non-linear relationship between changes in options prices and changes in the price of the corresponding underlying instrument by means of ten-day changes in the risk factors in the risk aggregation model. **294**

- Historical observation period and updating of the data series: The observation period for forecasting future changes, or volatility of risk factors (incl. the correlations between them) which forms the basis for the VaR calculation, must be at least one year. Where individual daily observations with different weightings are taken into account in calculating the volatility and correlation, the weighted average observation period must be at least six months (that is, the weighted average time lag of the individual figures may not be less than six months). The data series must be updated at least quarterly, but immediately if market conditions so require. **295**

- Correlations: The VaR may be calculated taking account of empirical correlations both within the general categories of risk factors (i.e. interest rates, exchange rates, share prices and commodity prices, including associated volatility) and also between the categories of risk factors, if the bank's system for measuring correlation is based on a sound design and has been correctly implemented. The correlations must be monitored continuously with special care. The impact on the VaR of abrupt changes in the correlations between the categories of risk factors must also be regularly calculated and assessed in stress tests. If the VaR is calculated without taking account of empirical correlations between the general categories of risk factors, the VaR for the individual categories of risk factors must be aggregated by addition. **296**

E. Minimum qualitative requirements

In addition to the general minimum requirements satisfying the Swiss Bankers Association's "Risk Management Guidelines for Trading and for the Use of Derivatives", banks wishing to use the model-based approach must comply with the following conditions pursuant to margin nos. 298-358. **297**

a) Data integrity

The bank must demonstrate that it has sound, documented, internally verified and approved procedures which guarantee that all transactions are recorded, assessed and prepared for risk measurement fully, correctly and in a timely manner. Manual corrections of data must be documented so that the cause and the precise content of the correction can be retraced. In detailed terms, the following principles apply: **298**

- All transactions must be reconciled with the counterparty on a daily basis. Transactions must be confirmed and reconciled by a unit which is independent of the front office. Discrepancies must investigated without delay. **299**

- There must be procedures in place to ensure that the data used in the valuation models are appropriate, uniform, consistent, up-to-date and independent. **300**

- All positions must be prepared in such a way that they are fully recorded from the point of view of risk. **301**

b) Independent risk monitoring department

The bank must have a risk monitoring department which is adequately staffed and independent of trading and which reports directly to the member of management responsible for risk monitoring. **302**

Risk monitoring must fulfill the following functions in particular:

- Structure and implementation of the risk monitoring systems (trading and monitoring systems); **303**

- Close monitoring of day-to-day business (limits, P&L etc.), taking account of the measurement parameter for market risk; **304**
- Daily VaR calculations, analyses, monitoring and reports:
  - Daily preparation of a report on the results of the risk aggregation model and analysis of the results, including the relationship between VaR and trading limits, **305**
  - Daily reporting to the competent member of management; **306**
- Performance of regular backtesting pursuant to margin nos. 320-335; **307**
- Performance of regular stress testing pursuant to margin nos. 336-351; **308**
- Testing and approval of:
  - risk aggregation models, **309**
  - valuation models for the daily P&L calculation, **310**
  - models for generating input factors (e.g. yield curve models). **311**
- Continuous verification and updating of the documentation of the risk monitoring system (trading and monitoring systems). **312**

c) Senior management

For senior management, the following provisions apply to the model-based approach:

- The competent member of senior management must be provided by the risk monitoring department directly with daily information in appropriate form on the results of the risk aggregation model and must subject those results to critical scrutiny; **313**
- The competent member of senior management who assesses the daily reports from the independent risk monitoring department must have the powers to secure both a reduction in the positions of individual traders and a reduction in the total risk exposure of the bank; **314**
- The competent member of senior management must be informed periodically by the risk monitoring department of the results of the backtesting and stress testing and must critically assess those results; **315**

d) Risk aggregation model, daily risk management and systems of limits

The following principles apply to the relationship between the risk aggregation model, daily risk monitoring and limits:

- The risk aggregation model must be closely integrated into the daily risk monitoring. In particular, results produced by the model must form an integral part of the planning, monitoring and control of the bank's market risk profile; **316**
- There must be a clear and enduring relationship between the internal trading limits and the VaR (as used to determine the capital required for market risks). This relationship must be known to both traders and management; **317**
- The limits must be regularly reviewed; **318**
- The procedures to be initiated in the event of limit overruns must be clearly defined and **319**

documented along with any sanctions.

e) Backtesting

A bank which uses the model-based approach to calculating capital adequacy requirements for market risks must have regular, sound, consistent, documented, internally verified backtesting procedures in place. Backtesting is in principle used to obtain indications of the quality and precision of a risk measurement system. **320**

aa) Backtesting in general

The backtesting procedure compares trading revenues retrospectively over a defined period of time with the variation range of the trading income forecast for this period with the aid of the risk aggregation model. The aim of the procedure is to be able to state with a given margin of error whether the VaR ascertained by the risk aggregation model actually covers 99% of the bank's trading results. To make the statements statistically reliable, the daily trading income and the daily VaR are compared over a long observation period. **321**

Under the model-based approach, a standardized backtesting procedure for determining the bank-specific multiplier is required (see margin nos. 246-250). Its parameters are defined in margin nos. 324-335. However, independently of this, the banks should also apply backtesting procedures to lower levels than merely the level of the global risk aggregation model, for example for individual risk factors or product categories, in order to examine questions of risk measurement. At the same time, different parameters from those for the standardized backtesting procedure can be used in backtesting. **322**

Banks that use a risk aggregation model to determine not only the requirements for general market risks, but also those for specific risks must also have backtesting procedures which provide information on the adequacy of the modeling of specific risks. Separate backtests must in particular be carried out for subportfolios (equity and interest portfolios) entailing specific risks, and the results analyzed and – if requested – reported to the supervisory authority and the auditors. **323**

bb) Backtesting and definition of the bank-specific multiplier

To define the bank-specific multiplier, backtesting must be carried out taking account of the following requirements:

- The test must be based on the VaR calculated taking account of the model requirements pursuant to margin nos. 265-296. The only difference is that the holding period is assumed to be not ten days but just one day. **324**

- The individual banks can decide at their own discretion whether to perform the backtesting on the basis of

  - actual trading results, i.e. including the results of intraday trading and including commission income, **325**

  - trading results adjusted for these effects or **326**

  - hypothetical trading results determined by revaluation at market prices of the financial instruments held by the bank the previous day **327**

  on condition that the procedure can be described as sound and that the income figures used do not systematically distort the test result. A consistent procedure must also be used over time, i.e. the bank is not free to change its backtesting methods without consulting the supervisory authority. **328**

- The sample to be used is made up of the previous 250 observations. **329**

The VaR reported internally on a daily basis and the trading result must be recorded on the day they are **330**

calculated in a form which is irreversible and can be inspected by the supervisory authority and the auditors at any time.

The bank compares the trading result daily with the VaR ascertained for the previous day. Cases in which a trading loss exceeds the corresponding VaR are described as exceptions. These exceptions (for the observations for the previous 250 trading days) must be verified and documented at least quarterly. The result of this quarterly verification must be reported to the supervisory authority and the auditors (see margin nos. 362-365). 331

The bank-specific increase in the multiplier resulting from the backtesting is determined by the number of exceptions within the observations for the previous 250 trading days. In increasing the multiplier as a consequence of the backtesting, the supervisory authority may choose not to take account of individual exceptions if the bank demonstrates that the exception is not attributable to imprecision (forecasting quality) of the risk aggregation model. 332

Number of exceptions	Increase in the multiplier
4 or less	0.00
5	0.40
6	0.50
7	0.65
8	0.75
9	0.85
10 or more	1.00

Table 5: Bank-specific multiplier

If the number of exceptions for the relevant observation period exceeds four before 250 observations have been made, this must be reported to the supervisory authority without delay. From this date onward, the bank must calculate the VaR with the correspondingly increased multiplier (see Table 5 in margin no. 332) until the supervisory authority has reached a final decision. 333

If, on the basis of the backtesting, a bank is set a bank-specific multiplier of more than three, it will be expected to trace, and if possible eradicate, the causes behind the imprecise estimates produced by the risk aggregation model. If the multiplier is set at four, a rapid and careful review of the model is mandatory. Any shortcomings must be eradicated without delay, since otherwise the conditions for determining capital adequacy requirements according to the model-based approach to calculating capital adequacy requirements for market risks will be deemed no longer to be fulfilled. 334

The supervisory authority will only reduce the multiplier if the bank demonstrates that the error has been corrected and that the revised model provides appropriate forecasting quality. 335

f) Stress testing

A bank which uses the model-based approach to calculating capital adequacy requirements for market risks must have regular, sound, consistent, documented, internally verified stress testing procedures in place. The main purpose of the stress testing is to demonstrate that even under very unfavorable, but plausible, market conditions the bank would have adequate reserves in the form of economic capital. Stress tests are also intended to provide information on any measures relating to adjustments of the portfolio structure. 336

The definition of significant stress scenarios is in principle left to the individual bank. 337

However, depending on the composition of the portfolio, the following points should be taken into account:

- Illiquidity (impossible to sell positions quickly); 338
- Concentrated positions (in proportion to market sales); 339

- Non-linear products, in particular positions which are well out of the money; **340**
- Event risks which extend beyond the ten-day holding period and the 99% confidence interval, i.e. events not taken into account in the VaR which are unlikely to occur but would have a major impact; **341**
- Jumps-to-default; **342**
- Major changes in correlations; **343**
- All other risks which are not appropriately reflected in the VaR. **344**

The following fundamental principles apply:

- Scenarios must be taken into account which would lead to extraordinary losses and/or render risk monitoring difficult or impossible. **345**
- Different forms of stress scenarios should be used, in particular:
  - Extreme changes in the market risk factors and the correlations between them (arbitrarily prescribed scenarios or historical scenarios corresponding to previous periods of major market turbulence); **346**
  - Bank-specific scenarios which need to be regarded as particularly serious in light of the specific risk positions. **347**
- In addition to extreme changes in market risk factors and their mutual correlations, the analyses must also cover liquidity aspects of market disruptions. **348**
- The risks of all positions must be included in the stress testing, in particular those of options positions. **349**

In addition to the actual, quantitative stress tests and their analysis, procedures must also be in place to ensure that results of the stress testing trigger the necessary measures:

- The results of the stress testing must be periodically reviewed by the competent member of management and must be reflected in the policies and limits defined by management and the body responsible for overall management, supervision and monitoring. **350**
- If the stress testing brings to light certain weaknesses, steps must immediately be taken to limit these risks appropriately (e.g. through hedging or through reductions in risk exposures). **351**

g) Model validation

The risk aggregation model must be validated by employees whose reporting mandate is independent of the model development process. The risk aggregation model should not only be validated when it is developed and when it undergoes important changes, but also on a periodic basis and in the event of major structural changes in the market or significant changes in the composition of the portfolio. The model validation must include tests showing that all assumptions made in the model are appropriate and do not result in an underestimation of the risks. Hypothetical trading results (margin no. 324-329) should be used for backtesting within the framework of the model validation. **352**

h) Documentation and internal control system

The bank's risk monitoring system (trading and control systems) must be adequately documented. This applies in particular to **353**

- the general principles, 354
- powers and responsibilities (organizational structure) 355
- the organizational processes and 356
- the quantitative bases 357

for the daily VaR calculations and analyses, backtesting and stress testing. In addition, the bank must have control systems in place to ensure compliance with the aforementioned principles and procedures. 358

i) Internal audit

The internal audit verifies the risk monitoring system as a whole (trading and control systems) regularly at least once a year. The investigations cover the activities of both the trading and risk monitoring departments. The content of the investigations relates in particular to the conditions for approval of the model-based approach to calculating capital adequacy requirements for market risks defined in this Circular. 359

The investigations of internal and external auditors must also be strictly coordinated in the field of risk management and risk monitoring (Art. 19 para. 3 Federal Banking Act, SFBC Circular 05/1 "External Audit" and SFBC Circular 95/1 "Internal Audit", margin no. 18). 360

The reports of the internal auditors must be presented to the supervisory authority on request. 361

F. Reports

The supervisory authority and the external auditors must be notified without delay if

- significant changes are made to the risk aggregation model (see margin nos. 231-244), 362
- the risk policy is changed (see margin nos. 231-244) or 363
- the number of exemptions from backtesting exceeds four for the relevant observation period before 250 observations have been made (see margin nos. 320-335). 364

The backtesting procedure must be documented at least quarterly. The results must be reported to the supervisory authority and the external auditors within 15 trading days of the end of each quarter. 365

VI. Consolidated equity capital required

The capital required at consolidated level for the risk-weighted positions pursuant to Art. 37 CAO are in principle determined using the method of full or quota consolidation (Art. 7 CAO). 366

By contrast, however, the consolidated requirements for the market risks pursuant to Art. 70 CAO cannot always be calculated by means of consolidation, but rather an additive procedure must be used. 367

A. Consolidated requirements under the standardized approach

a) Consolidated determination of capital required

If several or all legal entities of a group use the standardized approach to calculating capital adequacy requirements for market risks and the technical/procedural conditions for daily aggregation of all relevant positions booked in the various legal entities are fulfilled, the capital required at consolidated level for the market risks of this legal entity may be determined by means of a consolidated calculation based on the standardized approach. This means that a consolidated balance sheet or a "consolidated trading book" is prepared first. The capital required is then calculated for each category of risk factor 368

(equities, interest rate instruments, currencies, gold and commodities) on the basis of the consolidated balance sheet and the "consolidated trading book". It is permissible to restrict the preparation of a consolidated balance sheet to individual categories of risk factors.

b) Additive determination of capital required

If several or all legal entities of a group use the standardized approach to calculating capital adequacy requirements for market risks and if the conditions for a consolidated calculation pursuant to margin nos. 70-92 are not fulfilled, the capital required at consolidated level for market risks will be determined by adding the capital required for the individual legal entities. The capital required should thus be determined separately for each legal entity and for each category of risk factor (equities, interest rate instruments, currencies, gold and commodities). When determining the net positions and when calculating the capital required, positions booked in different legal entities may not be offset against each other. **369**

B. Consolidated requirements under the model-based approach to calculating capital adequacy requirements for market risks

a) Consolidated determination of capital required

A condition for determining the capital required according to the model-based approach to calculating capital adequacy requirements for market risks in the sense of a consolidation is that the risks are measured, aggregated and monitored group-wide on a daily basis using a uniform, integrated system. The following detailed conditions must be fulfilled: **370**

- All preconditions for approval of the use of the model-based approach to calculating capital adequacy requirements for market risks pursuant to margin nos. 228-365 are complied with on a permanent basis at consolidated level; **371**

- There are no legal or technical/procedural difficulties to prevent the timely integration of individual risk positions into the consolidated risk monitoring system; **372**

- There is nothing to impede the rapid repatriation of profits of a foreign subsidiary bank. **373**

If all these preconditions are met, this means that there is a group-wide integrated risk monitoring system in place. Capital required for market risk at consolidated level may then be determined according to the same rules as for the individual bank, even if the positions are booked in different legal entities. **374**

b) Additive determination of consolidated capital required

The capital required for market risk at consolidated level may be determined on an additive basis if the various legal entities of a group use the model-based approach to calculating capital adequacy requirements for market risks, but the preconditions for the consolidated model-based calculation pursuant to margin nos. 370-374 are not fulfilled or are only partially fulfilled. In this case, no offsetting or aggregations taking account of correlations will be permissible between positions in legal entities which are not part of the same integrated risk monitoring system. **375**

The capital charge calculated according to the model-based approach to calculating capital adequacy requirements for market risks on the one hand and according to the standardized approach on the other hand will also always be aggregated on an additive basis. **376**

VII. Entry into force

SFBC Circular 97/1 "Capital adequacy requirements to support market risks" (REM-EBK) and the SFBC Circular 03/2 "Credit derivatives" will be annulled as of December 31, 2007. **377**

Date of entry into force: January 1, 2007 **378**

Annexes

Annex 1: Example for determining capital required according to the maturity method

Annex 2: Example for determining the capital required for options according to the simplified procedure

Annex 3: Example for determining the capital required for options according to the delta plus procedure

Annex 4: Example of the application of the de minimis test

Annex 5: Offsetting option for cross-currency relationships

Annex 6: Categorization of equity instruments

Annex 7: *"Associated hedging positions"* within the meaning of margin no. 189

Annex 8: Cross-currency relationships in the scenario analysis procedure

Annex 9: Example of the treatment of the capital adequacy calculation for forex forward contracts

Annex 10: Calculation of gamma and vega effects arising from swaptions

Annex 11: Options with foreign currency denominated exercise price

Annex 12: Notes on miscellaneous details

Legal basis

- Federal Law on Banks and Savings Banks ("Banking Act"): Art. 23bis para. 1
- CAO (Capital Adequacy Ordinance): Arts. 68–76
- EBK GebV (SFBC Ordinance on Levying of Fees and Commissions): Arts. 13 and 14

Annex 1:

Example for determining capital required according to the maturity method

The long and short positions assigned to the 15 maturity bands form the basis of the calculation; these are represented here using the zone demarcations for instruments with a coupon < 3%.

Initially, one open net position is to be calculated for each maturity band. This position should be weighted with the factor relevant to the maturity band; in this way an open weighted net position is obtained for each maturity band. These open weighted net positions should be added together across all maturity bands. For the 6–12 month maturity band, the unweighted open net position amounts to e.g. –200 (= 200 – 400); after weighting with the relevant factor of 0.70%, the open weighted net position obtained is –1.40. The first component of the capital required is obtained as the absolute sum of all 15 weighted open net positions. In the example shown it amounts to 6.80.

The next step involves **vertical offsetting** within each maturity band. For this purpose, the closed risk-weighted position of each maturity band is subject to a charge of 10%. For the 1.0 to 1.9 year maturity band, for example, the closed position (smaller of the absolute amounts of the sums of mutually offset long and short positions) amounts to 100. After weighting with the relevant factor of 1.25%, the closed risk weighted position amounts to 1.25. By multiplying this by 10%, we obtain the summand of the 1.0 to 1.9 year maturity band for determining the capital required for the vertical offsetting. By adding all 15 summands the latter amounts to 3.92 in the example shown. This amount represents the second component of the total capital required.

Horizontal offsetting is a two-stage process; initially within each of the three zones and then between the zones. Firstly, for **intra-zone horizontal offsetting** the risk-weighted open positions of the individual maturity bands must be aggregated within their zone to form a net zone position and then offset against each other. The closed positions resulting from the offsetting must be subject to a capital charge for each zone. These net positions amount to 40% for zone 1 and 30% each for zones 2 and 3. For example, the net zone position obtained for zone 2 is 3.25 (= 3.75 + 1.75 – 2.25). By offsetting the three risk-weighted open positions of the three maturity bands of this zone we obtain a closed position of 2.25. After weighting at 30%, the intra-zone horizontal offsetting of zone 2 results in a capital charge of 0.675. In the example, the sum of all these capital charges for the intra-zone horizontal offsetting amounts to 8.56. This constitutes the third component of the total capital charge.

Finally, **horizontal offsetting between the zones** still has to be performed. Because the net zone positions of zones 1 (–1.20) and 2 (+3.25) have different signs (i.e. one is negative and the other positive), a further offsetting procedure can be performed between them. The closed position of 1.20 resulting from the offsetting is subject to a rate of 40%, i.e. to a total capital charge of 0.48. The remaining open position (+2.05) stays in its zone, i.e. in this case in zone 2. Because of its sign (+), it cannot be offset against the net zone position of zone 3. This means that 0.48 is obtained as the fourth component of the total capital required.

The remaining open positions of zones 2 (2.05) and 3 (4.75) which cannot be further offset correspond together to the absolute sum of the open weighted net positions of all maturity bands (6.80).

The addition of all four components results in a sum of 19.76 (= 6.80 + 3.92 + 8.56 + 0.48) for the total capital required.

Table of maturity bands as an example for determining capital required

Zone	Maturity band	Weighting	Positions					Required capital				
			open			closed		Net pos.	Vertic. offsetting	Horizontal offsetting		
			long	short (–)	net	unweighted	weighted	open, weighted	within maturity bands	intra-zone	adjacent zones	non-adjacent zones
1	< 1 mth.	0.00%	200	–100	100	100	0.00	0.00	0.0000	0.08		
	1 – 3 mths.	0.20%	300	–200	100	200	0.40	0.20	0.0400			
	3 – 6 mths.	0.40%	100	–100	0	100	0.40	0.00	0.0400			
	6 – 12 mths.	0.70%	200	–400	–200	200	1.40	–1.40	0.1400		0.48	
2	1.0 – 1.9 yrs.	1.25%	400	–100	300	100	1.25	3.75	0.1250	0.675		
	1.9 – 2.8 yrs.	1.75%	200	–100	100	100	1.75	1.75	0.1750			
	2.8 – 3.6 yrs.	2.25%	100	–200	–100	100	2.25	–2.25	0.2250			
3	3.6 – 4.3 yrs.	2.75%	300	–100	200	100	2.75	5.50	0.2750	7.80		
	4.3 – 5.7 yrs.	3.25%	200	0	200	0	0.00	6.50	0.0000			
	5.7 – 7.3 yrs.	3.75%	300	–100	200	100	3.75	7.50	0.3750			
	7.3 – 9.3 yrs.	4.50%	0	–300	–300	0	0.00	–13.50	0.0000			
	9.3 – 10.6 yrs.	5.25%	200	–100	100	100	5.25	5.25	0.5250			
	10.6 – 12 yrs.	6.00%	300	–200	100	200	12.00	6.00	1.2000			
	12 – 20 yrs.	8.00%	100	–100	0	100	8.00	0.00	0.8000			
	> 20 yrs	12.50%	0	–100	–100	0	0.00	–12.50	0.0000			
								6.80	3.9200	8.56	0.48	0.00

Sums	
Zone 1	–1.20
Zone 2	3.25
Zone 3	4.75

Capital adequacy requirement:	19.76

Annex 2:

Example for determining the capital required for options according to the simplified procedure

The basis for the calculation is a portfolio consisting of the following three positions:

- Long position consisting of 10 call options on Swiss equity A, price of underlying: CHF 5,100, strike price: CHF 5,300, market value of an option: CHF 158.80
- Long spot position consisting of 15 contracts on equity index XY, market value of a contract: CHF 2,160
- Long position of 20 put options on equity index XY, price of underlying: CHF 2,160, strike price: CHF 2,200, market value of the option: CHF 63.80

For the first option position the portfolio contains no contrary spot position. The capital required to cover it therefore corresponds to the lesser of the market value of the option and the market price of the underlying multiplied by the relevant capital charge (here 16% in total, as the sum of 8% for the general market risk and 8% for the specific risk). In the present case, the first of the amounts is CHF **1,588.00** (= 10 · CHF 158.80) and the second corresponds to CHF 8,160.00 (= 10 · 0.16 · CHF 5,100). As the first amount is smaller, in this case it constitutes the relevant capital required for this position.

In relation to the equity index XY, 15 purchased put options are matched with the same number of (long) spot positions. In addition, there is another position consisting of 5 purchased put options on the index which is not covered by a corresponding spot position.

For the 15 option and spot positions on index XY, the capital required corresponds to the market value of the underlying instrument multiplied by the relevant capital charge less the intrinsic value of the option position.[22] In this specific case the result obtained is CHF **2,640.00** (= 15 · 0.10 · CHF 2,160.00 – 15 · [CHF 2,200.00 – CHF 2,160.00]). For the remaining residual position on 5 put options on the index, the capital adequacy requirement is the lesser of the market value of the option, CHF **319.00** (= 5 · CHF 63.80), and the market price of the underlying instrument multiplied by the relevant capital charge, CHF 1,080 (= 5 · 0.10 · CHF 2,160). In this case, the first of the amounts is smaller and so constitutes the relevant capital adequacy requirement.

In total, the resulting capital required for the present portfolio is CHF 4,547.00 (= CHF **1,588.00** + CHF **2,640.00** + CHF **319.00**).

[22] Here the relevant capital charge is 8% for the general market risk and 2% for the specific risk of an equity index which represents a broadly diversified equity portfolio; i.e. 10% in total.

Annex 3:

Example for determining the capital required for options according to the delta plus procedure

The basis for the calculation is an options portfolio comprising the following four positions:[23]

Position	I	II	III	IV
Number	– 10 (short)	20 (long)	15 (long)	100,000 (long)
Underlying	Swiss equity A	Swiss equity B	Foreign equity index XY[24]	USD/CHF
Price of underlying	13,490	1,940	3,790	1.4385
Option type	Call	Call	Put	Call
Exercise price	14,000	1,900	3,900	1.4500
Residual maturity	6 months	4 months	3 months	2 months
Volatility	25.5%	20.5%	22.0%	12.0%
Position value	– 7,802	2,310	3,350	2,388
Delta	0.4649	0.6038	– 0.5724	0.4585
Gamma	0.000163	0.001678	0.000941	5.630375
Vega	3,790.73	431.62	743.51	0.2330
Delta equivalent	– 62,717	23,428	32,541	65,957
Cap.adeq. (delta equ.):	– 10,035	3,748	3,254	6,596
Gamma effect	– 951	404	649	5,825
Vega effect	– 2,417	442	613	699

The first step is to calculate the **delta equivalents** of the individual positions. These are obtained by multiplying the number of securities belonging to the position by the price of the relevant underlying instrument and the associated position delta. The delta equivalents should subsequently be included in the calculation of the net positions for general market risks and specific risks (in the case of equities). For example, the delta equivalent of the position I amounts to: CHF –62,717 (= -10 · CHF +13,490 · 0.4649). It is subject to a capital charge of 16% (8% for the general market risk plus 8% for the specific risk). If the position were considered in isolation, this would result in a total capital requirement amounting to CHF – 10,035 in absolute terms (= 0.16 · CHF – 62,717). The procedure to be followed for the other three positions is exactly the same. The capital required for position II is also 16%, but is only 10%[25] for each of positions III and IV.

In the next stage, the **gamma effects** of the individual positions must be determined. These are obtained by multiplying the number of securities belonging to the position by a factor of 0.5, the associated position gamma and the square of the prescribed amount for the assumed change in the value of the underlying instrument. For position II, for example, the resulting capital requirement for the gamma effect is CHF 404 (= 20 · 0.5 · 0.001678 · [0.08 · CHF 1,940]^2). Because positions I and II both consist of options on Swiss equities and hence belong to the same category of underlying instrument (according to margin nos. 177-182), their gamma effects may be offset against each other. For the Swiss equities category, this results in a net gamma effect of CHF -547 (= CHF 404 – CHF 951). As this net gamma effect is negative, unlike that of positions III and IV it is relevant for calculating the capital required. Its absolute amount represents a component of the capital required.

Finally, the **vega effects** of underlying instruments (within the meaning of margin nos. 177-182) must be calculated per position and per category. These are obtained by multiplying the number of securities belonging to the position by a factor of 0.25, the associated option vega and the relevant volatility. For position III, for example, the result is CHF 613 (= 15 · 0.25 · 743.51 · 0.22). The net vega effect for the Swiss component of the equity portfolio amounts to CHF -1.975 (= CHF – 2,417 + CHF 442). Along similar lines to the gamma effect calculations this absolute amount also represents a component of the capital required.

[23] Assumptions for the calculation: European options, risk-free interest rates: 1% for CHF, 0% for USD, no dividends.
[24] All figures in CHF
[25] The relevant ratio for equity index positions (position III) amounts to 8% for general market risk, plus 2% for specific risk, while the ratio for currency positions (position IV) amounts to 10%.

The capital required therefore comes to a total of CHF 547 (absolute amount of CHF 404 – CHF 951) for the gamma effect and to a total of CHF 3,287 (= CHF 1,975 + CHF 613 + CHF 699) for the vega effect.

Annex 4:
Example of the application of the de minimis test

The following illustrates how to calculate the size of the trading book relevant for the de minimis test using a simple sample portfolio.[26] The trading book comprises six positions:

Position I: Bond A

Nominal value:	CHF 5,000,000
Coupon:	5%
Residual maturity:	3 years
Position value:	CHF 5,087,500

Position II: Index certificates on the SMI equity index

Number:	1,000
SMI level:	CHF 6,700
Position value:	CHF 6,700,000

Position III: Call options on the SMI equity index:

Number:	–5,000 (short position, 1-for-1 exercise ratio)
Option type:	European
Price of underlying instrument:	CHF 6,700
Exercise price:	CHF 7,000
Residual maturity:	6 months
Volatility:	30% p.a.
Risk-free interest rate:	1% p.a.
Delta:	0.46877
Position value:	CHF –2,258.433
Delta equivalent:	CHF –15,703.880

Position IV: Currency call options for the purchase of USD against CHF

Number:	1 million (1 for 1 exercise ratio)
Option type:	European
Exchange rate:	1.3670
Exercise price:	1.3000
Residual maturity:	2 months
Volatility:	15% p.a.
Risk-free CHF interest rate:	1%
Risk-free USD interest rate:	5%
Delta:	0.76540
Position value:	CHF 69,412
Delta equivalent:	CHF 1,046,297

Position V: Crude oil futures

[26] Note on the method of calculation: In the example, the calculation of the remaining term to maturity is based on effective calendar dates.

Number:	1,000 contracts for the purchase of 1,000 barrels of crude oil
Forward:	in 3 months
Agreed forward price:	USD 14.70 per barrel
Current exchange rate:	1.3670 (CHF/USD)
Current 3-mth forward price:	12.50 USD/barrel
3-mth, USD interest rate:	5.00% p.a.
Position value:	CHF –2,970,939
Value of long component:	CHF 16,880,341
Value of short component:	CHF –19,851,280

Position VI: Crude oil futures

Number:	300 contracts for the sale of 1,000 barrels of crude oil
Forward:	in 3 months and 5 days
Agreed forward price:	11.30 USD/barrel
Current exchange rate:	1.3670 (CHF/USD)
Curr. (3-mth + 5 days) forward price:	12.55 USD/barrel
(3-mth + 5days) USD interest rate:	5.02% p.a.
Position value:	CHF –506,042
Value of long component:	CHF 4,574,617
Value of short component:	CHF –506,042

For the calculation of the decisive value of the trading book, the individual values for each position are to be determined in accordance with margin nos. 53-60. At the same time the compensatory positions pursuant to margin nos. 73-80 may initially be disregarded. For the example presented, the two positions V and VI can therefore be partially offset against each other:

Position	1st component	2nd component
V	1,000,000 barrels of crude oil	–USD 14,700,000
VI	–300,000 barrels of crude oil	USD 3,390,000
V/VI: after offsetting	700,000 barrels of crude oil	–USD 11,310,000

For the first component, the offsetting results in a figure of CHF 11,816,238 (= 700,000–USD 12.50 / $1.05^{0.25}$–CHF/USD 1.3670); for the second component the resulting figure is CHF –15,273,332 (= USD -11,310,000 / $1.05^{0.25}$ · CHF/USD 1.3670). As the absolute value of the second component is greater than that of the first, it is taken as the pertinent amount for positions V and VI when calculating the relevant size of the trading book.

Position I:	CHF	5,087,500	
Position II:	CHF	6,700,000	
Position III:	CHF	15,703,880	short
Position IV:	CHF	1,046,297	
Positions V/VI:	CHF	15,273,332	

Moreover, in the present example positions II and III are positions which can be mutually netted off within the meaning of margin no. 123, which means that they too can be offset against each other.
Hence, the relevant size of the trading book for the de minimis test is the sum of the following position values:

Position I:	CHF	5,087,500
Positions II/III:	CHF	9,003,880
Position IV:	CHF	1,046,297
Positions V/VI:	CHF	15,273,332
Total:	**CHF**	**30,411,009**

As the value calculated in this way exceeds the sum of CHF 30 million, the example does not qualify for de minimis treatment – regardless whether or not it exceeds 6% of the balance sheet and off-balance sheet positions.

Annex 5:

Offsetting option for cross-currency relationships

The term *"contrary positions in derivatives"*, as used in margin nos. 74-80, refers strictly only to derivatives relating to the same underlying instruments and denominated in the same currency. However, in addition, cross-currency relationships can also be broken down into their component parts and included in the offsetting procedure. The precondition for this, though, is compliance with the restrictions referred to in margin no. 75, or margin nos. 77-80.

This is explained by the following example: Three forex forward transactions with different contract dates and identical maturity dates are given:

1. Purchase of USD 20 million for EUR 17 million
2. Sale of USD 20 million for CHF 28 million
3. Purchase of EUR 17 million for CHF 27 million

On the basis of the cross-relationship which exists, the first position may be broken down into the following transactions:

1a. Purchase of USD 20 million for CHF (at the corresponding exchange rate)
1b. Purchase of CHF for EUR 17 million (at the corresponding exchange rate)

According to margin nos. 77-80, positions 1a and 1b may be offset against positions 2 and 3. The precondition for this is that the analysis of the cross-relationship is comprehensively documented.

The analysis of cross-relationships is permissible only for forex futures transactions.

Annex 6:

Categorization of equity instruments

The national market or currency area of an issuer of equity instruments listed internationally is deemed to be the issuer's domestic market. Thus, for example, an equity security of a Japanese issuer is to be assigned to the Japanese stock market for purposes of calculating general market risk, even if the security was acquired in Switzerland for CHF.

In the case of American Depository Receipts (ADRs), the domestic market of the issuer of the stock is likewise deemed to be the relevant allocation criterion. This means that ADRs may not be offset against equity instruments assigned to the US stock market.

Equity positions contained in the various national indices should be assigned to the relevant national market or currency area, depending on how they are managed. For example, equity positions in ABB stocks, which are included in both the Swiss Market Index (SMI) and the Swedish SX-16 index, may be assigned to both the Swiss and the Swedish stock market, depending on how they are managed. This means that in such special cases it is in principle possible for an equity position in a certain stock to be assigned proportionately to different national markets or currency areas. However, it is expressly not permissible to change the assignment independently of management on an opportunistic basis.

If equity positions carry currency risks in addition to share price risks, the latter must be recorded in accordance with the corresponding provisions (see margin no. 119). An equity is deemed to carry a currency risk if the currency in the issuer's domestic market is a foreign currency.

Annex 7:

"Associated hedging positions" within the meaning of margin no. 189

In principle, the scenario analysis procedure is designed for determining the capital required for options positions and any associated hedging positions. A position is described as an *"associated hedging position"* within the meaning of margin no. 189 if it belongs to the same category pursuant to margin nos. 177-182 as the positions it is required to hedge and if its delta equivalent does not exceed that of those positions.
This means, for example, that on the basis of the classification of margin nos. 177-182, it is in principle permissible in the context of the scenario analysis procedure to regard a spot long position in Swiss equity "X" as a hedging position (i.e. an *"associated hedging position"*) on a short position of a call option on Swiss equity "Y".

Depending on the category of risk factor, different rules are used to integrate instruments not described as hedging positions into the scenario analysis matrices.

A. Equity instruments, currencies, gold and commodities:
Provided this would not result in a lower capital requirement than with separate treatment according to the conventional procedure, linear positions in equity instruments, currencies, gold and commodities which are not classified as hedging positions may in principle also be integrated into the corresponding scenario analysis matrices.

B. Interest rate instruments:
In terms of the offsetting possibilities, the scenario analysis procedure for options on interest rate instruments differs significantly from the procedures for interest rate instruments without option features (maturity method and duration method). Contrary to this procedure for options on interest rate instruments, margin no. 189 provides for the possibility of combining up to three maturity bands into one group, subject to the formation of a minimum of six such maturity groups. On the basis of the resulting extended offsetting possibilities, by using the scenario analysis procedure the capital requirement could – depending on the composition of the portfolio – be lower for interest rate instruments without option features than when the conventional procedures are correctly applied.
It is therefore not permissible to integrate into the scenario analysis matrices interest rate instruments within the meaning of margin no. 189 which are not described as hedging positions.

Annex 8

Cross-currency relationships in the scenario analysis procedure

For certain currency portfolios, cross-currency interdependencies may sometimes rule out the possibility of the relevant individual exchange rates following mutually independent trends. In such cases, the change scenarios do not necessarily need to be simulated for all exchange rates contained in the portfolio. If, for example, a portfolio contains currency options on the CHF/USD, USD/EUR and CHF/EUR exchange rates, in principle the simulation of two exchange rate changes may be sufficient if this also takes adequate account of the third on the basis of cross-currency relationships.

For example: A bank has options on three exchange rates: CHF/USD, USD/EUR and CHF/EUR. For each of these it calculates one 3x7 matrix (3 changes in volatility: +25%, 0%, –25%; and 7 exchange rate changes: +10%, +6.67%, +3.33%, 0%, –3.33%, –6.67%, –10%):

In matrix A (CHF/USD), for example, the maximum position loss is obtained in the field which assumes a change in volatility of –25% and a 3.33% depreciation in the value of the USD against the CHF.
Let us also suppose that in matrix B (USD/EUR) the largest position loss arises in the field which assumes a change in volatility of +25% and a 3.33% depreciation in the value of the EUR against the USD.
Let us finally suppose that in matrix C (CHF/EUR) the largest loss is contained in the field assuming a change in volatility of –25% and a 10% appreciation in the value of the EUR against the CHF.

The changes in the three exchange rates thus implied cannot be simultaneous. A 3.33% deprecation in the value of the USD against the CHF and a similar 3.33% depreciation in the value of the EUR against the USD imply a depreciation in the value of the EUR against the CHF of the order of 6.67%[27] and rule out an appreciation in the value of the EUR against the CHF – as assumed in matrix C.

However, an exclusive simulation of the CHF/EUR exchange rate change with the 6.67% depreciation in the value of the EUR against the CHF implied by the cross-currency relationship only makes sense if the positions of this currency pair captured in the matrix are quantitatively smaller in relation to their risk exposure than those of matrices A and B. For this reason, the volumes of the individual positions should be taken into account on the basis of their absolute delta equivalents.

Where D_A, D_B and D_C describe the CHF-denominated absolute delta equivalents of the positions from the individual matrices, on the basis of the cross-currency relationships the corresponding position in matrix C may be calculated up to a maximum of the lower of the percentage ratios D_A/D_C and D_B/D_C according to the simulation field of the column in matrix C which assumes a 6.67% depreciation in the value of the EUR against the CHF and produces the largest position loss within this column, i.e. implying the most unfavorable change in volatility. Any remainder of the position should be calculated in the conventional way according to the field in matrix C with the largest position loss; i.e. in the example in the field which stems from a change in volatility of –25% and a 10% appreciation in the value of the EUR against the CHF.

It should be borne in mind that the exchange rate notation is relevant to the calculation of the scenario analysis matrices. For example, if EUR 1 is equivalent to USD 1.10, the exchange rate can either be expressed in the form of USD/EUR (1.1000) or in the form of EUR/USD (0.9091).[28] For example, according to the notation USD/EUR, the results for simulated exchange rate changes of ±10% are figures of 0.9900 (change of –10%) or 1.2100 (change of +10%). If, on the other hand, the notation EUR/USD is used for the matrix, the same simulation produces exchange rates of 0.8182 (–10% change) and 1.0000 (change of

[27] The implied depreciation in value amounts to 6.56%. In relation to the exchange rate changes relevant for the matrix, this is closest to the assumed 6.67% depreciation in the value of the EUR against the CHF.

[28] The forms used here are the "mathematical" notations. Some of the notation descriptions normally used both in practice and in other sections of this Circular may differ from these. Thus, the exchange rate between USD and CHF is normally recorded mathematically in the form CHF/USD, but is conventionally referred to as the USD/CHF exchange rate.

+10%), which correspond to figures of 1.0000 and 1.2222 respectively in the notation USD/EUR. These differ from the values calculated directly for the notation USD/EUR (0.9900 and 1.2100 respectively).
A given notation must be used for the scenario analysis for each currency pair. This may not be changed on the basis of opportunistic considerations.

Annex 9:

Example of the treatment of the capital adequacy calculation for forex forward contracts

Assumption: The trading book contains 2 currency positions:
Market data: USD/CHF exchange rate 1.45, USD interest rate 5%, CHF interest rate 2%
Spot: USD 1 million short position
Forward: Purchase of USD 1 million one year forward, USD/CHF forward rate 1.41

To calculate the net position for determining the currency risk, the USD forward long position must be discounted at the USD interest rate, offset against the corresponding USD spot short position and subsequently converted to CHF at the spot exchange rate. In the above example the resulting figure is CHF –69,048 (= USD –47,619 – CHF/USD 1.45).

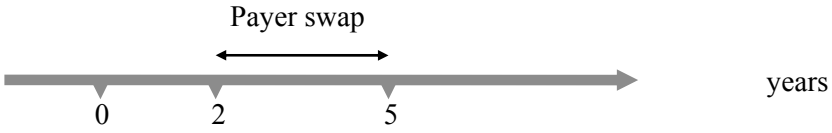
In addition, in order to provide capital to cover the risk of interest rate changes arising from the forward transaction, a USD 1 million long position in a USD government bond must be entered in the corresponding maturity band of the USD maturity ladder at its discounted value of USD 952,381 and a CHF 1.41 million short position in a CHF government bond must be entered in the corresponding maturity band of the CHF maturity ladder at its discounted value of CHF 1,382,353.

Annex 10:
Calculation of gamma and vega effects arising from swaptions

In principle, it is necessary to distinguish whether the maturity or duration method is used. In the following, the topic is explained on the basis of a long position in a swaption on a payer swap:

Where the maturity and the delta plus methods are used simultaneously, in order to determine the gamma and vega effects of a swaption, it is necessary to begin by replicating the swaps underlying the option. This replication results in two notional underlying instruments with differing maturities. The longer of the two maturities determines the assumed change in yield[29] used to calculate the gamma and vega effects.

The following example illustrates this:
A long position in a payer swaption expires in 2 years' time and has a swap term of 3 years from the maturity of the option. The swap rate is 6%.



As a long payer swap (or as a short receiver swap) pursuant to margin nos. 85-87, the underlying instrument of the option is represented by two positions in notional government bonds:

A. Long position in a 6% government bond with a residual term to maturity of 2 years
B. Short position in a 6% government bond with a residual term to maturity of 5 years

To calculate the capital required for the swaption, positions A and B should each be delta-weighted and assigned to their maturity bands pursuant to Table 1 in margin no. 101 (first maturity band of zone 2 or first maturity band of zone 3).

In addition, for the swap position a gamma effect must be calculated on the basis of the assumed change in yield for the 5 year maturity band (second maturity band of zone 3) in accordance with Table 3 in margin no. 112 and must be assigned[30] to this gamma effect maturity band:[31]

Gamma effect = $0.5 \cdot \Gamma \cdot VB^2 = 0.5 \cdot \Gamma \cdot (N \cdot \Delta r \cdot \Sigma d)^2$

Where:
N = nominal amount of the swap
Δr = assumed change in yield, according to Tab. 3 in margin no. 112
Σd = sum of the discount factors of the payment flows resulting from the swap

According to margin no. 183, only the negative net gamma effects are to be included in the calculation of the capital adequacy requirements for each category of underlying instrument pursuant to margin nos. 177-182. If the positive gamma effect shown in the example is the only one in its maturity band, it will thus be irrelevant for the calculation of the capital required.

[29] In accordance with Table 3 in margin no 112

[30] As an alternative, it is also permissible to apply the assignment to a maturity band in the same way as the calculation of the capital required for the delta equivalent. In our example, this would mean that the first (and not the second) maturity band of zone 3 would also be relevant. For the assumed change in yield Δr this would result in a figure of 0.75% (instead of 0.70%). If a bank decides on this alternative procedure, it must be applied consistently for all positions. A change of procedure based on opportunistic considerations is not permitted.

[31] The positions of the gamma effect maturity bands must not be offset with delta positions.

The vega effect defined as 0.25·υ volatility [see margin nos. 185-186] is assigned to the same maturity band as the gamma effect. Needless to say, it is not permissible to offset the two effects against each other.

If the duration method is used instead of the maturity method, this will not result in any significant differences in the example presented above. The only point to observe is that positions A and B – and the gamma and vega effect – must be assigned not on the basis of their residual terms to maturity, but on the basis of their (Macaulay) duration pursuant to table 3 in margin no.112.

Annex 11:

Options with foreign currency denominated exercise price

According to Art. 39 CAO in conjunction with margin nos. 132-136, the net position of a bank in a certain currency is obtained from various components. These include the delta equivalents of options positions.

In addition to any capital required for the currency position implied by the option's underlying instrument, a capital requirement must – under margin nos. 131-136 – also be calculated for the currency position resulting from the exercise price of the option. At the same time, the corresponding currency exposure must be regarded as the product of the option delta and the exercise price; the capital requirement amounts to 10% of this.

The following example is based on a long position in a call option on the SMI with an EUR-denominated exercise price:

Number:	10 (1 for 1 exercise ratio)
Option type:	European
Price of underlying instrument:	CHF 7,200
Exercise price:	EUR 4,400
EUR/CHF exchange rate:	1.60
Residual maturity:	12 months
SMI volatility:	25% p.a.
Risk-free CHF interest rate:	1% p.a.
Delta:	0.60052
Gamma:	0.00021
Vega:	2,780.72
Option price:	CHF 825.54

According to the delta plus procedure [see margin nos. 167-188] the capital required for the risks emanating from the option's underlying instrument is obtained from the sum of three components:

1. Delta effect:	CHF 4,324 = 10 · (0.08+0.02) · 0.60052 · CHF 7,200
2. Gamma effect:	CHF 0 = $\lvert$ min [CHF 0, 10 · 0.5 · 0.00021 · 1/CHF · (0.08 · CHF 7,200)^2] $\rvert$
3. Vega effect:	CHF 1,738 = 10 · 0.25 · CHF 2,780.72 · 0.25

In concrete terms, this results in a capital requirement of CHF 6,062. If the scenario analysis procedure [see margin nos. 189-199] were used instead of the delta plus procedure, on the basis of the matrix (matrix field determined by an 8% reduction in the price of the underlying instrument and a 25% reduction in volatility) this would result in a capital requirement of CHF 4,724 [= 10 · (CHF 825.54 – CHF 353.12)]. In addition to this, a separate requirement for the specific risk amounting to CHF 865 (= 10 · 0.02 · 0.60052 · CHF 7,200) would have to be calculated outside the scenario analysis matrix, resulting in a total capital adequacy requirement of CHF 5,589 (= CHF 4,724 + CHF 865) for the position using the scenario analysis procedure.

Over and above this, the foreign currency exposure implied by the EUR-denominated exercise price results in an additional capital requirement amounting to 10% of its delta-weighted exercise price; for the option position as a whole this corresponds to the sum of CHF 4,228:

Delta effect:	CHF –4,228 = EUR –2,642.29 = 10 · 0.1 · 0.60052 · EUR –4,400

If the underlying instrument and the exercise price of an option are denominated in one and the same currency – e.g. in the case of a call option on a foreign equity – then for the purposes of adequately recording the currency risk in economic terms the delta equivalent need not necessarily be factored in as a component

for calculating the net position in the corresponding foreign currency. For the purposes of keeping an adequate economic record, it is permissible to factor in the option price instead of the delta equivalent.[32]

The following example is based on a long position in a call option on a foreign equity index. Let us assume the position has the following characteristics:

Number:	1,000 (1 for 1 exercise ratio)
Option type:	European
Price of underlying instrument:	JPY 15,500
Exercise price:	JPY 13,000
JPY/CHF exchange rate:	1.20
Residual maturity:	12 months
Volatility:	25% p.a.
Risk-free interest rate:	1% p.a.
Delta:	0.80740249
Gamma:	$7.062 \cdot 10^{-5}$
Vega:	4,241.3155
Option price:	JPY 3,095.1144

If the capital required for the position is determined according to the delta plus procedure [see margin nos. 167-188], in terms of the risks directly resulting from the option it will be obtained from the sum of three components:

1. Delta effect:	JPY 1,251,474 = 1,000 · (0.08+0.02) · 0.80740 · JPY 15,500
2. Gamma effect:	JPY 0 = | min JPY [0, 1,000 · 0.5 · 0.00007 · 1/JPY · (0.08 · JPY 15,500)^2] |
3. Vega effect:	JPY 265,082 = 1,000 · 0.25 · JPY 4,241.32 · 0.25

The concrete result is a capital requirement of CHF 18,199 (= JPY 1,516,556 = JPY 1,251,474 + JPY 0 + JPY 265,082). If the scenario analysis procedure [see margin nos. 189-199] were used instead of the delta plus procedure, on the basis of the matrix (matrix field determined by an 8% reduction in the price of the underlying instrument and a 25% reduction in volatility) this would result in a capital requirement of CHF 14,886 [JPY 1,240,474 = 1,000– (JPY 3,095.1144 - JPY 1,854.6406)]. In addition to this, there would be a separate requirement for the specific risk amounting to CHF 3,004 (= JPY 250,295 = 1,000 · 0.02 · 0.80740 · JPY 15,500) to be calculated outside the scenario analysis matrix, which would result in a total capital requirement of CHF 17,890 (= CHF 14,886 + CHF3,004) for the position using the scenario analysis procedure.

In addition to these direct option-related risks, the foreign currency exposure is also subject to capital adequacy charges. A calculation following the wording of margin nos. 132-136 and Art. 39 CAO, and based on the delta equivalent would result in a capital adequacy requirement of CHF 2,422 (= JPY 201,851 = JPY 1,251,474 – JPY 1,049,623 = 1,000 · 0.1 · 0.80740 · JPY 15,500 – 1,000 · 0,1 · 0.80740 · JPY 13,000).

However, as the actual foreign currency exposure does not consist of the amount of the delta equivalent but of the amount of the position value, it is also permissible to calculate the capital required for the currency risk using the option price instead of the delta equivalent.

In this specific case, a sum of CHF 3,714 (= JPY 309,511 = 1,000 · 0.1 · JPY 3,095.1144) would be obtained as the capital requirement implied by the JPY long position.

[32] However, in this regard a bank must commit itself to one procedure for all options. It is explicitly not permissible to change procedure on the basis of opportunistic considerations.

Annex 12:
Notes on miscellaneous details

The following notes are based on issues which have been raised with the SFBC since the entry into force of market risk regulation.

1. Offsetting of interest rate risk positions

Margin no. 93 / margin nos. 98-115: In the procedures for calculating capital required for the general market risk, in contrast with that required for the specific risk, it is not permissible to offset different issues of the same issuer. Only positions originating from identical issues may be offset against each other and be incorporated in the maturity band or duration method as net positions.

2. Note on Tables 1 and 3

Owing to an error in the typesetting of Tables 1 (see margin no. 101) and 3 (see margin no. 112) in the version of SFBC Circular 97/1 "REM-EBK" published in SFBC Bulletin no. 34 reflecting the position as of December 31, 1997, the demarcation between various maturity bands is incorrect. The corresponding tables in the collection of Circulars are therefore to be used.

3. Categorization into coupons ≥3% and <3% for the maturity method

For positions with coupons ≥3% and <3% two separate maturity tables (maturity ladders) should not be prepared for each currency, but rather one per currency (see margin no. 99). However, allocation to the individual maturity bands within this table is based on various maturity-related criteria, depending on the coupon (see margin no. 100).

4. Terminological definition of the concept of "market value"

In this Circular (see in particular margin nos. 100 and 111), the term "market value" always refers to the economic value of a position and hence also includes accrued interest. For interest rate instruments, *"market value"* is thus not normally identical with the value quoted on the market or the listed value.

5. Treatment of equity futures

The interest rate risk of equity futures is to be taken into account in accordance with margin no. 124. Under margin nos. 132-136, in order to take account of any currency risks, the net forward position, as the present value of the net positions discounted with the current foreign currency interest rates and converted into CHF at the spot exchange rate, must be covered with capital.

6. Interest rate risk in relation to options on equity futures

In the case of options on equity futures or equity index futures, the interest rate risk of the underlying instrument may be disregarded for the purposes of calculating the capital required. Such options on equity futures transactions do not give rise to any interest rate risk which differs substantially from that of an option position on an equity instrument spot position. However, under the Swiss Bankers Association's "*Risk Management Guidelines for Trading and for the Use of Derivatives*" these risks must also of course be measured and monitored by the banks.

7. Interest rate risks of banking book positions

With regard to the recording of interest rate risk, the present Circular restricts itself to trading book positions (see margin no. 1). This restriction also of course applies to interest rate risks arising from gold, foreign currency or commodity positions in the banking book.

Consequently, the synthetic government bonds that need to be taken into account in the context of forward transactions in the trading book do not constitute market risk positions pursuant to Art. 68 para. 1 CAO. The present Circular does not therefore give rise to any capital requirement in respect of these.

For interest rate risks in the banking book, the provisions of SFBC Circular 99/1 "Interest rate risk" apply.

8. Concept of "Interest rate instruments" pursuant to Art. 46 para. 1 CAO

In principle, the term "interest rate instruments" pursuant to Art. 46 para. 1 CAO covers instruments for which interest rate risks are a prominent risk factor and which entail issuer-specific risks. For example, while interest rate swaps and fixed-interest mortgages are generally referred to as interest instruments, they are not dealt with in Art. 46 para. 1 CAO for the purposes of capital adequacy requirements. However, like caps, floors or interest rate futures, an interest rate swap also harbors no issuer-specific risk since there is no issuer and they can therefore be weighted at 0%.

A fixed-interest mortgage does not involve any issuer-specific risk either, but it must be covered according to the requirements for credit risk (Art. 58 and Annex 4 CAO).