



OESTERREICHISCHE NATIONALBANK

GUIDELINES ON MARKET RISK
VOLUME 6

Other Risks Associated with
the Trading Book



Guidelines on Market Risk

**Volume 1: General Market Risk of Debt Instruments
2nd revised and extended edition**

Volume 2: Standardized Approach Audits

Volume 3: Evaluation of Value-at-Risk Models

Volume 4: Provisions for Option Risks

Volume 5: Stress Testing

Volume 6: Other Risks Associated with the Trading Book

Published and produced by:

Oesterreichische Nationalbank

Editor in chief:

Wolfdietrich Grau

Author:

Financial Markets Analysis and Surveillance Division

Translated by:

Foreign Research Division

Layout, design, set, print and production:

Printing Office

Internet:

<http://www.oenb.at>

Paper:

Salzer Demeter, 100% woodpulp paper, bleached without chlorine, acid-free, without optical whiteners.

DVR 0031577

The second major amendment to the Austrian Banking Act, which entered into force on January 1, 1998, faced the Austrian credit institutions and banking supervisory authorities with an unparalleled challenge, as it entailed far-reaching statutory modifications and adjustments to comply with international standards.

The successful implementation of the adjustments clearly marks a quantum leap in the way banks engaged in substantial securities trading manage the associated risks. It also puts the spotlight on the importance of the competent staff's training and skills, which requires sizeable investments. All of this is certain to enhance professional practice and, feeding through to the interplay of market forces, will ultimately benefit all market participants.

The Oesterreichische Nationalbank, which serves both as a partner of the Austrian banking industry and an authority charged with banking supervisory tasks, has increasingly positioned itself as an agent that provides all market players with services of the highest standard, guaranteeing a level playing field.

Two volumes of the six-volume series of guidelines centering on the various facets of market risk provide information on how the Oesterreichische Nationalbank appraises value-at-risk models and on how it audits the standardized approach. The remaining four volumes discuss in depth stress testing for securities portfolios, the calculation of regulatory capital requirements to cover option risks, the general interest rate risk of debt instruments and other risks associated with the trading book including default and settlement risk.

These publications not only serve as a risk management tool for the financial sector, but are also designed to increase transparency and to enhance the objectivity of the audit procedures. The Oesterreichische Nationalbank selected this approach with a view to reinforcing confidence in the Austrian financial market and – against the backdrop of the global liberalization trend – to boosting the market's competitiveness and buttressing its stability.

Gertrude Tumpel-Gugerell

Vice Governor

Oesterreichische Nationalbank

Today, the financial sector is the most dynamic business sector, save perhaps the telecommunications industry. Buoyant growth in derivative financial products, both in terms of volume and of diversity and complexity, bears ample testimony to this. Given these developments, the requirement to offer optimum security for clients' investments represents a continual challenge for the financial sector.

It is the mandate of banking supervisors to ensure compliance with the provisions set up to meet this very requirement. To this end, the competent authorities must have flexible tools at their disposal to swiftly cover new financial products and new types of risks. Novel EU Directives, their amendments and the ensuing amendments to the Austrian Banking Act bear witness to the daunting pace of derivatives developments. Just when it seems that large projects, such as the limitation of market risks via the EU's capital adequacy Directives CAD I and CAD II, are about to draw to a close, regulators find themselves facing the innovations introduced by the much-discussed New Capital Accord of the Basle Committee on Banking Supervision. The latter document will not only make it necessary to adjust the regulatory capital requirements, but also require the supervisory authorities to develop a new, more comprehensive coverage of a credit institution's risk positions.

Many of the approaches and strategies for managing market risk which were incorporated in the Oesterreichische Nationalbank's Guidelines on Market Risk should – in line with the Basle Committee's standpoint – not be seen as merely confined to the trading book. Interest rate, foreign exchange and options risks also play a role in conventional banking business, albeit in a less conspicuous manner.

The revolution in finance has made it imperative for credit institutions to conform to changing supervisory standards. These guidelines should be of relevance not only to banks involved in large-scale trading, but also to institutions with less voluminous trading books. Prudence dictates that risk – including the "market risks" inherent in the bank book – be thoroughly analyzed; banks should have a vested interest in effective risk management. As the guidelines issued by the Oesterreichische Nationalbank are designed to support banks in this effort, banks should turn to them for frequent reference. Last, but not least, this series of publications, a key contribution in a highly specialized area, also testifies to the cooperation between the Austrian Federal Ministry of Finance and the Oesterreichische Nationalbank in the realm of banking supervision.

Alfred Lejsek
Director General
Federal Ministry of Finance

Preface

This guideline presents a discussion of the so-called other risks as laid down in the capital adequacy Directive and, providing a set of examples, attempts to elucidate the methodology used to calculate the regulatory capital requirement for the trading book.

Section 1 provides an overview of the legal framework and describes the procedures used to compute the regulatory capital required to back the individual risks subsumed under other risks on the basis of the standardized approach.

Section 2 presents numerous examples and pays particular attention to the way in which the counterparty risk has to be accounted for in the case of over-the-counter (OTC) derivative instruments.

The author would like to extend thanks to Gerhard Coosmann, Annemarie Gaal and Ronald Laszlo for their comments, discussions and the valuable suggestions they provided. Special thanks are due to the head of the division, Helga Mramor, who promoted the production of this series of guidelines on market risk.

Vienna, September 1999

Manfred Plank

Table of Contents

1	Legal Framework	1
1.1	Underwritings	1
1.2	Settlement Risk.....	2
1.3	Free Deliveries.....	4
1.4	Repurchase Agreements and Reverse Repurchase Agreements / Securities Lending and Securities Borrowing	5
1.5	Default Risk	7
1.5.1	Regulatory Capital Requirement against the Default Risk of Shares in Domestic and Foreign Mutual Funds	7
1.5.2	Regulatory Capital Requirement against the Default Risk of Other Positions ..	8
1.5.3	Regulatory Capital Requirement against the Default Risk of OTC Derivative Instruments	9
2	Examples	13
3	Bibliography	23

1 Legal Framework

Credit institutions which are obligated to calculate the required regulatory capital for their trading book in accordance with the provisions of § 22b para 1 Banking Act, must, beside the general and specific position risk associated with debt instruments and stocks and the risks associated with options also provide regulatory capital backing against the so-called other risks. The term other risks where it relates to the capital adequacy Directive denotes those risks arising from underwritings of debt instruments and stocks, the partial settlement of transactions contained in the trading book and potential counterparty default. These provisions stipulate additional regulatory capital requirements to cover the risks associated with underwritings and the settlement, delivery and counterparty risk.

1.1 Underwritings

By underwriting a financial obligation, a credit institution enters a legally binding commitment vis-à-vis an issuer or a third party (e.g. within the context of a syndicate) to place a defined quantity of securities at a previously agreed price with investors or to record this quantity in its own trading book at the preset price. The credit institution thus incurs the placement risk, which consists in the fact that the credit institution may not be able to place the entire volume of securities underwritten in the agreement with investors. When speaking of underwritings, we differentiate between private placements and underwriting guarantees furnished within the context of a public offering. As underwritings are typical for the business of investment firms, securities purchased within the context of an underwriting agreement always have to be allocated to the trading book.

In the case of private placements, the credit institution must include the remaining net position, i.e. the part of the underwritten securities that has not been taken over by third parties on the basis of written agreements, in its trading book. This net position thus becomes subject to the provisions relating to regulatory capital requirements against the general and specific position risk of the trading book and consequently must be treated in a similar manner as any ordinary long position in debt instruments or stocks. Since the securities are not listed on a stock exchange in the case of private placements, there is no current stock price on which to base the valuation of such a position. Hence, this type of security must be valued taking recourse to current market data and suitable valuation models. The same applies for public offerings up to working day zero. The agreed on underwriting price may be used only in exceptional cases, because this price fails to reflect the risk of market changes.

By contrast to private placements, underwriting guarantees for public offerings as defined by § 1 para 2 item 1 Capital Market Act require the remaining net position to be multiplied by one of the following weighting factors:

Day on which the underwriting guarantee is furnished to working day zero ¹	5%
working day one ²	10%
working day two and three	25%
working day four	50%
working day five	75%
as of working day six	100%

By weighting the net position over the first five working days with weights of less than 100%, we account for the fact that securities continue to be sold also after the end of the subscription period. Each long position is reduced by the weighting of the net position, a procedure which applies to both the general and the specific position risk as well as for determining the long position to limit large investments. This exception for underwriting guarantees within the scope of a public offering is designed as an incentive for the business community to use the capital market for raising money.

In order to calculate the general and specific position risk, we only have to take into account the net position that has been weighted in this manner. If a security has been listed on one or more exchanges at the time of the initial public offering, the weighted net position allocated to the trading book must be valued using the current stock exchange price, or, if no stock exchange price is available, the security must be valued on the basis of current market data and using suitable valuation models. The prearranged underwriting price should be used only in exceptional cases because it does not reflect the risk resulting from changes in the market.

1.2 Settlement Risk

The settlement risk incurred by a credit institution consists in the fact that a delay in the settlement of the transaction caused by the counterparty may give rise to a trading loss, because the market value of the underlying trade may change to the disadvantage of the credit institution in the meantime. Assuming that the counterparty defaults and the difference between the current market value and the agreed settlement price changes to the disadvantage of the credit institution, the initially agreed transaction represents a positive value for the institution and its substitution would translate into a profit for the institution. Hence, it is the size of the institution's potential loss position that constitutes the assessment basis for calculating the settlement risk. This loss position is calculated by determining the difference between the agreed-on settlement price and the current market price (provided this difference is to the disadvantage of the credit institution) of the security that has not yet been delivered or received.

¹ In the case of public offerings of one-off issues, working day zero is the last day of the subscription period.

² The commitment of the credit institution to accept a known quantity of securities at an agreed price is known from working day one.

The regulatory capital requirement against the settlement risk of debt instruments and equities, excepting repurchase agreements and securities lending, which are discussed separately in section 1.4, is calculated by multiplying the assessment basis by a weighting factor, the size of which depends on the number of days that have passed since the agreed settlement date. Please note that a simplified procedure may be applied as from 46 working days after the due date.

Procedure 1:

The credit institution calculates the difference between the current market price and the agreed settlement price for every single security to which the settlement risk is applicable. The regulatory capital requirement then results as the total of all positive differences weighted with the appropriate factors as shown in table I below. Offsetting against profits from other securities transactions effected with or without delay – even if transacted with the same contracting party – is not permitted.

Weighting factors for procedure 1 - settlement risk

Number of working days after the agreed due date	Weighting factor
0 to 4	0%
5 to 15	8%
16 to 30	50%
31 to 45	75%
46 and more	100%

Table 1

Procedure 2 (simplified procedure):

The regulatory capital requirement for securities transactions that are still unsettled within a period of 45 working days as of the agreed due date is calculated by weighting the agreed settlement price with the appropriate factors shown in the table below. As from 46 working days after the due date, the regulatory capital requirement must always be calculated in line with procedure 1.

Weighting factors for procedure 2 - settlement risk

Number of working days after the agreed due date	Weighting factor
0 to 4	0%
5 to 15	0.5%
16 to 30	4%
31 to 45	9%
46 and more	procedure 1

Table 2

If the regulatory capital requirement is calculated according to procedure 2, regulatory capital backing must be provided even if the market price of the security has changed in favor of the credit institution after the conclusion of the transaction.

At this point it is worth noting that the lawmaker, once the credit institution has determined which procedure it wants to apply, permits a change of procedure only from procedure 2 to procedure 1, but not vice versa. Moreover, the selected procedure must be indicated in the credit institution’s monthly report.

The regulatory capital requirement against the settlement risk is not applicable if the credit institution can furnish proof that the hypothetical losses resulting from the default in delivery by the counterparty have been realized by purchasing a substitute for the security on the market. This situation occurs, for example, if the credit institution purchases a security in order to be able to meet an existing obligation to deliver the security at a specific date. If the counterparty fails to deliver, the credit institution is compelled to buy the equity on the market in order to meet its obligations. If the price has risen in the meantime, this purchase is tantamount to a loss realization by means of the replacement transaction. Provided there is a definite link between the two transactions – purchase of a security with delayed delivery and replacement transaction – the obligation to provide regulatory capital backing ends with the date of the replacement purchase.

1.3 Free Deliveries

The risk associated with free deliveries differs from the settlement risk in so far as in the latter case the credit institution has not yet made any payment or delivery, whereas the free delivery risk relates to trading activities in the context of which the credit institution already made a payment or delivery, but the payment or delivery due from the counterparty is still outstanding. Hence, there is the risk that the unilaterally made payment or delivery is forfeited in case of a

default of the counterparty. For this reason, free deliveries are subject to the risk weighting of the counterparty pursuant to § 22 Banking Act.

Within the meaning of § 22m Banking Act, free deliveries exist once the credit institution has paid for securities before receiving them or has delivered securities before receiving payment for them and one or more days have elapsed since the payment or delivery. To calculate the number of days elapsed we have to start out from the value date of the respective transaction. The regulatory capital requirement is the product of the current market value of the delivered securities or the pre-payment made, the counterparty risk weighting pursuant to § 22 Banking Act and 8%.

The settlement risk and the free delivery risk may occur simultaneously. This is the case if a transaction has not been settled in due time and one of the two contracting parties has executed a free delivery. In this case regulatory capital backing must be provided both against the settlement risk (from the fifth day onwards) and the free delivery risk.

1.4 Repurchase Agreements and Reverse Repurchase Agreements / Securities Lending and Securities Borrowing

Transactions based on securities in the trading book and having as their subject matter the transfer of securities included in the trading book by the credit institution to a third party for a defined period of time and against payment of an amount of money or provision of a collateral (e.g. collateral in cash or in securities) are considered as repurchase or reverse repurchase agreements or securities lending or borrowing transactions based on securities included in the trading book. For the purpose of calculating the regulatory capital requirement against the default risk of the above transactions, we need not differentiate between transactions providing for payments and repayments (repurchase and reverse repurchase agreements) and transactions providing for an exchange and re-exchange (securities lending and borrowing) of securities, because the risk situation is very much the same for these two types of deals.

In the case of repurchase agreements and securities lending (if the latter involves securities included in the trading book, the law requires that a risk-dependant collateral is set up, which in the initial stage of the transaction exceeds the market value of the lent securities), under which the credit institution lends securities to a third party and in return receives a certain amount of money or a collateral, the regulatory capital requirement against the default risk is calculated in two steps:

1. Calculation of the current amount of excess collateral

The current amount of excess collateral equals the current market value (including accrued interest, if any) of the securities lent to the counterparty minus the amount of money received or the current market value (including accrued interest, if any) of the collateral received.

2. Regulatory capital requirement against the default risk

Negative amounts of excess collateral remain out of account.

The regulatory capital requirement equals the positive amounts of excess collateral multiplied by the counterparty risk weighting according to § 22 Banking Act multiplied by 8%.

In the case of reverse repurchase agreements and securities borrowing, under which the credit institution borrows securities from a third party and in return furnishes the third party with a specific amount of money or a collateral, the regulatory capital requirement against the default risk is determined as follows:

1. Calculation of the current amount of excess collateral

The current amount of excess collateral equals the amount of money lent to the counterparty (including accrued interest, if any) by the credit institution or the collateral furnished minus the current market value (inclusive of accrued interest, if any) of the securities received.

2. Regulatory capital requirement against the default risk

Negative amounts of excess collateral remain out of account.

The regulatory capital requirement equals the positive amount of excess collateral multiplied by the counterparty risk weighting pursuant to § 22 Banking Act multiplied by 8%.

Note

Positive amounts of excess collateral guaranteed by a central government, a central bank of Zone A, a recognized exchange or a recognized clearing agent need not be included in the calculations for determining the regulatory capital requirements against the default risk.

In the case of repurchase agreements, the specific type of default risk depends on whether the agreement in question is a genuine sale and repurchase transaction or whether the transaction relates to a sale with an option to repurchase.

In the case of a genuine sale and repurchase agreement (the transferee undertakes to return the assets transferred upon him by the transferor against payment of an amount of money), a counterparty default risk exists both for the transferee and the transferor: For the institution that transfers the assets, the default risk consists in the possibility that the counterparty fails to return

the asset as agreed or that the amount of money or the value of the collateral received at the outset of the transaction fails to cover the market value of the asset. For the institution to which the asset was transferred, the default risk consists in the possibility that the transferor fails to pay the agreed amount of money upon retransfer of the asset or fails to return the collateral furnished or the value of the asset retained by the institution fails to provide full coverage.

In the case of a sale with an option to repurchase (the transferee is entitled, but not obliged to retransfer the assets transferred to him or her against payment of an amount of money), by contrast, only the counterparty default risk incurred by the transferee has to be taken into account. The transferor, in this case, is subject to the risk of a price change (risk of price loss of the asset, which the transferor must take back on request of the transferee), but not to the counterparty default risk.

In the case of repurchase agreements, securities lending, reverse repurchase agreements and securities borrowing based on securities included in the trading book, the law stipulates that regulatory capital backing must be provided not only against the default risk, but also against the general and specific position risk of the securities transferred or the amounts of money or collateral received in return; this provision applies independently of whether they are shown in the balance sheet of the counterparty or not.

1.5 Default Risk

1.5.1 Regulatory Capital Requirement against the Default Risk of Shares in Domestic and Foreign Mutual Funds

For calculating the regulatory capital requirement for shares of domestic and foreign mutual funds pursuant to § 5 para 1 and § 24 para 1 Investment Fund Act, the general and specific position risk remains out of account; in this case, only the regulatory capital requirement against the credit risk must be taken into account in accordance with the provisions of the solvency ratio Directive.

In accordance with the solvency ratio Directive, a weighting of 100% is generally applicable to shares in mutual funds, except if these shares convey a title of co-ownership. The regulatory capital requirement against such funds can be calculated on the basis of two procedures:

Procedure 1

The regulatory capital requirement for each individual financial instrument contained in the fund's assets is determined in accordance with the provisions of the solvency ratio Directive. The mutual fund's regulatory capital requirement is then calculated by striking the total of the individual regulatory capital requirements thus determined. If the regulatory capital backing of a mutual fund is calculated in accordance with this procedure, it must be recalculated daily, taking into account the current composition of the fund.

Procedure 2

The investment limits pursuant to the fund's management regulations are multiplied by the risk weightings allocated to them. In this case, the assessment basis is the total of the risk-weighted investment limits multiplied by the current market value of the mutual fund. The regulatory capital requirement is 8% of the assessment basis calculated in this way.

1.5.2 Regulatory Capital Requirement against the Default Risk of Other Positions

Other positions of the trading book in connection with the trade in financial instruments pursuant to § 2 No 35 lit f Banking Act are, in particular, exposures in the form of fees, commissions, interest, dividends and margins on exchange-traded futures and options contracts. If these positions are not taken into account in calculating the regulatory capital requirement against the general and specific position risk, they must be backed by own funds in accordance with the solvency ratio Directive.

As the trading book must generally be valued on the basis of current market conditions and the current market prices also constitute the basis for calculating the general and specific position risk, interest and dividends need not be backed separately in accordance with the solvency ratio Directive. Current bond prices include all future interest payments as well as all interest accrued. Current stock prices include future dividend payments.

As to fees, commissions and margins on exchange-traded futures and options contracts, the assessment basis for the regulatory capital requirement is calculated by multiplying the fees, commissions and margins with the appropriate risk weighting.

1.5.3 Regulatory Capital Requirement against the Default Risk of OTC Derivative Instruments

In the case of OTC derivative instruments included in the trading book, regulatory capital backing must be provided both against the general and the specific position risk and the counterparty default risk. In this case the law stipulates that all credit institutions to which § 22b para 2 Banking Act is not applicable must calculate the regulatory capital requirement against the counterparty default risk of OTC derivative instruments – *including instruments contained in the banking book* - exclusively on the basis of the marking to market approach. Hence, these institutions do not have the choice between the marking to market and the original exposure approach.

Marking to market approach

The marking to market approach starts out from the assumption that the credit risk of OTC derivatives consists of two components, which are found by answering the following two questions:

- I. What are the costs that would arise if, due to counterparty default, the credit institution were compelled to repurchase the derivative in question under current market conditions?
- II. What are the additional costs arising if the counterparty were to default at a later point in time but prior to the derivative's maturity?

The answers to these questions are:

I. Current replacement cost (repurchasing cost)

Assuming that the counterparty defaults today, the credit institution is compelled to replace the contract at current market conditions. The replacement cost can be exactly calculated from today's point of view. Should no liquid market exist for a contract, we have to compute the theoretical market value on the basis of current market parameters using appropriate valuation models. Only positive replacement costs are taken into account for calculating the required regulatory capital. Generally it is not allowed to offset positive and negative replacement costs against each other (except in the case of netting agreements recognized as such by the competent supervisory authority).

II. Potential additional cost in the event of default

In the event that the counterparty defaults on the contract at a future point in time, the current replacement costs would be increased by the costs that may arise due to possible unfavorable market movements up to that point of time. These costs cannot be exactly determined from today’s point of view, but have to be estimated. The potential additional default costs that must be taken into account for calculating the regulatory capital backing are computed by multiplying the *effective* nominal value of the contract with the appropriate percentage listed in the following table. If the replacement costs of a contract depend on price changes in different categories, the contract must be allocated to the category with the highest applicable percentage as shown in the following table.

The potential additional default costs must always be calculated, regardless of whether the current replacement costs are a positive or a negative figure.

Weighting factors for determining the markup for the potential future credit risk

Time to maturity of the contract	Interest rate contracts	Foreign exchange and gold contracts	Stock contracts	Precious metal contracts except gold	Commodities contracts (No 6, Annex 2 Banking Act)
1 year or less	0%	1%	6%	7%	10%
more than 1 year but less than 5 years	0.50%	5%	8%	7%	12%
more than 5 years	1.50%	7.50%	10%	8%	15%

Table 3

The regulatory capital requirement for OTC derivative instruments is then calculated as follows:

$$8\% \times \text{counterparty risk weighting} \times (\text{positive replacement cost} + \text{potential additional default cost})$$

Note

The risk weighting allocated to the counterparty is never more than 50%.

For the purpose of calculating the potential additional default costs, we must in a first step determine the *effective* nominal amount. The concept of the effective nominal amount is important because swaps may include swaps on stocks and stock indices as well as on commodities, in which case the payments under the swap are not necessarily coupled to a fixed amount, but rather to an amount that may vary in the course of time. Moreover, in this category we increasingly find types of swaps whose formula for calculating the payments under the swap allows for an artificial reduction of the contractually fixed nominal amounts (e.g. so-called multiplier swaps, which at a comparatively low nominal amount require swap payments of a size several times the size of the actual current market interest rate and which therefore largely correspond to swaps with swap payments at the respective market interest rate on a substantially higher nominal amount).

In the case of a swap contract providing for payments on the reference asset at several points of time during the time to maturity, the nominal amount consists of the total of the payments still to be swapped.

In the case of transactions under which the counterparty undertakes to fulfill the claims and obligations outstanding at specific payment dates, whereupon the contract terms are fixed again so that the market value of the contract at the respective point in time is zero, the time to maturity is the time to the next payment date. In the case of interest-rate contracts with this type of structure and a time to maturity of more than one year, a weighting of no less than 0.5% must be allocated to the effective nominal amounts.

In the case of basis swaps in a single currency and interest adjustment periods of up to six months, no markup for potential future default risk needs to be taken into account.

2 Examples

Risk on underwritings

Non-public offers

Within the context of a non-public offer, a bank underwrites 10,000 stocks at a underwriting price of EUR 100 per share.

General and specific stock price risk on underwritings of private placements (EUR values)

Days from furnishing the underwriting	Take over guaranteed by third parties (No. of shares)	Mark to Model	Net position (No. of shares)	Specific stock price risk	General stock price risk
1	5,000	99	5,000	19,800	39,600
2	6,500	98	3,500	13,720	27,440
3	6,500	101	3,500	14,140	28,280
4	8,000	100	2,000	8,000	16,000
5	9,000	103	1,000	4,120	8,240
6	9,500	104	500	2,080	4,160
7	9,500	102	500	2,040	4,080
8	10,000	102	0	0	0

Table 4

Public offers

A bank underwrites 10,000 stocks at a underwriting price of EUR 100 per share within the context of a public offer. The subscription period ends in two days.

General and specific stock price risk on underwritings of private placements (EUR values)

Days from end of subscription period	Take over guaranteed by third parties	Market price	Weighting	Net position (No. of shares)	Specific stock price risk	General stock price risk
-1	5,000	99	0.05	250	990	1,980
0	6,500	98	0.05	175	686	1,372
1	6,500	101	0.1	350	1,414	2,828
2	8,000	100	0.25	500	2,000	4,000
3	9,000	103	0.25	250	1,030	2,060
4	9,500	104	0.5	250	1,040	2,080
5	9,500	102	0.75	375	1,530	3,060
6	9,900	102	1	100	408	816

Table 5

The specific stock-price risk is 4%³ of the unweighted or weighted net position and the general stock-price risk is 8% of the unweighted or weighted net position.

If the underwritten securities are debt instruments rather than stocks, the procedure is applied analogously, the specific and the general position risk being calculated pursuant to § 22g and § 22h Banking Act.

Settlement risk

The credit institution has purchased 500 shares of company A at a price of EUR 200 per share, 1,000 shares of company B at a price of EUR 180 per share as of August 3, 1999, and a bond A of a face value of EUR 1,000,000 and a price of 102.32 (including accrued interest) as of August 15, 1999. Moreover, the credit institution has acquired 500 shares of company C at a price of EUR 145 as of May 5, 1999, and a bond B of a face value of EUR 2,000,000 at price of 99.78 (including accrued interest) as of July 15, 1999. The business partners defaulted on the agreed delivery dates. On August 24, 1999, the stock A had a market value of EUR 180, stock B had a market value of EUR 220, stock C had a market value of EUR 170, bond A had a price of 103,78 (including accrued interest), and bond B had a price of 98,24 (including accrued interest). The regulatory capital requirement to cover the loss risks due to the delayed settlement of the transactions calculated in accordance with procedure 1 and procedure 2 can be read from the following tables.

This percentage is reduced to 2% for stocks that meet all conditions listed under § 22i para 1 No 1 to 5 Banking Act.

Regulatory capital requirement against the settlement risk according to procedure 1 (EUR values)

Securities	Agreed settlement price	Agreed settlement date	Current market price on 24.8.99	Potential loss/profit	Weighting factor	Regulatory capital requirement
500 A stocks	200	03.08.99	180	10,000	0.5	0
1,000 B stocks	180	03.08.99	220	-40,000	0.5	20,000
500 C stocks	145	05.05.99	170	-12,500	1	12,500
1 m of bond A	102.32	15.08.99	103.78	-14,600	0.08	1,168
2 m of bond B	99.78	15.07.99	98.24	30,800	0.75	0

Table 6

Regulatory capital requirement against the settlement risk according to procedure 2 (EUR values)

Securities	Agreed settlement price	Agreed settlement date	Current market price on 24.8.99	Potential loss/profit	Weighting factor	Regulatory capital requirement
500 A stocks	200	03.08.99	180	10,000	0.04	4,000
1,000 B stocks	180	03.08.99	220	-40,000	0.04	7,200
500 C stocks	145	05.05.99	170	-12,500	procedure 1	12,500
1 m of bond A	102.32	15.08.99	103.78	-14,600	0.005	5,116
2 m of bond B	99.78	15.07.99	98.24	30,800	0.09	179,604

Table 7

According to procedure 2, the current stock exchange prices remain out of account for the first 45 days. From the 46th day onward, procedure 1 must be applied and hence the current stock exchange prices enter the calculation of the regulatory capital requirement.

Free deliveries

- On August 1, the bank A purchases 3,000 items of a specific stock at a price of EUR 500 per share from the OECD bank. Value date is August 3. On August 3, bank A effects the payment as agreed, however, bank B fails to deliver the stocks. On August 6, delivery has still not been effected, whereas the stock price has moved to EUR 560 by this date. The interest rate for call money is at 3%.

The regulatory capital requirement is calculated as follows:

$$\text{EUR } 3,000 \times 500 \times (1 + 0.03 \times 3/360) \times 0.20 \times 0.08 = \text{EUR } 24,006$$

- On August 1, bank A sells a bond with a face value of EUR 1,000,000 at a price of 101.12 (including accrued interest) to a company. Value date is August 3. On August 3, bank A delivers the bond as agreed, however, the company fails to pay the agreed amount. On August 6, the payment has still not been effected; the bond price is 100.89 (including accrued interest) on this date.

The regulatory capital requirement is calculated as follows:

$$\text{EUR } 10,000 \times 100.98 \times 1.00 \times 0.08 = \text{EUR } 80,712$$

Note

In the above examples, no regulatory capital backing against the settlement risk is required, because less than five days have elapsed since the agreed delivery date.

Settlement risk and free delivery risk cumulated

- On August 1, bank A purchases 3,000 shares of a specific stock at a price of EUR 500 per share from the OECD bank. Value date is August 3. On August 3, bank A effects the payment as agreed, however, bank B fails to deliver the stock. On August 29, the delivery has still not been effected, and the stock price has moved to EUR 590 by this date. The interest rate for call money is 3%.

The regulatory capital requirement is calculated as follows:

Free delivery:

$$\text{EUR } 3,000 \times 500 \times (1 + 0.03 \times 26/360) \times 0.20 \times 0.08 = \text{EUR } 24,052$$

Settlement risk:

Procedure 1:

$$\text{EUR } 3,000 \times (590 - 500) \times 0.5 = \text{EUR } 135,000$$

Procedure 2 (Simplified procedure):

$$\text{EUR } 3,000 \times 500 \times 0.04 = \text{EUR } 60,000$$

The cumulative regulatory capital requirement thus amounts to EUR 159,052 or EUR 84,052, depending on whether the settlement risk is calculated in accordance with procedure 1 or procedure 2.

- On August 1, the bank A sells a bond with a face value of EUR 1,000,000 at the price of 101.12 (including accrued interest) to a company. Value date is August 3. On August 3, the bank delivers the bond as agreed, however, the company fails to pay the agreed amount of

money. On August 29, the payment has still not been effected, while the bond price has in the meantime moved to 99.89 (including accrued interest).

The regulatory capital requirement is calculated as follows:

Free delivery:

$$\text{EUR } 10,000 \times 99.89 \times 1.00 \times 0.08 = \text{EUR } 79,912$$

Settlement risk:

Procedure 1:

$$\text{EUR } 10,000 \times [-99.89 - (-101.12)] \times 1.00 \times 0.08 = \text{EUR } 984$$

Procedure 2:

$$\text{EUR } 10,000 \times 101.12 \times 0.04 = \text{EUR } 40,448$$

The cumulative regulatory capital requirement consequently amounts to EUR 80,896 or EUR 120,360, depending on whether the settlement risk is calculated in accordance with procedure 1 or procedure 2.

Repurchase agreements and securities lending

A credit institution A of Zone A concludes the following repurchase agreements with a credit institution B, which does not belong to Zone A.

Repurchase agreement with a maturity of 7 days

Transferor: credit institution A

Transferee: credit institution B

On August 1, the credit institution A lends Austrian federal bonds of a face value of EUR 10 million (5% coupon, time to maturity 4.5 years) to credit institution B and in return receives a cash payment in the amount of EUR 10 million. On August 1, the bond's (clean) price is 102.34. By August 4, the bond's market value has moved to 102.65 and interest accrued amounts to EUR 250,000. The interest accrued on the payment made amounts to EUR 84,000 on this date. The regulatory capital requirement to cover the default risk of each of the two credit institutions as of August 4 can be read from the following tables:

Regulatory capital requirement for repurchase agreements and securities lending (credit institution A)

	Market value receivables	Market value collateral	Current excess amount	Reg. capital requirement default risk
Genuine sale and repurchase agreement	10,515,000	10,084,000	431,000	34,480
Sale with option to repurchase	10,515,000	10,084,000	431,000	according to section 1.5

Table 8

Regulatory capital requirement on repurchase agreements and securities lending (credit institution B)

	Market value collateral	Market value receivables	Current excess amount	Reg. capital requirement default risk
Genuine sale and repurchase agreement	10,515,000	10,084,000	-431,000	0
Sale with option to repurchase	10,515,000	10,084,000	-431,000	according to section 1.5

Table 9

Note

Apart from the default risk, repurchase agreements and securities lending also require regulatory capital backing against the general and specific position risk.

Shares in mutual funds

The trading book of a credit institution contains a mutual fund negotiating co-ownership with a current market value of EUR 1.43 million. According to the management regulations, the fund's holdings may not exceed a maximum of 20% in stocks of non-banks, a maximum of 30% in stocks of OECD banks and a maximum of 50% of fixed-interest bearing bonds of central governments of Zone A. Currently the fund is composed of 30% stocks of OECD banks, 10% stocks of non-banks and 40% fixed-interest bearing bonds of central governments of Zone A. The remainder of 20% are cash holdings. The regulatory capital requirement for mutual funds in accordance with the two procedures is calculated as follows:

Procedure 1:

$$0.08 \times (0.1 \times 1 + 0.3 \times 0.2 + 0.4 \times 0 + 0.2 \times 0) \times \text{EUR } 1.43 \text{ m} = \text{EUR } 18,304$$

Procedure 2:

$$0.08 \times (0.2 \times 1 + 0.3 \times 0.2 + 0.5 \times 0) \times \text{EUR } 1.43 \text{ m} = \text{EUR } 29,744$$

Note

In the event the fund contains derivative instruments, these must be treated according to procedure 1 as described in 1.5.3.

Other positions

A credit institution has receivables in the form of margins on exchange traded forwards and options in the amount of EUR 100,000 vis-à-vis a recognized stock exchange. The regulatory capital requirement for these receivables is calculated as follows:

$$0.08 \times 0.2 \times \text{EUR } 100.000 = \text{EUR } 1,600$$

OTC derivatives/FRAs

A credit institution, whose domestic currency is the EUR, holds the following three FRAs in its trading book:

- 6 against 9 months EUR denominated FRA with a face value of EUR 10 million, a time to maturity of 8 months and a current positive market value of EUR 5,000; the counterparty is an OECD bank.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.2 \times \text{EUR}(5,000 + 0 \times 10 \text{ m}) = \text{EUR } 80$$

- 3 against 6 months USD denominated FRA with a face value of USD 10 m, a term to maturity of 5 months and a current positive market value of USD 8,000; the counterparty is a corporate body.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.5 \times \text{USD } (8,000 + 0.01 \times 10 \text{ m}) = \text{USD } 4,320$$

Note

The replacement cost to be borne by the credit institution depends on the change in USD interest rates and the exchange rate USD/EUR. Therefore, the highest percentage rate of all risk categories must be used to calculate the markup factor. In the present case this would be the percentage rate against the exchange-rate risk rather than the percentage rate against the interest-rate risk.

- 12 against 15 months JPY denominated FRA with a face value of JPY 100 million, a time to maturity of 13 months and a current negative market value of JPY –3,000; the counterparty is an OECD bank.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.2 \times \text{JPY} (0 + 0.05 \times 100 \text{ m}) = \text{JPY } 80,000$$

Note

The replacement cost to be borne by the credit institution depends on the change in JPY interest rates and the exchange rate JPY/EUR. Therefore, the highest percentage rate of all risk categories must be used to calculate the markup factor. In the present case this would be the percentage rate against the exchange-rate risk rather than the percentage rate against the interest-rate risk.

The foreign-currency amounts obtained must then be converted into EUR on the basis of the current exchange rate.

OTC derivatives/ swaps

A credit institution whose domestic currency is the EUR has the following swaps in its trading book:

- 3 against 6 months EUR basis swap with a face value of EUR 10 million, a time to maturity of 8 years and a current positive market value of EUR 30,000; the counterparty is an OECD bank.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.2 \times \text{EUR} (30,000) = \text{EUR } 480$$

Since the interest-rate adjustment period does not exceed 6 months, the markup against the potential future default risk is not applicable in this case.

- EUR coupon swap with a face value of EUR 10 million, a time to maturity of 7 years and a current positive market value of EUR 25,000; the counterparty is a corporate body.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.5 \times \text{EUR} (25,000 + 0.015 \times 10 \text{ m}) = \text{EUR } 7,000$$

- USD/JPY cross currency swap with face values USD 10 million and JPY 1,250 million, a time to maturity of 10 years and a current positive market value of USD 1.55 million; the counterparty is an OECD bank. The credit institution receives USD while effecting payments in JPY.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.2 \times \text{USD} (1.55 \text{ m} + 0.075 \times 10 \text{ m}) = \text{USD } 36,800$$

Note

The replacement cost to be borne by the credit institution depends on the interest-rate changes and the exchange rate USD/JPY. Therefore, the highest percentage rate of all risk categories must be used to calculate the markup factor. In the present case this would be the percentage rate against the exchange-rate risk rather than the percentage rate against the interest-rate risk.

OTC derivatives/ options

A credit institution, whose domestic currency is the EUR, has the following OTC options in its trading book:

- A long position in 2,000 calls on the stock A with a current option price of EUR 64.23, a time to maturity of 6.7 months and a current price of the underlying of EUR 854; the counterparty is a non-OECD bank.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.5 \times \text{EUR} (64.23 \times 2,000 + 0.06 \times 854 \times 2,000) = \text{EUR } 9,237.6$$

Even though the risk weighting of a non-OECD bank is 100%, in this case the applicable risk weighting is 50% because pursuant to the Austrian Banking Act⁴ the maximum risk weight for off-balance sheet transactions is 50%.

⁴ § 22 para 2 No 3 Banking Act

- A short position in 1,000 puts on the stock B with a current option price of EUR 54,24, a time to maturity of 7 months and a current price of the underlying of EUR 954; the counterparty is an OECD bank.

Regulatory capital requirement against the default risk:

No capital backing against the default risk is required, because short positions in options involve no credit risk.

- A long position in a call on a USD bond with a face value of USD 1 million, a current option price of USD 79,800, a time to maturity of 1.3 years and a current price of the underlying of 102.84; the counterparty is an OECD bank.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.2 \times \text{USD} (79,800 + 0.05 \times 1,028.400) = \text{USD} 2,099.52$$

Note

The replacement cost to be borne by the credit institution depends on the change in interest rates and the exchange rate USD/EUR. Therefore, the highest percentage rate of all risk categories must be used to calculate the markup factor. In the present case this would be the percentage rate against the exchange-rate risk rather than the percentage rate against the interest-rate risk.

- A long position in a put on a USD/JPY option with a face value of USD 1 million, a current option price of USD 98,500, a time to maturity of 6 months and a current price of the underlying of JPY/USD 119; the counterparty is an OECD bank.

Regulatory capital requirement against the default risk:

$$0.08 \times 0.2 \times \text{USD} (98,500 + 0.01 \times 1 \text{ m}) = \text{USD} 1,736$$

Note

The replacement cost to be borne by the credit institution depends on the change in interest rates and the exchange rate USD/JPY. Therefore, the highest percentage rate of all risk categories must be used to calculate the markup factor. In the present case this would be the percentage rate against the exchange-rate risk rather than the percentage rate against the interest-rate risk.

3 Bibliography

Council Directive 89/647/EEC of 18 December 1989 on a solvency ratio for credit institutions, Official Journal L 386, 30/12/1989 (solvency ratio Directive)

Council Directive 93/6/EEC of 15 March 1993 on the capital adequacy of investment firms and credit institutions, Official Journal L 141, 11/06/1993 (capital adequacy Directive)

Provisions of the Austrian Banking Act as amended by Federal Law Gazette No. 753/1996 and No.757/1996

Bundesaufsichtsamt für das Kreditwesen (1997): *Principle I of October 29, 1997* (implementation of the capital adequacy Directive in Germany)

Schulte-Mattler H. and Traber U. (1995): *Marktrisiko und Eigenkapital*, Gabler Verlag